Committee for the Environment

Report on the Committee's Inquiry into Wind Energy Volume 6

Other papers submitted to the Committee relating to the report

Ordered by the Committee for the Environment to be printed 29 January 2015

Mandate 2011/16 **Seventh Report - NIA 226/11-16**

Membership and Powers

The Committee for the Environment is a Statutory Departmental Committee established in accordance with paragraphs 8 and 9 of the Belfast Agreement, section 29 of the Northern Ireland Act 1998 and under Standing Order 48.

The Committee has power to:

- Consider and advise on Departmental budgets and annual plans in the context of the overall budget allocation;
- Consider relevant secondary legislation and take the Committee stage of primary legislation;
- Call for persons and papers;
- Initiate inquires and make reports; and
- Consider and advise on any matters brought to the Committee by the Minister of the Environment

The Committee has 11 members including a Chairperson and Deputy Chairperson and a quorum of 5. The membership of the Committee since 9 May 2011 has been as follows:

Ms Anna Lo MBE (Chairperson)
Ms Pam Cameron (Deputy Chairperson)[1]
Mr Cathal Boylan
Mr Colum Eastwood[2]
Mrs Sandra Overend[3, 4]
Mr Alban Maginness[5, 6]
Mr Ian McCrea[7, 8, 9, 10]
Mr Barry McElduff[11, 12]
Mr Ian Milne[13, 14]
Lord Morrow
Mr Peter Weir

1 With effect from 10 September 2013 Ms Pam Cameron replaced Mr Simon Hamilton as Deputy Chairperson
2 With effect from 18 June 2012 Mr Colum Eastwood replaced Mr John Dallat
3 With effect from 23 April 2012 Mr Tom Elliott replaced Mr Danny Kinahan
4 With effect from 04 July 2014 Mrs Sandra Overend replaced Mr Tom Elliott
5 With effect from 23 April 2012 Mrs Dolores Kelly replaced Mr Patsy McGlone
6 With effect from 07 October 2013 Mr Alban Maginness replaced Mrs Dolores Kelly
7 With effect from 20 February 2012 Mr Gregory Campbell replaced Ms Paula Bradley
8 With effect from 01 October 2012 Mr Alastair Ross replaced Mr Gregory Campbell
9 With effect from 07 May 2013 Mr Sydney Anderson replaced Mr Alastair Ross
10 With effect from 16 September 2013 Mr Ian McCrea replaced Mr Sydney Anderson
11 With effect from 08 May 2012 Mr Chris Hazzard replaced Mr Willie Clarke
12 With effect from 10 September 2012 Mr Barry McElduff replaced Mr Chris Hazzard
13 With effect from 07 April 2013 Mr Francie Molloy resigned as a Member
14 With effect from 15 April 2013 Mr Ian Milne replaced Mr Francie Molloy

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List of abbreviations

The Minister	The Minister for the Environment
The Department	Department of the Environment
AM	Amplitude Modulation
AONB	Area of Outstanding Natural Beauty
CIEH	Chartered Institute of Environmental Health
DETI	Department of Enterprise, Trade and Investment
DOE	Department of the Environment
EIA	Environmental Impact Assessment
ETSU	Energy Technology Support Unit
EU	European Union
HSENI	Health and Safety Executive Northern Ireland
MW	Megawatt
NIAPA	Northern Ireland Agricultural Producers Association
NIE	Northern Ireland Electricity
NIRIG	Northern Ireland Renewables Industry Group
NREAP	National Renewable Energy Action Plans
PAD	Pre-application Discussion
PfG	Programme for Government
PHA	Public Health Agency
PPS	Planning Policy Statement
QUB	Queen's University Belfast
RES	Renewable Energy Systems
SPPS	Single Planning Policy Statement
ToR	Terms of Reference
UFU	Ulster Farmer's Union
UU	University of Ulster

Northern Ireland Assembly

Appendix 7

Other Papers

List of Other Papers

Papers relating to the Review

1. Department letter re Planning Policy Statement 18
2. Department reply re request for information re Wind Turbine Applications
3. Windwatch briefing paper from informal meeting
4. Department reply to issues raised by Windwatch
5. Fermanagh Trust research Report on Community Engagement
6. Windwatch briefing paper on 27th June 2013
7. Omagh and Strabane District Councils briefing paper on 27th June 2013
8. Department reply to issues raised by Omagh and Strabane District Councils
9. DARD letter to Committee re Wind Energy
10. Emails from West Tyrone Against Wind Turbines
11. Letter from ORRA Action Group
12. Omagh and Strabane District Councils response to Committee
13. NIRIG briefing paper on 12th September 2013
14. NIRIG briefing note on Wind Turbine Noise on 12th September 2013
15. NIRIG follow up information from briefing on 12th September 2013
16. NIRIG response re correspondence from Windwatch
17. DETI response to written evidence from Omagh and Strabane District Councils
18. Wind Energy Review submission – Mr John Wilson
19. Wind Energy Review submission – Mr Ralph Erskine
20. Wind Energy Review submission – Prof Geraint Ellis
21. Wind energy review submission – SSE Renewables

Papers relating to the Inquiry

22. Action Renewables report – Communities & Renewable energy: A Study
23. Association for Public Service Excellence presentations
24. Letter from Omagh District Council re draft guidance on community benefits
25. SSE Airtricity re NI Community Fund
26. Simple Power
27. NIFPO Ltd letter re potential impact of proposed Offshore Wind Farm Development on NI Fishing Industry
28. Follow up from the Chartered Institute of Environmental Health
29. Report from Specialist Advisor Ursula Walsh

30. Report: 'Wind Turbines in Denmark' – Danish Energy Agency
31. NIRIG briefing paper 23rd October 2014
32. Windwatch – Comments on UU survey 'Living with wind turbines'
33. Windwatch – 20 questions for the wind industry
34. Windwatch – briefing paper by Prof. Alun Evans
35. Windwatch – briefing paper Pat Swords
36. NIRIG follow up letter from briefing on 23rd October 2014

Department letter re Planning Policy Statement 18

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Email: privateoffice.assemblyunit@doeni.gov.uk
Your reference: Our reference: CQ/183/12

Mrs Alex McGarel
Clerk to the Environment Committee
Northern Ireland Assembly
Parliament Buildings
Ballymiscaw
Stormont
Belfast BT4 3XX

Date: 4 July 2012

Dear Alex,

Following their meeting on 7 June 2012, where the Committee considered the Departmental reply re NI Water and wind turbine planning applications, the Committee commented as follows:

The Committee feels that the Department needs to review its approach to achieving a balance between the desire for renewable energy and the objections of local residents.

Members would like to know what mechanisms the Department uses for engaging with the general public to avoid issuing conflicting messages on this issue. Members would also like to know if the Department considers the cumulative impact of wind turbines and if there is a 'saturation point' at which the Department will step in to protect against over development. The Department acknowledges that a balance is required in achieving renewable energy targets and ensuring the proposal will not have an unacceptable adverse impact on interests of acknowledged importance. DOE Planning is committed to working to ensure that the renewable energy targets are achieved in a way that respects local and environmental considerations.

The aim of Planning Policy Statement 18 (Renewable Energy) is to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment in order to achieve Northern Ireland's renewable energy targets and to realise the benefits of renewable energy. Notwithstanding the promotive nature of the policy, it also recognises the need for a balanced approach as proposals must also meet 5 policy criteria to ensure that the development will not result in an unacceptable adverse impact on:

(a) public safety, human health, or residential amenity;

(b) visual amenity and landscape character;

(c) biodiversity, nature conservation or built heritage interests;

(d) local natural resources, such as air quality or water quality; and

(e) public access to the countryside.

In terms of engaging with the general public, all planning applications are advertised in the local press and are available for viewing on the Planning website. Adjacent neighbours are also notified of the proposal. The general public therefore have the opportunity to consider the proposal and to comment on it accordingly.

DOE Planning also carry out substantial consultations with a number of consultees when processing renewable energy applications including where there is a potential impact on communication and radio links to ensure there are no unacceptable impacts. The Department takes all comments received into account before reaching a balanced judgement on the planning application.

On the issue of cumulative impact, Policy RE1 of PPS18 requires that any proposed renewable energy development takes into consideration the cumulative impact of existing wind turbines, those which have permissions and those that are currently the subject of valid but undetermined applications. In order to assist with the cumulative impact assessment, the Department, as part of the quarterly statistics bulletin, also produce a map of all approved wind turbines/ wind farms for the relevant quarter. This information is monitored by the Department on an ongoing basis. The matter of Renewable Energy is also a standing item at Internal Management meetings with senior staff which ensures there is a consistent approach to interpreting and operating policy.

Although the policy does not refer to a 'saturation point', the Department considers that the material question is whether the proposal would individually or cumulatively have an unacceptable detrimental effect on the locality generally, and on amenities that ought, in the public interest, to be protected.

I trust this information is of assistance, should you require anything further please contact me directly.

Yours sincerely,

Helen Richmond

DALO
[by e-mail]

Department of the Environment
www.doeni.gov.uk

Planning and Environmental Policy Group

Best Practice Guidance to

Planning Policy Statement 18 'Renewable Energy'

August 2009

Department of the
Environment
www.doeni.gov.uk

Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy'

Planning Policy Statement 18 'Renewable Energy' (PPS18) sets out the Department's planning policy for development that generates energy from renewable resources and that requires the submission of a planning application.

The information contained in this guide should be read in conjunction with PPS 18.

Planning and Environmental Policy Group
Calvert House
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BELFAST
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August 2009

Contents

Preamble

This guide provides background information on the various renewable energy technologies that may come forward in Northern Ireland and is designed to contribute to the development management process. It has been drawn up taking account of similar material available for other parts of the UK and the Republic of Ireland. This includes:

- Scottish Executive Planning Advice Note 45, Renewable Energy Technologies (2002);
- the technical annex to the Companion Guide to Planning Policy Statement 22 issued by the Office of the Deputy Prime Minister (2004);
- Planning Policy Wales, Technical Advice Note 8: Planning for Renewable Energy (2005); and
- Wind Energy Development Guidelines, Department of the Environment, Heritage and Local Government (Ireland) (2006).

The advice and guidance contained within this guide should be read in conjunction with Planning Policy Statement 18 ‘Renewable Energy’ which sets out the Department’s planning policy for development that generates energy from renewable resources and that requires the submission of a planning application.

1. Wind energy

INTRODUCTION

1.1.1 This section describes the technology of wind turbines in relation to current turbine sizes (600kW-3MW) that are expected to comprise the bulk of the UK's onshore wind generated electricity provision. In most respects this information will be equally valid for both smaller wind turbines, more suited to locations with higher population densities, and the larger machines that will be developed in the coming years. Where there are differences these will be clearly noted. The section discusses only land-based turbines, although there is essentially little difference between these and machines that are installed off-shore.

1.1.2 A typical wind energy development may include the following elements:

Wind turbines	-
Wind monitoring mast	-
Transformers	Serving each turbine
Internal tracks and crane pads	Giving access to the turbines
Substation compound	Including transformers, circuit breakers and control building
Power cables	Usually underground within the site
Poles/pylons	Connecting wind energy development site to the national grid
Other associated infrastructure and development	Wind monitoring masts, site entrance, temporary contractors compound and borrow pits

TECHNOLOGY

1.2.1 There are essentially two types of wind turbine – those that have rotors that rotate about a vertical axis, and horizontal axis machines whose rotating shafts are aligned horizontally. Most wind turbines installed today are of the latter type and this is likely to remain the case for the foreseeable future. The remainder of this section refers primarily to horizontal axis machines.

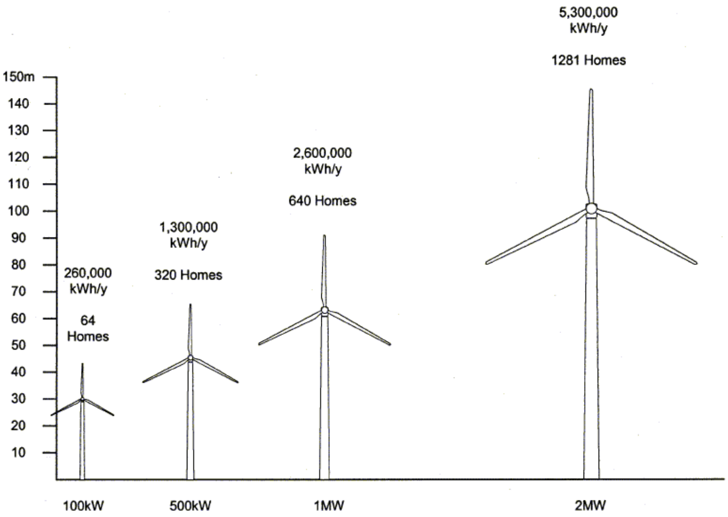
1.2.2 Whilst wind turbines are sometimes used to generate mechanical power, particularly for pumping water, this section deals only with the electricity producing variety. Such wind turbines convert the kinetic energy of the wind that passes through the swept area of the rotor into electrical energy by means of a rotor (generally comprising 3 blades), a mechanical drive train (usually including a gearbox) and an electrical generator. These are all mounted on a tower. The blades need to be far enough from the ground to minimise turbulence and to maximise the energy capture of the wind turbine. Normally solid tubular towers are used rather than lattice constructed towers.

1.2.3 Wind turbines are defined by the size (diameter) of the rotor and rated power or capacity in kW (kW) or megawatts (MW). The rated capacity of a wind turbine is a measure of the maximum output of the electricity generator which will generally be achieved in wind speeds greater than 12-15m/s at the hub height of the rotor. There are two things worth noting:

- an increase in the rotor diameter of a wind turbine will result in a greater than proportional change in rated power (see figure 1);
- an increase in wind speed will result in a greater than proportional change in rated power. Rated power is proportional to the cube of the wind speed, and hence a doubling of wind speed will result in a roughly eight-fold increase in power output.

1.2.4 Technological advances have led to a wide range of wind turbine designs. The smallest turbines, some with a rotor diameter of less than one metre, are usually used for charging batteries although recent mains-connected micro-turbines have been introduced to the market. At the other end of the scale, turbines with rotor diameters of greater than 100m are now being deployed.

Figure 1
Approximate sizes of typical three-bladed turbines by installed capacity, also showing approximate annual energy output based on an average capacity factor of 0.3, the figure for the number of homes supplied is based on the average UK household consumption of 4100 kWh/year
(OFGEM)



1.2.5 The blades are usually of a glass-fibre reinforced plastic construction. Other materials used include wood-epoxy laminates and carbon fibres. These may both become more prevalent as current wind turbine designs are scaled up. They are generally the largest single item that is transported to a wind farm during construction. Smaller turbines (less than 50kW) may use blades made of a variety of other materials such as plastics, metal or wood.

1.2.6 The blades are attached to the hub, which is in turn attached to the main shaft that drives the generator, usually but not always via a gearbox.

1.2.7 The generator, gearbox and yaw drive that turns the rotor to face the wind are the main components housed within the nacelle. For large, grid-connected turbines the rotor alignment with the oncoming wind is always controlled actively via the yaw drive and they are designed so that the blades see the wind before the tower does. Such a design is known as an upwind rotor with active yaw control. Smaller turbine designs may use upwind or downwind rotors and may use active or passive yaw control. Vertical axis machines require no yaw control by virtue of their design.

1.2.8 The nacelle is mounted on the tower, which for large grid-connected turbines is normally of a tubular steel construction. Smaller turbines (less than 50kW) may be mounted on similarly designed towers, but may equally use lattice or guyed towers. Turbines designed specifically for micro-generation may be mounted directly onto existing structures, such as roofs.

Figure 2
Main components of a wind turbine

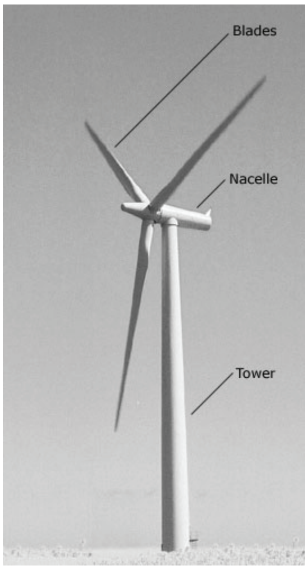


ILLUSTRATION: BWEA

1.2.9 There are a number of technical differences amongst the wind turbines that are currently available. The most obvious difference is in the number of blades. Most machines now have three blades, but there are some two-bladed machines in operation. Other than this the two most important differences are the way in which a turbine regulates its power capture above rated wind speed (pitch or stall regulation) and whether the machine operates at a fixed or variable rotor speed.

1.2.10 The turbine is controlled by its own computer system, which provides both operational and safety functions. In addition to controlling blade angle and rotor speed, a wind turbine's control system must also align the rotor with the oncoming wind. This is achieved by rotating the nacelle in relation to the tower top with a yaw gear mechanism.

1.2.11 Modern wind turbines also continuously monitor their own performance and if atypical vibrations caused by component imbalances are detected, or if connection to the local electricity grid infrastructure is lost, all turbines must be capable of emergency stops. Most modern wind turbines undergo test certification procedures, which must conform to the guidelines laid down by the International Electro-technical Commission (IEC).

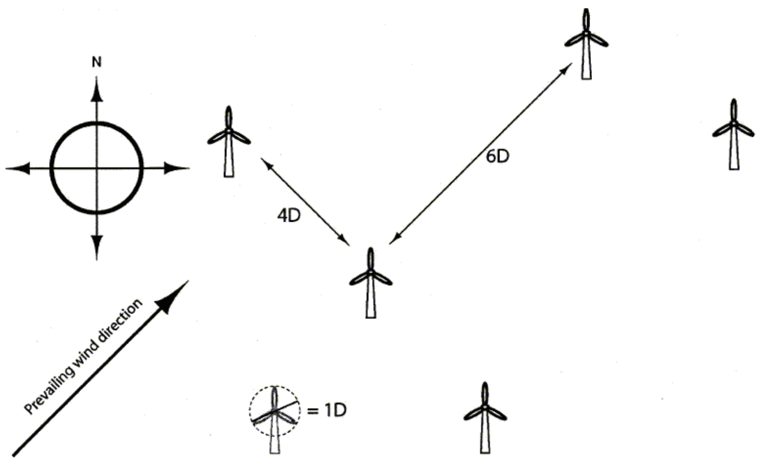
1.2.12 Wind turbines can be deployed singly, in small clusters, or in larger groups known as wind farms. Factors that may influence the size of a development include the physical nature of the site, the capacity of the local electricity distribution network and the organisation undertaking the development. It is likely that the Region's wind resource will be harnessed most satisfactorily using a mixture of these types of development.

1.2.13 The direction of rotation of the wind turbine rotors will be common across a wind farm. Wind turbines are usually semi-matt white, off white or grey in colour, often as a condition of planning permission. The colours of the blades, nacelle and towers are normally the same.

Spacing of Turbines

1.2.14 Indicatively wind turbines need to be positioned so that the distances between them are between 3-10 rotor diameters (about 180-600 metres for a wind farm using 60m diameter, 1.3MW wind turbines) depending on the individual circumstances of the site. This spacing represents a compromise between compactness, which minimises capital cost, and the need for adequate separations to lessen energy loss through wind shadowing from upstream machines. The required spacing will often be dependent on the prevailing wind direction as illustrated in Figure 3 below, which shows a possible layout for a site in Northern Ireland with a typical South Westerly prevailing wind direction.

Figure 3
Example turbine spacing in a wind farm with a South Westerly prevailing wind direction



1.2.15 All development associated with wind farm proposals, including the sweep from the turbine blades, will generally be expected to be contained within the boundary or the site curtilage, unless there is written agreement from adjoining landowners.

Other Infrastructure

1.2.16 In addition to wind turbines, the required infrastructure of a wind farm consists of adequate road/site access, temporary contractors compound, borrow pits, on site-tracks, turbine foundations, crane hard standings, one or more anemometer masts, a construction compound, electrical cabling and an electrical sub-station and control building. Some of these features are permanent and others are required only in the construction phase and as such are temporary.

1.2.17 One or more anemometer masts may be required on-site. These are usually slender structures with guy supports, built to the hub height of the turbines, with anemometers and wind vanes mounted at different heights. Permanent anemometer masts may be supported by a lattice tower. Anemometer masts are needed as part of the project planning and design process but they are also needed post-construction in order to provide control information.

1.2.18 A construction compound will generally be specified in the proposal. While this is of a temporary nature, its location should be identified with the planning application.

1.2.19 The road access to a wind farm site will need to be able to accommodate trailers carrying the longest loads (usually the blades), as well as the heaviest and widest loads (generally the cranes required in erection). Amendments to existing roads required to gain access to site should be detailed in any wind farm planning application.

1.2.20 On-site tracks need to meet the weight and dimensional requirements detailed above. There will be an operational requirement for decommissioning and to gain access to the site for routine maintenance with light vehicles, as well as to reach the site with loads potentially as large as those initially used (as in the case of a major component failure).

1.2.21 Larger hard standings are also required next to each turbine to act as bases for cranes during turbine erection and component lay down areas. These hard standing should be constructed and finished in an appropriate material so as not to adversely effect the chemical composition of the surrounding soil.

1.2.22 The towers of the turbines are fixed to a concrete foundation whose surface will normally be flush with the surrounding ground. This foundation pad is likely to be square or hexagonal in shape and about 7-20 metres across. The diameter of the base of the turbine tower is likely to be 2-5 metres. The land area actually used by the turbines is therefore very small. On land where public access is allowed, people might walk right up to the base of the towers without interfering with turbine operation. On land normally used for agricultural purposes, agricultural use could continue right up to the edge of the foundations.

Connection to the Electricity Grid

1.2.23 A wind farm is likely to be connected to the electricity distribution network just like any other power station. Small transformers are required to change the generating voltage (likely to be 690V) to a common site voltage which is likely to be 11kV, 33kV or 110 kV. Depending on the model of turbine used, these transformers can either be housed outside or within the turbine tower. The output from the turbines in a wind farm is normally connected to a single point via underground cables.

1.2.24 Responsibility for the routing of electrical cabling onwards from the sub-station to the nearest suitable point of the local electricity distribution network is the responsibility of the District Network Operator, presently NIE (Northern Ireland Electricity). This will be achieved either by a standard 3-wire system mounted on wooden poles or by lines laid underground. It should be noted, however, that laying high voltage cables underground is much more expensive (around 6-20 times greater) than pole-mounted overhead systems and would be likely to be used only for limited lengths and/or in special circumstances. Whilst the routing of such lines by NIE is usually dealt with separate to the planning application for the wind farm, developers will generally be expected to provide indicative details of likely routes and the anticipated method of connection (over ground or underground).

Operation and Maintenance

1.2.25 A wind farm is often equipped with a central monitoring system. This consists of a computer that supervises the operation of the farm and can communicate with a remote headquarters. Wind farms are likely to be un-manned, and their operational status regularly checked through the central monitoring system and remote link. Such a checking system may be housed in a small building somewhere on a wind farm site or may quite normally be combined with the sub-station. Remote links will require associated equipment in order to allow communication to take place, for example an aerial or dish.

Wind Resource

1.2.26 The energy produced by a wind turbine depends on the strength of the wind to which it is exposed. The simplest indicator of the wind resource available at a given location is the annual mean wind speed at the site (usually given at the hub height of the turbine). A machine located on a site which has an annual mean wind speed of 6 metres per second will typically produce only half as much energy as the same machine on a site where the annual wind speed is 8 metres per second.

1.2.27 For any given location the wind speed rises with elevation above the ground due to wind shear. The degree of wind shear (the rate at which the wind speed increases when moving vertically away from the ground) is dependent on the surrounding ground conditions; the higher the surrounding obstructions (e.g. vegetation or buildings) the greater the wind shear produced. Due to this, raising the hub height of the turbines, by mounting them on taller towers, can increase the energy capture at any given site. Current hub heights available to developers are between 50-125m.

1.2.28 As well as affecting the wind shear, surrounding obstacles such as woodlands and buildings will increase the turbulence in the wind. Higher turbulence levels in the wind adversely affect wind turbine performance and life expectancy and, as such, developers will look to position turbines as far away from obstacles as is practicable. Again, the use of taller towers can ameliorate this effect by placing the rotor in less disturbed air.

1.2.29 Assessing whether a particular site will harness wind power satisfactorily entails using historical meteorological data (available from the Meteorological Office) and information derived from anemometers placed on site. Anemometer masts are normally required on a site for at least 12 months; the longer measurements are taken the better the predictions will be. The measurements from the anemometers help to determine whether or not a candidate site is suitable and, if it is, the measurements help to determine the best position for the wind turbines within the site's boundary. The masts should be approximately as tall as the hub height of the planned turbine. However, often when the mast is erected it is not known either if the site is suitable for wind farming or which turbine type would be most suitable. Masts are usually 25-80m tall. Planning permission is required to erect a temporary anemometer mast.

1.2.30 The mean wind speed at hub height (along with the statistical distribution of predicted wind speeds about this mean and the wind turbines used) will determine the energy captured at a site. The simplest way of expressing the energy capture at a site is by use of the Capacity Factor.

1.2.31 This can be expressed alternatively as the actual energy generated by a wind turbine over the course of 1 year divided by the energy that would have been generated by a wind turbine over the course of 1 year had the wind been consistently blowing at speeds between rated and cut-out (typically 12-25m/s). Capacity factors in the UK may generally fall anywhere between 0.2 and 0.5, with 0.3 being typical in the UK.

PLANNING ISSUES

General

1.3.1 While the Department is reviewing permitted development for small scale renewable energy development for both domestic and non-domestic premises, all development involving wind turbines currently requires planning permission under the Planning (Northern Ireland) (Order) 1991.

1.3.2 The successful development of wind energy always entails detailed consideration of a wide range of factors and the developer will often need to provide information on some if not all of the following matters:

- Local environmental impacts including noise, shadow flicker, electromagnetic interference, etc;
- Overall economic and social benefits attributed to the scheme;
- Potential impact of the project on nature conservation, to include direct and indirect effects on protected sites, on habitats and species of ecological sensitivity and biodiversity value and, where necessary, management plans to deal with the satisfactory co-existence of the wind energy development and the particular species/habitat identified;
- Potential impact of the project on the built heritage including archaeology;
- Potential impact on ground conditions, including peat stability;
- Potential impact on site drainage, sedimentation of water bodies and other hydrological effects, such as impact on water supply and quality and watercourse crossings;
- Size, scale and layout and the degree to which the wind energy project is visible over certain areas;
- Landscape character and visual impact issues including ancillary development, such as access roads;
- Adequacy of local access road network to facilitate construction of the project and transportation of large machinery and turbine parts to site;
- Information on any cumulative effects due to other projects, including effects on natural heritage and visual effects and potential cumulative noise impact;
- Information on the location of borrow pits proposed and an indication as to the quarries to be used during the construction phase and associated remedial works thereafter;
- Temporary and/or permanent storage, disposal or elimination of waste/surplus material from construction/site clearance, particularly significant for peatland sites; and
- Decommissioning considerations.

1.3.3 Although in the past most windfarm development tended to be located in upland areas due to higher wind speeds, technological advances, and changes to the renewable electricity markets have resulted in wind speed being less pivotal in the site selection process. Generally, whether there is a reasonable prospect of obtaining planning permission is becoming a much more dominant factor in the initial site selection process.

1.3.4 The planning system exists to regulate the development and use of land in the public interest. The material question is whether the proposal would have an unacceptable detrimental effect on the locality generally, and on amenities that ought, in the public interest, to be protected. Each planning application will be considered on its own merits, and the argument that granting permission might lead to another application will not be sufficient grounds for refusal.

Specific Issues

1.3.5 There are a number of issues specific to wind turbine developments that need to be considered when determining an application for planning permission. Where Environmental Impact Assessment (EIA) is deemed necessary (see paragraph 1.4.4) the potential issues should be covered in the Environmental Statement but, for smaller developments that do not require a full EIA, the Department will often still require some or all of the issues to be addressed through an environmental report to accompany the planning application. The information required will depend on the individual circumstances of the case and the applicant should enter into pre-application discussions with the local divisional planning office.

Nature Conservation

1.3.6 Planning Policy Statement 2 Planning and Nature Conservation sets out the Department's current planning policies on nature conservation that are taken into account when considering any development of land. As the development of a wind farm is a civil engineering project, there can be potentially serious implications for biodiversity. The major ecological impacts are most likely to be associated with site infrastructure rather than the turbines themselves – other than the impact of the moving blades upon birds and bats, and the advice contained in PPS 2 should cover all aspects of the development. With such extensive application sites there should often be opportunities for developers to mitigate for any potential ecological damage and preferably enhance current wildlife habitats.

1.3.7 Beyond designated sites and peatland habitats the impact of a wind farm on local nature conservation interests should be minimal. A typical wind farm will usually leave the land between the turbines unaffected. There is little evidence that domesticated or wild animals will be affected by a wind farm – indeed, there are examples of cows and sheep grazing right up to the base of turbines.

1.3.8 Applications to harness wind energy may be made in Sites of International Nature Conservation Importance, and such applications will be subject to the most rigorous examination. Developers should also note that applications which have the potential to significantly effect any such site as a matter of policy will be subject to an Appropriate Assessment[1].

1.3.9 Experience indicates that bird species and their habitats are rarely affected by wind turbine developments and the impact of an appropriately designed and located wind farm on the local bird life should, in many cases, be minimal. To date, the most common concern has been the risk of 'bird strike' i.e. birds flying through the area swept by the blades and being hit, causing injury or death. This is most likely to occur if a wind turbine is erected directly in a migration path, where there are high concentrations of particular species (i.e. birds feeding), or where there are vulnerable species. Most birds in flight can be expected to take action to avoid obstacles but different species will vary in their reaction and manoeuvrability. Most evidence to date suggests that the risk of collision is minimal. However, some areas are important for a variety of bird species protected under the EU and UK legislation (SPAs, SACs and ASSIs). These could represent potential constraints to wind farm development. As indicated in PPS 2 on nature conservation, the importance of complying with international and national conservation obligations must be recognised and wind farms should not adversely affect the integrity of designated sites. Protected species, such as hen harriers, occupy many areas outside designated sites and are protected across Northern Ireland. These factors have to be considered against the positioning and size of turbines, including the size of the area swept by the blades in relation to the air space used by the birds in the vicinity of the development.

1.3.10 Early consultation between the developer and the Northern Ireland Environment Agency (NIEA) and RSPB is recommended. Most sites will require an assessment of breeding birds (between late March and early June) and wintering birds (September to March). Others, where potential ornithological sensitivities are higher, may require substantially more survey work, including studies of wintering/passage birds, raptors and moorland birds and detailed observations to quantify bird flight activity across the site.

1.3.11 Among the other potential impacts to birds, loss of habitat, the deposition of spoil or hazardous substances from construction and operation, scrub and hedgerow removal should also be assessed.

[1] Regulation 43, Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995

“The risks of disturbance to bird species during construction and operation of the wind farm is also an important consideration. For some species this is of greater potential significance than collision mortality. Scottish Natural Heritage, in consultation with the British Wind Energy Association (BWEA), is preparing a ‘Methodology for assessing the effect of wind farms on ornithological interests’. Whilst this publication tackles the situation in Scotland it is equally relevant to England. In addition, the DTI’s Renewable Energy Programme has published a report ‘Cumulative effects of wind turbines’ in which Section 3 deals with ‘Cumulative effects on birds’. Both will be of use to developers when assessing the potential impact of proposed developments on bird life. Royal Society for the Protection of Birds (RSPB), World Wildlife Fund (WWF), English Nature and BWEA have also published ‘Wind Farm Development and Nature Conservation’. Another useful source of information is ‘Windfarms and Birds: An analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues.”

RHW Langston & JD Pullan (2003). BirdLife International on behalf of the Berne Convention.

1.3.12 The impact of the moving blades of a wind turbine upon bats and their ultrasound has also on occasion been raised as a concern, but there is little evidence to date to suggest that significant numbers of deaths or injuries will occur. Early consultation between the developer and NIEA and the Bat Conservation Trust is recommended. Some sites may require the submission of a bat survey to assess the use of the site.

1.3.13 In addition, under the EC Habitats Directive, other species or habitats of special interest may be present. For example, active peatland is of particular importance to the Region for its biodiversity, water and carbon storage and can be adversely affected by wind farm development. In general such areas should be avoided and where possible, encourage the restoration of degraded areas.

1.3.14 The main potential impacts on habitats that can result in the reduction, or loss, of biodiversity are:

- Direct loss of habitat to the developments’ infrastructure, including turbine foundations, crane pads, buildings, roads, quarries and borrow pits;
- Degradation of habitats through alteration or disturbance, in particular arising from changes to hydrology that may alter the surface or groundwater flows and levels, and drainage patterns critical in peatlands and river headwaters and increase the risk of bog burst;
- Fragmentation of habitats and increased edge effects;
- Changes to land management brought about by improved access; and

- Degradation and loss of habitats outside the development site, especially wetland habitats that may arise from pollution, siltation and erosion originating from within the development site.

1.3.15 Developers should ensure that their ecological advisers enter into early discussions with NIEA about the presence and importance of species and habitats in and around a proposed development site. Discussions should assess any potential impacts and the scope for mitigation in the design and layout. A Habitat Survey could usefully inform these discussions. In addition discussions with locally based groups such as the Ulster Wildlife Trust or RSPB could benefit the ecological assessment procedure.

Landscape and Visual Impact

1.3.16 In order to minimise wind speed variations, commercial wind energy developments need to be located in areas of relatively smooth and rounded relief. They also require ready access to the electricity transmission and distribution system unless they are intended solely for private use. The current generation of turbines is capable of operating at lower wind speeds than previously due to the marketing regime and wind turbine size increases, which has the effect of increasing the types of areas (and landscapes) that may attract developer interest.

1.3.17 There are a number of publications that can assist planners, developers and other professionals in addressing landscape issues. These include the Landscape Institute publication Guidelines for Landscape and Visual Impact Assessment 2nd edition, 2002 (currently under review); Scottish Natural Heritage (2001) Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes; and Scottish Natural Heritage (2005) Guidance: Cumulative Effect of Windfarms, Version 2.

1.3.18 Northern Ireland has a variety of landscapes as identified in the Northern Ireland Landscape Character Assessment, 2000. Some will be able to accommodate wind farms more easily than others, on account of their landform and relief and ability to limit visibility. Some are highly valued for their quality. There are no landscapes into which a wind farm will not introduce a new and distinctive feature. Given the Government's commitment to addressing the important issue of climate change and the contribution expected from renewable energy developments, particularly wind farms, it is important for society at large to accept them as a feature of many areas of the Region for the foreseeable future.

1.3.19 This is not to suggest that areas valued for their particular landscape and/or nature conservation interest will have to be sacrificed. Nor that elsewhere, attempts to lessen the impacts by integrating the development into the surrounding landscape would not be worthwhile. On the contrary, it emphasises the need for account to be taken of regional and local landscape considerations. Careful consideration is required to locate the development and even though highly visible, every effort should be made to reduce the impact and aid integration into the local landscape.

1.3.20 The landscape and visual impact of wind turbines is influenced by:
- land form;
- landscape character and features;
- number, size and layout of turbines, and their inter-relationship;
- how the turbines relate to the skyline
- design and colour;
- visual receptors;
- access tracks; and
- ancillary components like power lines and substations.

In addition it is acknowledged that the construction and transportation of turbines will have an impact on the local landscape.

1.3.21 The capacity of the landscape to accommodate wind farm development depends on three considerations:
- the degree of impact the development will have on the existing character of the landscape;
- the sensitivity of the character of the landscape; and
- the extent to which this impact can be modified and reduced by design.

However it will not necessarily be the case that the extent of visual impact or visibility of wind farm development will give rise to negative effects; wind farm developments are by their nature highly visible yet this in itself should not preclude them as acceptable features in the landscape.

1.3.22 The ability of the landscape to absorb development depends on careful siting, the skill of the designer, and the inherent characteristics of the landscape such as landform, ridges, hills, valleys, and vegetation.

1.3.23 A cautious approach is necessary in relation to those landscapes which are of designated significant value, such as Areas of Outstanding Natural Beauty, and the Giant's Causeway World Heritage Site, and their wider settings. Here, it may be difficult to accommodate wind turbines without detriment to the Region's cultural and natural heritage assets.

1.3.24 The document 'Wind Energy Development in Northern Ireland's Landscapes', published by the Northern Ireland Environment Agency identifies landscape characteristics that may be sensitive to wind turbine development. This document provides supplementary planning guidance on the landscape and visual analysis process, and the indicative type of development that may be appropriate. While the SPG will be taken into account in assessing all wind turbine proposals it is not intended to be prescriptive.

Visual Impact

1.3.25 Turbines in wind farms will normally be tall, frequently located in open land, and therefore will often be highly visible. Domestic turbines will be smaller (generally less than 15m). It will normally be unrealistic to seek to conceal them. Developers should seek to ensure that through good siting and design, landscape and visual impacts are limited and appropriate to the location. The visual impact will be dependent on the distance over which a wind farm may be viewed, whether the turbines can be viewed adjacent to other features, different weather conditions, the scale and layout of the development and the landscape and nature of the visibility. The following is a general guide to the effect which distance has on the perception of the development in an open landscape.

General Perception of a Wind Farm in an Open Landscape:

Up to 2kms	Likely to be a prominent feature
2-5kms	Relatively prominent
5-15kms	Prominent in clear visibility - seen as part of the wider landscape
15-30kms	Only seen in very clear visibility - a minor element in the landscape.

1.3.26 The visual impact of wind farms will be affected by their siting and layout in relation to local land form and landscape characteristics, and the qualities of the specific site, as well as by the number and arrangement of turbines. Different layouts will be appropriate in different circumstances. For example, grouped turbines can normally appear acceptable as a single, isolated feature in an open, undeveloped landscape, while rows of turbines may be more appropriate in a flatter agricultural landscape with formal field boundaries. Although wind farms may be complex, they should not appear confusing in relation to the character of the landscape. Ideally they should be separate from surrounding features to create a simple image. The design of each development must be appropriate to its site. The study commissioned by NIEA (ref. paragraph 1.3.24) will consider this matter in more detail.

1.3.27 The style and colour of turbines can also be relevant. Experience suggests that solid towers appear less complex than lattice and tapering towers are generally regarded as being more elegant than cylindrical. In terms of colour, white or off-white is generally preferred, but other colours may be acceptable in appropriate circumstances. A semi-matt or matt non reflective finish is required to reduce the reflection of light. However, colour choice can not be a substitute for good siting and design.

Ancillary development

1.3.28 Ancillary elements also need to be fully addressed, as their impact can often be significant. Access tracks should be routed and designed to

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minimise both visual and habitat impacts. This can be minimised by careful route selection, which takes account of layout and appropriate surfacing material together with the impact of cuttings, embankments and drainage channels. Managing problems of erosion and providing for reinstatement of vegetation along the track is essential. Fencing, buildings and anemometer masts should be located and designed in a way which minimises clutter. It should be noted that peat is very slow at reinstatement and may require active management, e.g. brashings from nearby habitat, to limit the visual impact and erosion potential. The location and extent of the use of any borrow pit should also be indicated in the visual assessment.

1.3.29 The impact of the transportation of components to site on the minor road network and on the associated trees and hedges should be assessed e.g. transportation may involve lorries up to 45 metres in length requiring large turning circles.

1.3.30 Power lines connecting the individual turbines to the on-site substation will be underground. To avoid visual confusion, routing and design of power lines, connecting the wind farm substation to the electricity distribution system, will require sensitive treatment.

Visual Assessment

1.3.31 There are a number of techniques which may be used to inform visual assessment of a proposed development:

- a **zone of theoretical visibility map** will show where a wind farm may be seen from;
- **viewpoint analysis** based on key viewpoints throughout the surrounding area;
- computer generated **wireline diagrams** will indicate how wind turbines will appear from specific viewpoints; and
- **photo- and video montages** are images whereby an impression of a proposed development is superimposed upon an actual photograph or video of the proposed site.

All of these have strengths and limitations.

1.3.32 In comparison with other, well-established, forms of development in the countryside, wind turbines are relatively unfamiliar, prominently vertical and have the significant characteristic of movement. Individually or in groups, they will be distinctive features in the landscape. The visual impact of wind turbines must be assessed with these characteristics clearly in mind.

Cumulative Landscape and Visual Impacts

1.3.33 The cumulative impact of a number of neighbouring developments is an important material consideration. The nature and character of the location, and the landscape in which a development is located, will in part determine the acceptability or otherwise of siting proposals in proximity to each other.

1.3.34 A number of factors have influenced the current geographic distribution of wind farm proposals in Northern Ireland, for example:
- the distribution of the viable wind resource;
- technical and economic constraints to the viability of exploiting different wind speeds;
- electricity grid access constraints;
- protected areas; and
- planning policy.

1.3.35 These have tended to focus developments in a relatively limited number of areas. With increasing numbers of existing and proposed wind energy developments it is necessary to address the cumulative impacts on the landscape with reference to the context that probability of cumulative impacts is increased by existing renewable energy targets and hence greater demand for wind energy developments.

1.3.36 The cumulative effects of wind farm development can arise as the combined consequences of:
- an existing wind energy development and a proposed extension to that development;
- proposals for more than one wind energy development within an area;
- proposal(s) for new wind energy development(s) in an area with one or more existing development(s); and
- any combination of the above.

1.3.37 In assessing cumulative effects, it is unreasonable to expect these to extend beyond schemes in the vicinity that have been built, those which have permissions and those that are currently the subject of undetermined applications.

Ground Water Conditions/Geology

1.3.38 In assessing wind energy developments, the underlying geology is an important factor. Information on the following issues should be submitted as part of a planning application to enable adequate assessment of the impact of the proposed wind energy development and any mitigating measures proposed to counter the impacts:
- A geological assessment of the locality;
- A geotechnical assessment of the overburden and bedrock;
- A landslide and slope stability risk assessment for the site for all stages of the project, with proposed mitigation measures where appropriate (this should also consider the possible effects of storage of excavated material);
- An assessment of whether the development could create a bog burst or landslide hazard;
- Location of the site in relation to any area or site that has been identified as an important geological site or area and the potential impacts of the proposal on the geological resource.

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- Location of the site in relation to areas of significant mineral or aggregate potential;
- An assessment of any potential impacts of the development on groundwater; and
- Details of any borrow-pits proposed on site should be shown on the planning application and details given where blasting is proposed, such as on the avoidance and remediation of land slippage (if so are there any impacts discussed or mitigation methods proposed).

1.3.39 In order to ensure that the above issues have been fully addressed, a developer should consult with the Geological Survey of Northern Ireland and obtain professional advice/source reports from suitably qualified geotechnical engineers, engineering geologists or geologists as appropriate. If upland sites are proposed, the application should be accompanied by a statement from a geologist, a hydro-geologist or an engineer with expertise in soil mechanics.

Archaeology and the Built Heritage

1.3.40 Planning Policy Statement 6 Planning, Archaeology and the Built Heritage sets out planning policy for the protection and conservation of archaeological remains and features of the built heritage.

1.3.41 The potential impact of the proposed wind energy development on the archaeological heritage of the site should be assessed. The assessment should address direct impacts on the integrity, visual amenity, and setting of individual sites and monuments or any location designated as an Area of Significant Archaeological Interest. It should also detail appropriate mitigation measures, such as through a desktop study and a field inspection where necessary.

1.3.42 In addition, an assessment should be made on the potential impact of the proposed wind energy development on the wider built heritage of the locality and its landscape context, where relevant. This is particularly necessary in the case of structures impacting on Listed Buildings; Historic Parks, Gardens and Demesnes; Conservation Areas; and Areas of Townscape Character.

Noise

1.3.43 Well designed wind farms should be located so that increases in ambient noise levels around noise-sensitive developments are kept to acceptable levels with relation to existing background noise. This will normally be achieved through good design of the turbines and through allowing sufficient distance between the turbines and any existing noise-sensitive development so that noise from the turbines will not normally be significant. As a matter of best practice for wind farm development, the Department will generally apply a separation distance of 10 times rotor diameter to occupied property (with a minimum distance of not less than 500m). In applying this separation distance, any significant impact on sensitive noise receptors should be minimised, particularly with the increasing number of proposals for turbines in excess of 100 metres in height. Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be masked by wind-generated background noise. Table 1 below indicates the noise generated by wind turbines, compared with other every-day activities.

Table 1
Noise generated by wind turbines compared with other everyday activities

Source / Activity	Indicative noise level dB(A)
Threshold of pain	140
Jet aircraft at 250m	105
Pneumatic drill at 7m	95
Truck at 30mph at 100m	65
Busy general office	60
Car at 40mph at 100m	55
Wind farm at 350m	**35-45**
Quiet bedroom	35
Rural night-time background	20-40
Threshold of hearing	0

1.3.44 There are two quite distinct types of noise source within a wind turbine. The mechanical noise produced by the gearbox, generator and other parts of the drive train; and the aerodynamic noise produced by the passage of the blades through the air. Since the early 1990s there has been a significant reduction in the mechanical noise generated by wind turbines and it is now usually less than, or of a similar level to, the aerodynamic noise. Aerodynamic noise from wind turbines is generally unobtrusive – it is broad-band in nature and in this respect is similar to, for example, the noise of wind in trees.

1.3.45 Wind-generated background noise increases with wind speed, and at a faster rate than the wind turbine noise increases. Evidence suggests that the difference between the noise of the wind farm and the background noise is liable to be greatest at wind speeds in the range of 6 – 8m/s. Varying the speed of the turbines in such conditions can, if necessary, reduce the sound output from modern turbines.

1.3.46 The report, 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97), describes a framework for the measurement of wind farm noise and gives indicative noise levels calculated to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development. The report presents the findings of a cross-interest Noise Working Group and makes a series of recommendations that can be regarded as relevant guidance on good practice. This methodology overcomes some of the disadvantages of BS 4142 when assessing the noise effects of windfarms, and should be used in the assessment and rating noise from wind energy developments.

Recommended Good Practice on Controlling Noise from Wind Turbines

From 'The Assessment and Rating of Noise from Wind Farms' (ETSU for DTI 1997).

The current practice on controlling wind farm noise by the application of noise limits at the nearest noise-sensitive properties is the most appropriate approach.

Noise limits should be applied to external locations and should apply only to those areas frequently used for relaxation or activities for which a quiet environment is highly desirable.

Noise limits set relative to the background noise are more appropriate in the majority of cases. Generally, the noise limits should be set relative to the existing background noise at the nearest noise-sensitive properties and the limits should reflect the variation in both turbine source noise and background noise with wind speed.

It is not necessary to use a margin above background noise levels in particularly quiet areas. This would unduly restrict developments that are recognised as having wider national and global benefits. Such low limits are, in any event, not necessary in order to offer a reasonable degree of protection to wind farm neighbours.

Separate noise limits should apply for day-time and for night-time as during the night the protection of external amenity becomes less important and the emphasis should be on preventing sleep disturbance.

Absolute noise limits and margins above background should relate to the cumulative effect of all wind turbines in the area contributing to the noise received at the properties in question. Any existing turbines should not be considered as part of the prevailing background noise.

Noise from the wind farm should be limited to 5 dB(A) above background for both day- and night-time, remembering that the background level of each period may be different.

The $L_{A90,10min}$ descriptor should be used for both the background noise and the wind farm noise, and when setting limits it should be borne in mind that the $L_{A90,10min}$ of the wind farm is likely to be about 1.5-2.5 dB(A) less than the L_{Aeq} measured over the same period. The use of the $L_{A90,10min}$ descriptor for wind farm noise allows reliable measurements to be made without corruption from
relatively loud, transitory noise events from other sources.

A fixed limit of 43 dB(A) is recommended for night-time. This is based on a sleep disturbance criteria of 35 dB(A) with an allowance of 10 dB(A) for attenuation through an open window (free field to internal) and 2 dB(A) subtracted to account for the use of $L_{A90,10min}$ rather than $L_{Aeq,10min}$.
Both day- and night-time lower fixed limits can be increased to 45 dB(A) to increase the permissible margin above background where the occupier of the property has some financial interest in the wind farm.

In low noise environments the day-time level of the $L_{A90,10min}$ of the wind farm noise should be limited to an absolute level within the range of 35-40 dB(A). The actual value chosen within this range should depend upon: the number of dwellings in the neighbourhood of the wind farm, the effect of noise limits on the number of kWh generated, and the duration of the level of exposure.

For single turbines or wind farms with very large separation distances between the turbines and the nearest properties, a simplified noise condition may be suitable. If the noise is limited to a $L_{A90,10min}$ of 35 dB(A) up to wind speeds of 10 m/s at 10 m height, then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary.

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Low Frequency Noise (Infrasound)

1.3.47 There is no evidence that ground transmitted low frequency noise from wind turbines is at a sufficient level to be harmful to human health. A comprehensive study of vibration measurements in the vicinity of a modern wind farm was undertaken in the UK in 1997 by ETSU for the DTI (ETSU W/13/00392/REP). Measurements were made on site and up to 1km away – in a wide range of wind speeds and direction.

1.3.48 The study found that:

- Vibration levels 100m from the nearest turbine were a factor of 10 less than those recommended for human exposure in critical buildings (i.e. laboratories for precision measurement); and
- Tones above 3.0 Hz were found to attenuate rapidly with distance – the higher frequencies attenuating at a progressively increasing rate.

1.3.49 In a subsequent study by DTI entitled “The measurement of low frequency noise at three UK Wind Farms, W/45/00656/00/00” the principal findings were that infrasound associated with modern wind turbines is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbour. In addition from the data collected, internal noise levels were deemed insufficient to wake up residents at the three sites investigated.

Safety

1.3.50 Experience indicates that properly designed and maintained wind turbines are a safe technology. The very few accidents that have occurred involving injury to humans have been caused by failure to observe manufacturers’ and operators’ instructions for the operation of the machines. There has been no example of injury to a member of the public.

1.3.51 The only source of possible danger to human or animal life from a wind turbine would be the loss of a piece of the blade or, in most exceptional circumstances, of the whole blade. Many blades are composite structures with no bolts or other separate components. Blade failure is therefore most unlikely. Even for blades with separate control surfaces on or comprising the tips of the blade, separation is most unlikely.

1.3.52 For wind farm developments the best practice separation distance of 10 times rotor diameter to occupied property should comfortably satisfy safety requirements. For a smaller individual wind turbine, for example on a farm enterprise, the fall over distance (i.e. the height of the turbine to the tip of the blade) plus 10% is often used as a safe separation distance.

Proximity to Road and Railways

1.3.53 Applicants are advised to consult at an early stage with DRD Roads Service for development affecting public roads. In the case of railway lines consultation should take place with Translink.

1.3.54 Although wind turbines erected in accordance with best engineering practice are considered to be stable structures, they should be set-back at least fall over distance plus 10% from the edge of any public road, public right of way or railway line so as to achieve maximum safety.

1.3.55 Concern is often expressed over the effects of wind turbines on car drivers, who may be distracted by the turbines and the movement of the blades. Drivers are faced with a number of varied and competing distractions during any normal journey, including advertising hoardings, which are deliberately designed to attract attention. At all times drivers are required to take reasonable care to ensure their own and others' safety. Wind turbines should therefore not be treated any differently from other distractions a driver must face and should not be considered particularly hazardous. The provision of appropriately sited lay-bys for viewing purposes may be helpful in giving an opportunity to view the wind energy development in safety; lay-by size should be adequate to cater for tour buses.

Proximity to Power Lines

1.3.56 Wind turbines should be separated from overhead power lines in accordance with the Energy Networks Association standard TS 43-8 issue 3 'Overhead Line Clearances'.

Lightning Strike

1.3.57 The possibility of attracting lightning strikes applies to all tall structures and wind turbines are no different. Appropriate lightning protection measures are incorporated in wind turbines to ensure that lightning is conducted harmlessly past the sensitive parts of the nacelle and down into the earth.

Electromagnetic Production and Interference

1.3.58 Wind turbines contain electrical machines producing power and as a consequence electromagnetic emissions. These however are at a very low level comparable to most domestic appliances.

1.3.59 Provided careful attention is paid to siting, wind turbines should not cause any significant adverse effects on communication systems which use electromagnetic waves as the transmission medium (e.g. television, radio, telecommunication links, and police and emergency service links). Generally, turbine siting can mitigate any potential impacts, as the separation distance required to avoid problems is

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generally a matter of a few hundred metres. In some cases, it may be possible to effectively re-route the signal around the development, at the developer's expense, to overcome the problem.

1.3.60 Scattering of signal mainly affects domestic TV and radio reception, and the general public may be concerned that a wind farm will interfere with these services. Experience has shown that when this occurs it is of a predictable nature and can generally be alleviated by a range of measures such as aerial redirection/upgrade or the installation or modification of a local repeater station or cable connection.

1.3.61 Specialist organisations responsible for the operation of the electromagnetic links typically require a 100m clearance either side of a line of sight link from the swept area of turbine blades although some operators are willing to accept Fresnel zones[2] of avoidance. There may however be additional constraints in relation to the police TETRA system. Individual consultations would be necessary to identify each organisation's safeguarding distance. Effects on such links can usually be resolved through careful siting of individual turbines

1.3.62 Since a large number of bodies use communication systems, and some of the users are commercially sensitive or of strategic importance, it is often difficult to obtain a definitive picture of all the transmission routes across a potential site. The Office of Communications (OFCOM) holds a central register of all civil radio communications operators in the UK and acts as a central point of contact for identifying specific consultees relevant to a site. OFCOM will identify any radio installations relevant to a wind farm site. Although OFCOM passes any enquiry on to other interested parties, who should respond to an application, this process is only partial and an applicant seeking planning permission would be well advised to make direct contact with any authorities/bodies which are likely to be interested – a list of potentially interested parties is given at the end of this Section.

1.3.63 It may also be necessary to consult utility providers and the emergency services such as the ambulance service and the coastguard. In particular the Police Service for Northern Ireland would encourage wind farm developers to consult them on all applications in order that the impact of their proposal on the TETRA broadcast facilities can be properly considered.

1.3.64 For proposals within 20km of the Republic of Ireland it is recommended that developers consult with licensed operators there. A list of these operators is available on the ComReg website at www.comreg.ie. In such cases it is also advisable to contact Irish mobile phone operators.

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[2] The area around the visual line-of-sight that radio waves spread out into after they leave the antenna.

Aviation Interests

1.3.65 Wind turbines may have an adverse effect on two aspects of air traffic movement and safety. Firstly, they may represent a risk of collision with low flying aircraft, and secondly, they may interfere with the proper operation of radar by limiting the capacity to handle air traffic, and aircraft instrument landing systems.

Risk of Collision

1.3.66 Risk of collision is likely to occur close to civilian and military airfields, and in military low flying zones. As appropriate, the Department consults with the relevant licensed operators of civil airports/airfields, the Ministry of Defence (MOD) and the National Air Traffic Service (NATS) on all proposals for wind turbine developments in Northern Ireland. The Civil Aviation Authority (CAA) can inform the applicant of any civilian airfields that are likely to be affected, but it is the responsibility of the applicant to consult the airfield management at the airfield in question. It is recommended that such consultation should occur prior to submission of an application and the applicant should take account of the airfield management's requirements, which will depend on local topography and the preferred flight paths at the site.

1.3.67 In the interests of aviation safety, lights may be required on wind turbine development and is mandatory in all cases where the structure exceeds 150m high. In addition, structures over 91.4m (300ft) are required to be charted on aviation maps. Developers will be required to provide details of the development to the Defence Geographic Centre.

1.3.68 There is currently no low flying training undertaken by the MOD in Northern Ireland.

Radar

1.3.69 Any large structure is liable to show up on radar, but wind turbines can present a particular problem as they can be interpreted by radar as a moving object, which is only intermittently seen (as the nacelle rotates to face the wind). There is a consultation zone and an advisory zone around every civilian and military air traffic radar but objections may sometimes be raised in respect of developments further afield. Consultation by the developer will also be required in respect of any meteorological radar. Developers therefore need to carefully consider this matter. Both the Irish Wind Energy Association and the British Wind Energy Association web sites give details of how adequate consultation can be achieved. In addition, developers may be required to contact the Irish Aviation Authority at the pre-planning stage with details of locations and proposed heights of turbines, to ensure that the proposed development will not cause difficulties with air navigation safety in the Republic of Ireland.

1.3.70 Because topography, intervening buildings and even tree cover can mitigate the effect of wind turbines on radar, it does not necessarily follow that the presence of a wind turbine in a safeguarding zone will have a negative effect. However, if an objection is raised by either a civil aviation or Defence Estates consultee, the onus is on the applicant to prove that the proposal will have no adverse effect on aviation interests.

1.3.71 The CAA publishes guidance to provide assistance to aviation stakeholders when addressing wind energy related issues.

Shadow Flicker and Reflected Light

1.3.72 Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as 'shadow flicker'. It only occurs inside buildings where the flicker appears through a narrow window opening. A single window in a single building is likely to be affected for a few minutes at certain times of the day during short periods of the year. The likelihood of this occurring and the duration of such an effect depends upon:

- the direction of the residence relative to the turbine(s);
- the distance from the turbine(s);
- the turbine hub-height and rotor diameter;
- the time of year;
- the proportion of day-light hours in which the turbines operate;
- the frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon); and,
- the prevailing wind direction.

1.3.73 Shadow flicker generally only occurs in relative proximity to sites and has only been recorded occasionally at one site in the UK. Only properties within 130 degrees either side of north, relative to the turbines can be affected at these latitudes in the UK – turbines do not cast long shadows on their southern side.

1.3.74 The further the observer is from the turbine the less pronounced the effect will be. There are several reasons for this:

- there are fewer times when the sun is low enough to cast a long shadow;
- when the sun is low it is more likely to be obscured by either cloud on the horizon or intervening buildings and vegetation; and,
- the centre of the rotor's shadow passes more quickly over the land reducing the duration of the effect.

1.3.75 At distance, the blades do not cover the sun but only partly mask it, substantially weakening the shadow. This effect occurs first with the shadow from the blade tip, the tips being thinner in section than the rest of the blade. The shadows from the tips extend the furthest and so only a very weak effect is observed at distance from the turbines.

1.3.76 Problems caused by shadow flicker are rare. At distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low. The seasonal duration of this effect can be calculated from the geometry of the machine and the latitude of the site. Where shadow flicker could be a problem, developers should provide calculations to quantify the effect and where appropriate take measures to prevent or ameliorate the potential effect, such as by turning off a particular turbine at certain times.

1.3.77 Careful site selection, design and planning, and good use of relevant software, can help avoid the possibility of shadow flicker in the first instance. It is recommended that shadow flicker at neighbouring offices and dwellings within 500m should not exceed 30 hours per year or 30 minutes per day[3].

1.3.78 Turbines can also cause flashes of reflected light, which can be visible for some distance. It is possible to ameliorate the flashing but it is not possible to eliminate it. Careful choice of blade colour and surface finish can help reduce the effect. Light grey semi-matt finishes are often used for this. Other colours and patterns can also be used to reduce the effect further. (See 'The Influence of Colour on the Aesthetics of Wind Turbine Generators' – ETSU W/14/00533/00/00).

Ice Throw

1.3.79 The build-up of ice on turbine blades is unlikely to present problems on the majority of sites in Northern Ireland. Even where icing does occur the turbines' own vibration sensors are likely to detect the imbalance and inhibit the operation of the machines.

Recreation and Tourism

1.3.80 In many areas in Northern Ireland, recreation and tourism are a significant element of the local economy and can depend to varying degrees on the quality of the environment. It is not considered that wind energy developments are necessarily incompatible with tourism and leisure interests, but it is acknowledged that care does need to be taken to ensure that insensitively sited wind energy developments do not impact negatively on tourism potential. The results of survey work conducted in 2003 in the Republic of Ireland indicate that tourism and wind energy can co-exist happily[4].

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[3] The shadow flicker recommendations are based on research by Predac, a European Union sponsored organisation promoting best practice in energy use and supply which draws on experience from Belgium, Denmark, France, the Netherlands and Germany.

[4] Attitudes Towards the Development of Wind Farms in Ireland – Sustainable Energy Ireland, 2003

1.3.81 For future wind farms, the judgment of acceptability based on landscape protection should provide adequate protection for tourism interests. The threshold of landscape protection is generally more sensitive to wind farm development than tourism, therefore if there is deemed to be acceptable within the landscape at the planning stage, there should be no unreasonable impacts on tourism interests.

1.3.82 The educational potential of wind energy developments should also be considered. For example, there may be scope for an interpretive centre on alternative energy resources to be located at accessible location in proximity to a wind energy development. It would be helpful if established long distance walking routes/amenity rights-of-way were identified and mapped to enable an assessment both of the extent to which recreational pursuits can be accommodated and facilitated either within or adjacent to wind energy developments. Local councils would be a useful contact point to provide information on this matter.

Construction and Operational Disturbance

1.3.83 The degree of disturbance caused by the construction phase of a wind farm will depend on the number of turbines and the length of the construction period. Public perception of the construction phase will derive mainly from physical impact and traffic movements. The traffic movements to be expected will involve:

- vehicles bringing aggregate to the site including concrete for foundations;
- vehicles removing spoil from the site;
- vehicles (which may be articulated) bringing turbine components to the site;
- the vehicles of those working on the site; and,
- the crane(s) to erect the turbines.

1.3.84 Although construction traffic for a wind turbine development will essentially be no different from other developments, many turbines will be sited in areas served by the minor road network. In such cases, it may be necessary to impose suitable conditions on consents or enter a legal agreement with the developer to control the number of vehicle movements to and from the site in a specified period and, where possible, the route of such movements, particularly by heavy vehicles. Further requirements for strengthening bridges may also be required by the DRD Roads Service. Where culverting of any watercourse under site roads is planned, the provisions of Planning Policy Statement 15 Planning and Flood Risk will be taken into account. Consent from the Department of Agriculture and Rural Development’s Rivers Agency will also be required.

1.3.85 Once turbines are in operation, traffic movements to and from the site will be very light, probably averaging two visits a week by a light commercial vehicle or car. The need to replace machine components will generate heavier commercial vehicle movements, but these are likely to be infrequent.

Decommissioning and Reinstatement

1.3.86 The decommissioning of a wind energy development once electricity ceases to be generated will need to be assessed. Plans for decommissioning should be outlined at the planning application stage. Issues to be addressed include restorative measures, the removal of above ground structures and equipment, landscaping and/or reseeding roads. On occasion it may be appropriate to allow tracks to remain, e.g., as part of a walking route after decommissioning.

1.3.87 A decommissioning plan may be covered in conditions and/or a legal agreement accompanying planning permission and will be triggered by the expiry of the consent or in the event of the project ceasing to operate for a specified period. Developers should demonstrate that funding to implement decommissioning will be available when required.

1.3.88 It is likely that the duration of the planning permission will be linked to the expected operational life of the turbines. However during this period, proposals may be forthcoming to extend the life of the project by re-equipping or to replace the original turbines with new ones. While there are obvious advantages in utilising established sites, such cases will have to be determined on their individual merit and in the light of the then prevailing policy and other relevant considerations.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

1.4.1 The developer should submit the following to accompany a wind energy application:

- 7 copies of the P1 Planning Application form, accurately completed, signed and dated;
- planning fee (currently £200 per 0.1ha or part thereof of the footprint of the development up to a maximum of £10,000);
- 7 copies of the site location map with site boundary, including the access road and land for any junction improvement outlined in red;
- 7 copies of the site layout including access roads within the site, detailed plans to scale including turbines, details of bases, access roads, wind monitoring masts, sub-stations and other ancillary development. Details of finishing materials (e.g. on turbines, sub-stations, control rooms, fences and other structures), landscaping etc. are required. Information will also be required detailing spoil storage and the location of road/site access, temporary contractors compound, borrow pits, on site-tracks, turbine foundations, crane hard standings, one or more anemometer masts, construction compound, electrical cabling and an electrical sub-station and control building of any construction.

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1.4.2 Where wind energy proposals are deemed as EIA developments, the developer is also required to submit sufficient copies of the EIA statement to enable the Department to carry out consultations. The developer should contact the Department to ascertain the numbers of statements required and the format preferred.

1.4.3 For smaller developments that do not require a full EIA, the Department will often still require some or all of the issues set out in paragraph 1.3.2 to be addressed through an environmental report to accompany the planning application to include for example a report detailing noise emissions and an assessment of the impact.

Environmental Impact Assessment

1.4.4 Wind turbines fall within descriptions of development listed under Schedule 2, category 3(j) to the EIA Regulations. The Department of the Environment is required to screen applications for the need for EIA where the development involves the installation of more than 2 turbines or the hub height of any turbine or height of any other structure exceeds 15 metres

OTHER AUTHORISATIONS/CONSENTS

Grid Connection

1.5.1 Where the works required to connect the wind farm to the local electricity distribution network are not permitted under the General Development Order it will be necessary to submit a separate planning application[5]. Either NIE or the wind farm developer may make such an application. Developers should provide information on the most likely route and method for the grid connection (overground or underground) to the wind farm with their planning application and as part of any EIA. The connection of the wind farm to the electricity grid forms an intrinsic part of the project. Whilst the routing of such lines by NIE is usually dealt with separate to the planning application for the wind farm, developers will generally be expected to provide indicative details of likely routes and the anticipated method of connection (over ground or underground).

1.6 In addition DETI consent for electricity generation over 10MW will be required.

[5] Please note responsibility for determining consent and granting deemed planning permission for the installation of overhead lines which have a nominal voltage of over 20 kilovolts associated with wind farms is planned to transfer to the Department of Enterprise Trade and Investment.

CONSULTEES

1.6.1 Wind energy developers may wish to refer to the Department's consultees:

- **Arqiva** - Crawley Court, Winchester, Hampshire, SO21 2QA
- **Belfast International Airport** - Belfast BT29 4AB
- **Chief Executive**, Local Government Authority
- **City of Derry Airport** - Airport Road, Eglington BT47 3GY
- **Council for Nature Conservation and the Countryside** - 5-33 Hill Street, Belfast, BT1 2LR
- **Crown Castle UK** - National Grid Wireless, Wireless House, Warwick Tech. Park, Heathcote Lane, Warwick CV34 6DD
- **Defence Estates Organisation** - Saferguarding Bylaws, Blakemore Drive, Sutton Coldfield, West Midlands, B75 7RL
- **Department of Agriculture and Rural Development** – Countryside Management Branch, Agri-Environment Schemes Management Branch, Lindesay Hall, Loughry Campus, Cookstown, BT80 9AA
- **Department of Culture Arts & Leisure** - Dept of Culture Arts & Leisure, Inland Fisheries Branch, Interpoint, 20-24 York Street, Belfast, BT15 1AQ
- **Department of Enterprise, Trade and Investment** - Energy Branch, Netherleigh, Massey Avenue, Belfast
- **Department of the Environment, Heritage and Local** Government –Custom House, Dublin 1, Ireland
- **Enniskillen (St. Angelo) Airport** - Trory, Enniskillen BT94 2FP
- **Environmental Health Officers**, Local District Council
- **Fisheries Conservancy Board for Northern Ireland** - HQ Office, 1 Mahon Road, Portadown, BT62 6EE
- **Geological Survey (NI)** – Colby House, Stranmillis Court, Stranmillis Road, Belfast BT9 5BF
- **George Best Belfast City Airport** - Belfast BT3 9JGH
- **Health & Safety Inspectorate** - 83 Ladas Drive, Belfast, BT6 9FR
- **Loughs Agency** - 22 Victoria Road, Londonderry BT47 2AD
- **National Air Traffic Service** - Navigation, Spectrum & Surveillance, Spectrum House, Gatwick, West Sussex, RH6 0LG
- **Newtownards Airport** - Ulster Flying, Portaferry Road, Newtownards BT23 8SG
- **Northern Ireland Electricity** – Enniskillen Business Centre, Lacckaghboy, Tempo Road, Enniskillen, BT74 4RL
- **Northern Ireland Environment Agency** - Natural Heritage, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast BT7 2JA
- **Northern Ireland Environment Agency** – Protecting Historic Buildings, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast BT7 2JA
- **Northern Ireland Environment Agency** – Protecting Historic Monuments, 5-33 Hill Street, BELFAST, BT1 2LR

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- **Northern Ireland Environment Agency** – Water Management Unit, 17 Antrim Road, Lisburn, BT28 3AL
- **Northern Ireland Tourist Board** - St Anne's Court, 59 North Street, BELFAST, BT1 1ND
- **Northern Ireland Water**
- **OFCOM** – Windfarm Enquiries, Riverside House, 2a Southwark Bride Road, London, SE1 9HA
- **Police Service of Northern Ireland** – Information and Communication Services, 18 Lislea Drive, Lisburn Road, Belfast BT9 7JG
- **Roads Service** – Local Divisional Office
- **Royal Society for the Protection of Birds** - Belvoir Forest, Belvoir Park, Belfast, BT8 7QT

2. Biomass

INTRODUCTION

2.1.1 This section describes biomass technology its various forms, and outlines the main planning and environmental implications.

2.1.2 Biomass fuels can be utilised to provide energy either by combustion or fermentation/digestion technologies. Because of the two distinct technological approaches, this section deals with combustion technologies. Section 3 deals with fermentation and digestion technologies.

2.1.3 The principal feedstock for combustion technologies include:
- Forestry – co-product from existing forestry operations (small diameter roundwood (SDR), branches, lop and top);
- Energy crops (short rotation coppice willow and poplar (SRC), Miscanthus and other energy grasses);
- Primary processing co-product (sawdust, slabwood, points etc);
- Clean wood waste from industry (e.g. pallets, furniture manufacture);
- Other crops and bi-products (e.g. whole cereal crops and straw);
- Poultry litter; and
- Biodegradable fraction of Municipal Solid Waste (MSW).

2.1.4 Feedstock to fuel combustion technologies is generally grown rather than harnessed, and it gives off carbon dioxide when burned. However, these fuels are regarded as 'carbon neutral', because the carbon released on combustion is only that which was absorbed during crop growth – the gas is simply recycled. So, when it is used in combustion in place of fossil fuels, a net reduction in carbon emissions is achieved.

2.1.5 There are currently three main categories of biomass plant:
- Plant designed primarily for the production of electricity. These are generally larger schemes, in the range 10 to 40MW. Excess heat from the process is not utilised. Typically, 1 MW of electricity generated would require around 4MW of thermal input;
- Combined Heat and Power (CHP) plant. The primary product of these is the generation of electricity, but the excess heat is used productively, for instance as industrial process heat or in a district heating scheme. The typical size range for CHP is 5 to 30 MW output, but some smaller schemes of a few hundred kW have been built in the UK; and,
- Plant designed for the production of heat. These cover a wide range of applications, including single dwelling domestic or district heating, commercial and community buildings, and industrial process heat. The size can range from a few kW, to above 5MW.

2.1.6 Opportunities for large scale production of liquid biofuels for transport in Northern Ireland are particularly limited at this current time mainly due to the lack of significant indigenous raw material to support a large bio-refinery. Currently the EU is revisiting their policy on the current production of biofuels due to environmental and carbon emission concerns around some production practices.

TECHNOLOGY

2.2.1 Energy generation based on biomass is technologically well advanced and widely utilised in many parts of the world.

2.2.2 There are three main combustion technologies for converting biomass into energy:

- Direct combustion is used for heating water or to raise steam to drive a steam engine or turbine to generate electricity (steam cycle). Equipment ranges from very small wood stoves used for domestic heating to multi-MW plants for electricity production. The upper limit is restricted by local energy demand and availability of biomass rather than by combustion technology. Equipment design depends, among other things, on the moisture content and particle size of the fuel;
- Gasification is a technique in which the solid fuel undergoes incomplete combustion in a limited air supply to produce a combustible gas that can be burned in a boiler, or used as fuel for an engine or gas turbine. This technology is more applicable to multi megawatt plants, but smaller plants of under 5 MW are becoming more common; and
- Pyrolysis involves heating in the absence of oxygen (rather like traditional charcoal production) to produce a combustible gas or liquid, which is used in a similar way to gas produced from gasification.

2.2.3 Direct combustion is the most commonly used technology for ‘heat only’ plants, whilst both direct combustion and gasification are used for CHP and ‘electricity only’ plants. Pyrolysis is more commonly associated with the production of transport fuel, such as biodiesel. Combustion technology and generation of electricity using the steam cycle is an advanced, mature technology. At present gasification and pyrolysis are much less mature technologies than direct combustion.

2.2.4 The three technologies appear externally to be similar, and share much in common from a planning perspective. For a given capacity of plant, the size, extent and appearance of the development will be similar, similar amounts of fuel feedstock will be required, and emissions and other waste products will be similar, although pyrolysis and gasification plant may have a smaller footprint, as the process is more compact.

Fuel Sources

2.2.5 Although this section deals with the planning implications of the energy conversion plant itself, and not of the fuel supply, some reference to the different sources is important. In summary these are:

- material from forestry harvesting;
- material from timber processing;
- "organic" waste streams or agricultural residues;
- energy crops; and
- waste streams.

A large biomass scheme may use fuel from one or more sources, in order to ensure security of supply.

2.2.6 All the biomass fuels listed above have a broadly similar gross energy content. How much of this energy content can be exploited depends on the process, the technology employed, and the moisture content. Some direct combustion technologies can use fuel with a high moisture content (up to 50%), but gasification and pyrolysis generally require fuel to have a moisture content of less than 30%, and fuel may have to be dried as part of the process.

2.2.7 Biomass material from forestry harvesting, agricultural residues and energy crops may have a similar supply strategy. Most biomass plants require fuel to be in a chipped form, and chipping often occurs close to where the crop is grown. Once chipped, fuel tends to deteriorate fairly quickly, hence fuel in long term storage (e.g. inter-seasonal) is usually left in the 'as harvested' state, either in situ, or in converted agricultural buildings. Chipped fuel is often loaded directly onto lorries for delivery to the energy plant. Generally, only short term storage facilities are provided at the energy plant, and regular fuel deliveries are needed. A useful rule of thumb for fuel deliveries is two 38 tonne lorry deliveries per day, per MW thermal continuous heat input. Thus, a 250kW boiler operating for half of the time (a duty cycle of 50%), supplying heat to a leisure development would require 1 or 2 deliveries a week, and a 10MW plant producing electricity continuously would require around 20 deliveries a day.

2.2.8 Existing large coal fired power stations can use biomass to augment the traditional fuel. This is known as 'co-firing'. Although this may not have implications for the planning system, it is an important way of increasing the critical mass of producers in the fuel supply chain.

Residues from forestry harvesting

2.2.9 Forestry co-product harvesting makes use of those parts of the tree which, with conventional timber extraction and tree thinning, are normally left on the forest floor. The tops and branches of a tree are known as brash, and can account for 30-40 per cent of the gross weight of a conifer crop and over 50 per cent of the weight of a deciduous crop. Not all brash is available as biomass feedstock, as environmental impacts, extraction methods and ground conditions may render it unusable or undesirable to use.

2.2.10 Whole tree comminution is the mechanical felling and chipping of whole small trees, usually undertaken in thinning operations. The main product is wood fuel chips, although higher value 'white' stemwood chips can be screened out for use in the wood processing industry. The use of small diameter roundwood (SDR) is becoming the preferred option for most forestry operators, due to diversification into new markets.

2.2.11 Integrated harvesting is the mechanical extraction and processing of whole trees in a single operation. The tree is separated into stem wood and fuel wood products on site. This method leaves clear ground that can be immediately replanted and is considered to offer the most significant long term potential for the cost-effective harvesting of fuel wood. However, whole tree harvesting is not appropriate on all sites, and on some sites loss of nutrients and organic matter as well as soil compaction can be a significant factor.

2.2.12 Although most of the fuel in this category arises from commercial softwood production, the use of arisings from the management of smaller hardwood woodlands can also be important to the rural economy, and can form a significant proportion of a small biomass heating plant in a rural area. It has the added advantage of providing another source of income for small woodland owners and farmers.

Co-Product from timber processing

2.2.13 Untreated co-products from industries such as saw milling, or production of fencing, including off-cuts, sawdust and wood shavings often form the basis of the fuel supply for a project. In some cases, a biomass plant that is associated with an existing industry may be proposed, either to supply heat for the industry itself (e.g. for kiln drying of timber) or as a separate activity.

Agricultural sources of biomass

2.2.14 The most commonly used fuels in this category are straw (which should be viewed as an agricultural product, rather than a residue) and chicken litter. Straw is utilised in whole bale form, and is generally sourced from within a 50 mile radius of the plant. Chicken litter generally consists of a mixture of wood shavings, straw or other bedding material and poultry droppings. It is a good fuel for electricity generation with nearly half the calorific value of coal.

Biomass Fuel Pellets

2.2.15 Most of the biomass materials which have been discussed can be incorporated into fuel pellets which are particularly suited to domestic scale boilers. While pelletising adds to the cost of the fuel it renders it into a form which can be easily transported and marketed as a retail product either in bags or bulk containers.

Energy crops

2.2.16 Energy crops are renewable materials which can be grown as a substitute for fossil fuels. They offer the opportunity for the full potential of biomass to contribute to meeting renewable energy targets. The most common energy crop grown in Northern Ireland is short rotation coppice willow.

2.2.17 Short rotation coppice willow (SRC) is a specialised form of forestry plantation and involves growing willow at close spacing and harvesting at regular intervals (normally every second or third year). The crop is established during the Spring (March – June) by planting around 15,000 cuttings per hectare. After one year these are cut back close to the ground, which causes them to form multiple shoots (i.e. to coppice). The crop is then allowed to grow for 2-4 years, after which time the fuel is harvested by cutting the stems close to the soil level. The cut stems again form multiple shoots that grow on for a further cycle to become the next harvest. This cycle of harvest and re-growth can be repeated many times, up to an expected lifespan of 15-20 years. The shoots are usually harvested during the winter as chips, short billets or as whole stems, 25-50mm diameter and 3-4 metres long.

2.2.18 Other energy crops of interest in Northern Ireland include oilseed rape and other cereals grown for energy production. A number of energy grasses, for example miscanthus, canary reed grass and switchgrass have also received attention in the last couple of years. Research continues to assess the potential of these grasses to be used as energy crops in Northern Ireland.

2.2.19 Energy crop production will only be viable if the financial rewards and associated risks make it more attractive than existing agricultural enterprises.

Short Rotation Coppice (SRC)
Under Axis 1 of the Northern Ireland Rural Development Programme (NIRDP) 2007-2013 specific support up to a maximum of £1000 per hectare is available for the establishment of Short Rotation Coppice such as willow, grown for energy end use. To date just under 1000 hectares have been planted of approved for planting under the Woodland Grant Scheme and the previous "Challenge Fund".

At present, the economics of SRC for heat production, without a planting grant, suggest that it could represent a viable alternative enterprise for growers when the price of domestic heating oil is in excess of 35 pence per litre. The attractiveness of SRC as a crop is, however, significantly improved if it can also be used for bioremediation purposes and where the latter activity can either generate an additional income stream (through gate fees) or reduce costs elsewhere on the holding.

Generally SRC is grown in the locality of the end user and market demand due to the bulky, low value nature of chipped willow mean that it is necessary to keep transport distances and costs to a minimum. Other constraints have also been identified - proximity to drying equipment, the availability of suitable land in terms of soil type, topography and road access to planting sites.

Municipal Solid Waste (MSW)

2.2.20 Certain types of MSW are classed, under some circumstances, as renewable energy sources. For combustion technologies the biodegradable fraction of MSW, comprising such items as garden refuse, certain wood waste, and domestic waste paper, can be classed as renewable provided that at least 90% of the fuel is biodegradable. For 'advanced' technologies such as pyrolysis and gasification, any MSW (biodegradable and non degradable) may be used as fuel, but only the biodegradable fraction qualifies as a renewable resource.

2.2.21 In planning terms, the same issues apply to MSW that apply to other fuel sources, but MSW may fall into a different category under the pollution prevention control regime.

2.2.22 Further information on MSW is set out in Section 4.

Additional Products

2.2.23 Some technologies and fuels produce products additional to heat and electricity. Pyrolysis projects may produce liquid or solid products for onward sale. Agricultural biomass projects can produce fertiliser.

Emission and Residual Products

2.2.24 Emissions and waste products from biomass energy production fall into three categories:

- Airborne Emissions
- Emissions to Watercourses
- Ash

The Department of the Environment's Planning and Environmental Policy Group and the Northern Ireland Environment Agency have responsibility for the control of water quality, water abstraction and all emissions and will be consulted on all development proposals. In addition, as emissions may impact upon the district council local air quality management duties set out under the Environment (Northern Ireland) Order 2002, the local council may also need to be consulted.

Airborne Emissions

2.2.25 All processes that involve combustion, gasification or pyrolysis give rise to emissions to the air. It is therefore important to consider stack emissions produced by a biomass power plant in the existing environmental context. At the local level, this means comparing them with other sources of emissions and with current air quality. In the broader context, it means comparing the stack emissions from a biomass electricity generating plant with those from a power station fuelled by coal, oil or gas.

2.2.26 Emissions from biomass fuel combustion include limited quantities of gaseous nitrogen and sulphur oxides and carbon dioxide. Emissions of nitrogen and sulphur oxides are significantly less than those from comparable fossil fuel stations. Flue gas is discharged from the plant via a chimney. Under certain conditions (particularly in cold weather) a steam plume may emanate from the chimney. This is non-polluting, the only consideration being the visual effect.

2.2.27 Biomass fuel combustion may also give rise to particulate emissions from the chimney, known as particulate matter (PM_{10} or $PM_{2.5}$). These can be kept within UK and European particulate emission limits using techniques such as cyclone separation, or electrostatic precipitation in the flue. Depending on the biomass plant, airborne emissions may be controlled under the Pollution Prevention and Control Regulations (Northern Ireland) 2003 or the Clean Air (Northern Ireland) Order 1981.

2.2.28 In general, the larger the combustion unit, the easier it is to control the combustion conditions and therefore the easier it is to reduce the level of air pollution emissions. A single large boiler will tend to produce lower emissions than a series of smaller units using the same fuel and for the same energy output. It is more difficult to fit additional pollution abatement equipment to smaller units; below $500kW_{th}$, it is not usually possible to fit abatement equipment at all, and so emission reductions must rely on good boiler design, operation and maintenance. This

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lower size range includes most small scale domestic wood burning stoves and boilers, although the emissions performance of many modern models is high compared with older models.

2.2.29 A recent Government impact assessment for the uptake of biomass heat and its potential impacts on air quality showed that, where certain conditions are met, these air quality impacts can be reduced to a manageable level, and that no additional breaches of the current EU Air Quality Directive’s air quality limit values would occur. These conditions are:

- that all new biomass plant are of high quality, corresponding to the best performing units currently on the market;
- that the majority of biomass heat uptake replaces or displaces existing coal and oil fired heating;
- that the majority of uptake is located off the gas grid and generally away from densely populated urban areas; and
- that levels of uptake where the local authority has declared an Air Quality Management Area under article 12 of the Environment (Northern Ireland) Order 2003 are substantially lower than other areas.

Emissions to Watercourses

2.2.30 A generating station may require a supply of water for steam production and condensing. Where water supplies present a problem, air cooling can be employed for steam condensing and other duties – thus reducing net abstraction to low levels. Advanced conversion processes such as gasification and pyrolysis may need lower levels of water use, depending on the technology.

2.2.31 A generating plant will also have releases to the public sewer system comprising treated boiler drainings and condensate, effluent from the water treatment process and surface water run-off. Effluent from gasification plant may need treatment to remove organic contamination before release to the sewer.

2.2.32 Large wood chip piles may produce liquids that could leach to watercourses, so a collection ditch may be required around the storage area. With regard to run-off water quality from wood stores, recent research indicates that nitrate concentrations are likely to be well below the 11.3 mg/l NO3 N maximum for drinking water specified in the Nitrate Directive. NH4 N concentrations are also likely to be well below the mandatory limits of 1.5 and 4.0 mg/l specified in the Directive.

2.2.33 The Biological Oxygen Demand (BOD) values of run-off water are likely to be low (10 milligrams per litre) in comparison with agricultural effluent like manure slurry (10,000-30,000 mg/l), raw domestic sewage (300-400mg/l) or treated domestic sewage (20-60 mg/l).

Ash

2.2.34 The main solid bi-product of the conversion of biomass into energy is ash, usually termed 'bottom ash'. Bottom ash is produced at a rate of around 1 per cent of the total weight of the biomass burned. If residues from forests are used, the inclusion of 'tramp' materials such as soil may increase this ash level to 3-4 per cent. The ash from most fuels, with the general exception of MSW, can be safely returned to the soil as a fertiliser.

Locational Issues

2.2.35 Three main considerations must be taken into account when deciding upon the location of a biomass-fuelled power plant.

Feedstock availability

2.2.36 Biomass is a low value, high volume commodity that increases in cost with even short transport distances. Generally, it is preferable to locate the proposed plant at the 'centre of gravity' of the proposed feedstock. As it may be necessary to seek a variety of feedstocks for a number of reasons including security of supply and regulatory policy, this centre of gravity will inevitably be influenced by the location of the different feedstocks. Main transport conduits or feedstock concentration points will be preferred locations for the larger plant.

Customers

2.2.37 The ability to sell heat directly to an end user has a significant positive effect on the commercial performance of a scheme and therefore it would be very advantageous from an environmental and commercial point of view to locate the scheme close to a potential customer e.g. within district heating systems or commercial / industrial estates.

Grid Connection

2.2.38 Due to cost considerations, the majority of electricity generation projects need to be located close to existing grid infrastructure with the capacity to accept the proposed generation capacity.

Appearance and site footprint

2.2.39 The appearance and site footprint depends on the scale of the plant. For example, in the case of a small heat plant for a school, the boiler house could be some 4 metres by 3 metres, with a fuel bunker of similar proportions. The bunker may be semi-underground, only a metre or so protruding above ground, with a lockable steel lid. The chimney will be 3 to 10 metres high, depending on plant design and surrounding buildings. Sufficient space to safely manoeuvre a large lorry or tractor and trailer is required.

2.2.40 In the case of a larger electricity generating plant, a medium sized industrial building will be required, with a slender chimney of 25 or more metres in height. A Dutch barn scale building may be required for on-site storage of fuel, and additional buildings for offices and workshops may be required. An extensive area for lorry manoeuvring will be needed. Typically, a 1.5MW plant producing electricity using gasification technology will require a site area of some 0.5 hectares and a 40MW plant may require 5 hectares.

PLANNING ISSUES

2.3.1 The remit of consideration for the planning system is around the power plant and associated impacts and not the production of the fuel source. However, the impacts of growing and collecting the fuel are key to ensuring the successful development of a facility. Many of the environmental issues associated with the fuel supply (e.g. impact on landscape, ecology, archaeology, land use etc) may be covered by an Environmental Impact Assessment (EIA) undertaken by other bodies in connection with the scheme.

2.3.2 The following issues will be considered when determining a planning application:

- the positive benefit of the plant to the local economy. The supply of biomass fuel can secure a long-term income for farmers, forestry owners and contractors, and transport operators in rural areas. Some 80 to 90% of operational expenditure on biomass fuel supply can accrue to the local economy;
- visual intrusion – the plant is an industrial feature with a chimney. In certain weather conditions a plume may be evident from the chimney and/or drying equipment depending upon the design of the equipment;
- noise from traffic and plant operations. As an industrial development, BS 4142 will usually be the applicable standard;
- any effects on health, local ecology or conservation from the plant, and airborne and water borne emissions (as discussed above); and
- traffic to and from the site in order to transport biomass fuel and subsequent by-products. Traffic volumes, the associated noise, and local air pollution impacts may increase with the introduction of a large biomass power facility, as the scheme may require a continuous fuel supply.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

2.4.1 The successful development of a biomass-fuelled power plant entails detailed consideration of a wide range of factors and the developer may need to provide information on some if not all of the following matters:

- maps, diagrams and drawings showing the location and design of the plant, and the general location of fuel sources;

- details of the technology to be employed;
- in the case of large schemes, a Zone of Visual Impact map of the chimney, and photomontages of the plant from selected viewpoints;
- details of vehicular access and movements, and principal transport routes for fuel supply;
- landscaping provisions;
- details of air and noise emissions and an assessment of their impact;
- report detailing the disposal of residues;
- site management measures during construction; and
- indicative details of grid connection works, including transmission lines and transformers may be useful.

Environmental Impact Assessment

2.4.2 Schedule 2 to the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 lists those developments that must be screened to determine whether they are EIA Development. This type of development is likely to come under either of the following two categories listed under Section 3, "Energy Industry":

- industrial installations for the production of electricity, steam and hot water, where the development exceeds 0.5 hectare; and
- industrial installations for carrying gas, steam and hot water, where the area of works exceeds 1 hectare.

It is also possible that where a development will process waste it could fall under Schedule 2.11(c) to the Regulations.

OTHER AUTHORISATIONS/CONSENTS

2.5.1 In addition to planning permission, a biomass plant may require any of the following authorisations.

- DETI consent for electricity generation over 10MW
- Building Regulations
- Abstraction License
- Pollution Control
- Waste Management Licensing

All new biomass generation is required to adhere to the Clean Air (Northern Ireland) Order 1981. in addition the Smoke Control Areas (Exempted Fireplaces) Regulations (Northern Ireland) 1999 lists products and technologies permissible within smoke-free zones. Information on smoke-free zones is obtainable from the relevant district council.

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3. Energy from Waste (biological processes)

INTRODUCTION

3.1.1 This section offers guidance on systems using biological processes to extract energy from waste and organic materials, in terms of their main characteristics, the basic technology and their environmental implications. This covers systems using the following as a fuel to generate heat and/or electricity: landfill gas; sewage gas; biogas from organic agricultural material including wastes; digestible domestic or industrial waste. All these gases are products of an anaerobic digestion process, which is explained further below. Each process in this section begins by discussing anaerobic digestion in general, and subsequent to this, any differences relating to either sewage gas or landfill gas are described.

Anaerobic digestion

3.1.2 Anaerobic digestion (AD) is a process in which bacteria break down organic material in the absence of oxygen to produce a methane rich biogas. This can be combusted to generate electricity, as the primary output and heat which is generally utilised locally in the most efficient schemes. AD technology was initially developed to treat wastewater and sewage but has since expanded to deal with a wider range of feedstocks such as concentrated industrial wastewater, livestock manures and slurries, kitchen waste and industrial food processing residues such as fruit and vegetable peelings and distillation residues from distilleries. There is some potential to treat garden waste by AD and increasingly, grass and maize silage are also being utilised as feedstock.

3.1.3 The process has the benefit of using waste substances that are otherwise difficult to dispose of in an environmentally acceptable manner. Energy from AD is also effectively carbon neutral in that the carbon it releases is approximately equal to the carbon absorbed from the atmosphere by the plants which constitute the origin of the organic waste. It can therefore reduce overall quantities of carbon dioxide released in the atmosphere when it is used to replace energy from fossil fuels. When used for heating, the process is simple, with the minimum pre-treatment of the gas required, and the use of simple, well-proven technology.

3.1.4 Methane is a significant contributor to global warming (around 21 times more potent than carbon dioxide over a period of 100 years). AD with energy recovery offers an effective means of trapping this gas and converting it to carbon dioxide, which is less potent as a greenhouse gas, while producing a renewable source of energy. By-products of AD may be put to beneficial uses such as compost and liquid fertiliser. Such products can help reduce the demand for synthetic fertilisers and other soil conditioners that may be manufactured using less sustainable methods.

3.1.5 The AD process is becoming more widely used within the UK agricultural sector in the form of farm-scale digesters producing biogas to produce electricity and heat to meet the needs of the farm business. A successful AD on-farm project will form part of the necessary farm waste management system in which the feedstock and product are managed and utilised to achieve the maximum advantage to the farm business. However there is potential for larger scale centralised anaerobic digesters (CADs) using feedstocks imported from a number of sources.

Sewage gas

3.1.6 Sewage sludge differs from farm waste in that it generally has a far higher inert content (usually >40% of the dry solid matter in sewage is ash). However, as it is only the organic matter that is digested, the gas produced from sewage is of a similar composition to that from farm waste, and the main difference in the digestion plant is one of scale: as sewage waste treatment is generally more centralised, sewage sludge digesters are usually much larger than farm waste digesters.

Landfill gas

3.1.7 Organic waste materials such as food, paper and garden wastes decompose in landfills to produce landfill gas (LFG), a mixture of methane, carbon dioxide and a wide range of minor components. Using LFG provides energy from a source which would otherwise be flared off or vented to the atmosphere and so wasted.

3.1.8 The total waste produced in the UK is estimated to be about 434 million tonnes per year. Different types of waste vary immensely in their fuel values and characteristics. Municipal solid waste (MSW) and business waste are the largest potential sources of waste derived energy. However the composition and calorific value of these materials can vary markedly. The proportion sent to landfill will fall in the long term as a result of changes in waste management practices with, for example, increasing recycling. The EU Landfill Directive, implemented in Northern Ireland by the Landfill Regulations (Northern Ireland) 2003, will also progressively ensure the diversion of organic material from landfill, reaching 75% of 1995 levels by 2010; 50% of 1995 levels by 2013 and 35% of levels by 2020. Nevertheless landfill is likely to remain a significant means of waste disposal for some time and the sites will remain biologically active for decades to come.

3.1.9 The main difference between landfill gas systems and other forms of anaerobic digestion is that the landfill itself is effectively the digester, so there are no constructed tanks for this purpose. However, the generation plant for the landfill gas is broadly similar to that employed for other forms of anaerobic digestion.

TECHNOLOGY

Anaerobic digestion

3.2.1 AD is the bacterial fermentation of organic waste in warm, oxygen-free conditions. This process converts complex organic molecules into an inflammable gas comprising methane and carbon dioxide, leaving liquid and solid residues. The gas is usually referred to as biogas. During this process, up to 60% of the digestible solids are converted into biogas. This gas can be used to fuel a generator, to supply heating systems, or to serve a range of industrial applications.

3.2.2 The digestion process takes place in a sealed airless container (the digester) and needs to be warmed and mixed thoroughly to create the ideal conditions for the bacteria to convert the organic matter into biogas. There are two types of AD process:

- Mesophilic digestion. The digester is heated to 30-35°C and the feedstock remains in the digester typically for 15-30 days. Mesophilic digestion tends to be more robust and tolerant than the thermophilic process (see below), but gas production is less, larger digestion tanks are required and sanitisation, if required, is a separate process stage.
- Thermophilic digestion. The digester is heated to 55°C and the residence time is typically for 12-14 days. Thermophilic digestion systems offer higher methane production, faster throughput, and better pathogen 'kill', but require more expensive technology, greater energy input and a higher degree of operating and monitoring.

3.2.3 A typical AD plant will comprise waste pre-treatment equipment, a digester tank, buildings to house ancillary equipment such as a generator, a biogas storage tank, a flare stack and associated pipework. If anaerobic digestion is to be carried out on municipal solid waste, pre-treatment facilities will be required to separate organic from inorganic waste. Plants that use sewage sludge or farm slurry will require post-digestion equipment to treat the resulting liquors.

Fuel sources

3.2.4 Although other organic materials are increasingly being used as feedstock to AD plants, currently the main types of feedstock employed are:

- Sewage sludge. This is the sediment that is removed from foul sewage during the course of treatment by a process of settlement. AD of sewage sludge currently takes place at many sewage treatment works in the UK, and some schemes already include energy recovery. The raising of sewage treatment standards, together with tighter controls on the disposal of sludge, could potentially lead to increased arisings. Energy recovery will potentially become more economically attractive where AD is the chosen waste treatment measure.

- Farm slurry. The intensive rearing of livestock, particularly cattle and pigs, produces large quantities of slurry – manure in liquid form – which is not only odorous but which can also present pollution problems if it is not carefully disposed of. Silage effluent can cause similar problems. Farmers can face stiff penalties for causing these substances to pollute watercourses.
- Municipal solid waste (MSW). Municipal refuse contains large quantities of food, garden waste, paper and packaging with a high organic content, and is therefore suitable for energy extraction via AD.

3.2.5 Digestion reduces the volume of the waste and also has the benefits of reducing odour and removing harmful pathogens, which is a particular advantage in the case of farm slurry and sewage sludge.

3.2.6 Feedstocks for AD inevitably contain plant or animal pathogens (such as Salmonella) and parasites (such as Cryptosporidium) to different degrees in different materials. Precautions are therefore needed in AD projects, especially CAD projects which involve transporting residues from various sources to a central point, which could lead to cross-contamination unless appropriate preventative measures are taken. Mesophilic AD will reduce pathogens and bacteria, but will not eliminate them from waste. Thermophilic digestion will further reduce the levels, but cannot guarantee total removal.

3.2.7 After any necessary pre-treatment, the waste is fed into a digester tank. The contents are then mixed thoroughly, either mechanically or by pumping gas through suitably located tubes inside the tank. Digesters are usually operated at temperatures of 35°C or 55°C. The rate at which the digestate breaks down through microbial action increases with temperature. At the same time, the survival rate of pathogens such as Salmonella reduces significantly.

3.2.8 After the AD process has taken place, the gas generated is collected in a storage tank, with any excess gas being flared off. The contents of the digester will be a mixture of solids and liquids (digestate solids and digestate liquor), which might be suitable for beneficial use as fertiliser or soil conditioner (subject to legislation), or will otherwise require disposal.

3.2.9 In 'sequential batch' digesters, the tank is loaded with the feedstocks (farm slurry etc), AD proceeds and the residues (i.e. the digestates) are then removed to make way for a new load. This method is often used in small-scale digestion schemes, such as those on individual farms. Larger scale digesters often employ a 'continuous feed' system in which the incoming feedstock is fed into the tank while an equivalent volume of processed waste is drawn off. The transport implications of peak movements need to be borne in mind for sequential batch digesters.

Gas collection and use

3.2.10 The gas collected through the AD process is primarily a mixture of methane (typically 65% of the total) and carbon dioxide (typically 35%). Trace gases are also produced, including hydrogen sulphide.

3.2.11 The gas is collected at the top of the digester and piped to a holding tank. Because this tank will have a finite storage capacity, a flare stack is often located nearby to dispose of any excess gas. The gas can be used:

- as a heating fuel for nearby buildings and for the generation of electricity;
- in a range of industrial applications;
- for the drying or incineration of sludge at sewage works; and,
- to heat the digester itself and to power associated machinery.

The gas can also be bottled, after cleaning, for use as a domestic fuel or to power vehicles.

Other products

3.2.12 As well as biogas, two other important by-products of AD are liquors and solid organic materials. The digestate liquor is a nitrogen rich fertiliser and is generally used on the farms on which it was produced. A potentially wider market has yet to be fully developed, although some AD schemes have successfully bottled and sold the liquor as a liquid fertiliser. Solid organic materials that have undergone incomplete digestion can either be used without further pre-treatment as a soil conditioner or further processed to yield agricultural compost which can be an effective substitute for peat.

3.2.13 When heavy metals and other potentially toxic materials have been removed from MSW it is possible to complete the stabilisation of the digestate solids by composting. The treated product can then be used as a soil conditioner, an organic mulch or for use in land reclamation. If, however, the digestate solid contains significant amounts of heavy metals and toxins, disposal to landfill will be necessary. In such cases reference should be made to the appropriate waste management licensing controls and legislation.

Digestion equipment

3.2.14 An anaerobic digestion plant typically comprises a digester tank, buildings to house ancillary equipment such as a generator, a biogas storage tank, a flare stack and associated pipework. Plants can vary in scale from a small scheme treating the waste from an individual farm, or a medium-sized centralised facility dealing with wastes from several farms, to a sizeable industrial plant handling large quantities of MSW.

3.2.15 Digestion takes place in a tank, which is usually cylindrical or egg-shaped. The size of the tank will be determined by the projected volume and nature of the waste to be handled and the temperature and retention time in the digester. Some indicative tank dimensions are given in table 1. Digesters with a volume of less than 250m3 can operate successfully on farms. Whereas most tanks are constructed from glass-coated steel, these small digesters are often made of glass fibre-reinforced plastic.

Gas handling equipment

3.2.16 The collection, movement and storage of gas will require a range of equipment, including pipework and valves, flame traps, condensate traps, flare stacks and control and monitoring equipment. In some cases gas needs to be treated, necessitating the addition of extra plant such as filters and de-misters.

3.2.17 The flare stack used for burning off surplus gas comes in two basic types:

- high level stacks, typically 6m to 10m high with a small diameter; and
- low level stacks, typically 3m high with a larger diameter.

The flare stack is often now enclosed in an open-topped cylinder to provide visual concealment and heat insulation.

Plant containment

3.2.18 The ground around tanks and in waste reception areas is usually paved and bunded (surrounded by a barrier) to prevent pollution from the accidental discharge of spilled wastes. A collection system will often be installed within and around the plant to enable spilled waters to be collected and pumped either directly into the digester, or into a mixing tank used to increase the water content of solid waste.

Electricity and heat generation

3.2.19 Biogas can be used to fuel a variety of electricity generation equipment, including spark ignition engines, dual fuel diesel engines and gas turbines. Biogas can also be used to supply heating systems (including that required to maintain the required temperature of the digester), or combined heat and power (CHP) schemes. For small schemes such as farm digesters, the energy can be used to heat the domestic water supply and central heating system. For larger systems, the gas can also be used to heat buildings outside the digestion site.

Sewage gas

3.2.20 Anaerobic digesters installed at municipal sewage works typically range in volume from 180m3 to 3,400m3. The tank can be as high as 15 metres, although it can sometimes be partly buried. In addition to reducing the visual impact, partial burial offers heat insulation benefits and so reduces the energy demand of the digestion process.

Landfill gas

3.2.21 Most landfill sites containing biodegradable organic matter will produce landfill gas (LFG) through a complex process of microbial decomposition. The period of time over which LFG is actively produced will vary according to local conditions. Under favourable conditions, substantial gas generation from a large municipal landfill site would probably be complete within 25-30 years. However, many factors control the decomposition process, including the proportion and nature of the organic material in the waste, moisture content, temperature, acidity, and the design and management of the site. These in turn affect the quantity and composition of gas produced.

Gas collection and management

3.2.22 Many landfill sites are already equipped with LFG collection and control systems to prevent the gas from dispersing. The gas is piped to an extraction plant on the edge of the landfill site. The plant will typically include:

- gas conditioning equipment;
- extraction pumps;
- a flare stack;
- pipework and valves; and
- control and monitoring equipment.

3.2.23 Gas is drawn from the waste via vertical and/or horizontal wells, each of which is monitored and regulated. It is then conveyed to the extraction plant, usually in polyethylene pipes placed underground. LFG comes out of a landfill site warm and saturated with moisture. As it cools in the extraction pipework, liquid condenses out. The pipework is therefore laid at a gradient and incorporates condensate traps to remove this liquid from the gas flow. The type of gas conditioning equipment required depends on the use to which the gas will be put: gas for heat generation does not need to be purified as much as that used for electricity generation.

3.2.24 At any landfill site a flare stack is required to mitigate emission of methane, which will be generated regardless of whether there is energy recovery or not. Where engines are installed the flare will be used where there is excess production or during servicing. In visual terms, flares can be either open (where a luminous flame will be observable) or closed (where the flame will be shrouded).

Electricity Generation

3.2.25 LFG can be used to generate electricity via a number of generation systems, including spark ignition gas engines, dual fuel engines (in conjunction with diesel) and gas turbines. These technologies are now very well established. There is also the potential to generate electricity from landfill gas using fuel cells, but this is less well established at present.

3.2.26 The electricity generation plant tends to be located at or near the landfill site to minimise the need to pipe the gas over great distances. The generation equipment is usually integrated with the gas extraction plant, in a compound typically 25m x 25m in size.

3.2.27 The degree of shelter required depends on the type of equipment installed. The gas extraction pumps and conditioning equipment might be in the open air, under an open sided roof, or in a building along with the generator. Most engines with their generators are supplied in weatherproof prefabricated containers (typically 3m high, 2.5m wide and 10m long), which are fixed onto a concrete plinth. Transformers, switchgear, control panels and instrumentation are housed away from any gas handling plant in separate rooms or buildings.

Direct-End Use

3.2.28 The direct use of LFG as a replacement fuel for coal, oil or natural gas is a well established technology. The gas is pumped direct to a nearby end user, mainly to provide heat in industrial processes such as:

- firing and drying – as in brick and cement manufacture, stove drying and asphalt coating; and
- boiler firing – to raise steam and heat water for the drying and bleaching of textiles and paper, the heating of commercial greenhouses, and for food processing.

3.2.29 Direct end-use systems usually comprise a pressure booster station, a pumping main and the utilisation equipment. The booster station will normally be integrated with the extraction plant. Pumping mains will be placed underground, and tend not to exceed 5 km in length because of the high cost of installation. The utilisation equipment varies greatly depending on the process, and because it will usually be integrated with the process, the impact in relation to planning requirements will be lessened.

PLANNING ISSUES

Anaerobic digestion

Site selection, Transport and Traffic

3.3.1 Many AD plants will be located close to the waste source. Small digesters on farms can sometimes be accommodated quite satisfactorily within the existing complex of farm buildings. Sewage sludge digesters are likely to be built in conjunction with new or existing wastewater treatment works, and will be less noticeable amongst the array of tanks and ponds performing other treatment functions than as a plant in isolation.

3.3.2 Centralised AD facilities (CAD plants) handling large quantities of agricultural wastes, sewage sludge or MSW may be more economically viable for the plant operators, but have the potential to raise more complex siting issues. Acceptable sites are likely to include those beside existing industrial or wastewater treatment works or, in the case of digestion schemes using MSW, in close proximity to a landfill site or waste transfer station.

3.3.3 Transport movements at on-farm digesters are not likely to add significantly to the impact of normal farm activities. By comparison, CAD plants will draw traffic to their central location as feedstock is delivered and products are distributed. The impact of these transport movements can be minimised by carefully considering fuel supply logistics, thereby reducing the distances travelled between the feedstocks, storage tanks, digester and local markets.

Feedstocks and Product Storage

3.3.4 Planning permission may be given to a scheme specifying a certain feedstock and in these circumstances the feedstock will not be able to be changed without the further planning consent. The appropriate authorities should be consulted early in the process when considering waste handling issues and classifications.

3.3.5 The storage of farm slurry is covered by the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (Northern Ireland) 2003 and the Nitrates Action Programme Regulations (Northern Ireland) 2006, which specify minimum standards relating to the design, construction and operation of any farm slurry storage system. Storage facilities will also be needed for the processed fibre. The market is seasonal, so storage could be needed for up to six months output. Liquors can be stored on the farm, or at a CAD plant. Once cooled, they can be stored in lagoons or large tanks. For CAD sites, liquid storage facilities will need bunding around storage silos.

Odour

3.3.6 Predicted odour effects and proposed mitigating measures such as odour control systems should be examined. If a location is considered to be sensitive to odour nuisance, the Department will seek information from the developer to ensure that all possible sources of odour are accounted for in the proposals for odour control.

3.3.7 Odour may arise from:

- waste input storage bays: this is especially important during the summer, when the breakdown of organic material can begin before it is even collected for disposal;
- sorting and mixing plant: here the waste is sorted or mixed with digestate prior to digestion;
- the digester: although this is sealed during use, this will release odours when opened to allow cleaning; and
- digestate draw-off and de-watering plant: digested material is significantly less odorous than raw organic material, but can still give off unpleasant smells.

It should however be noted that AD can bring benefits in terms of odour reduction. The digestion of slurry, for example, is significantly less odorous than the common practice of storing slurry in pits.

Emissions to Ground and Watercourses

3.3.8 Serious farm pollution incidents can occur through the leakage or run-off of raw agricultural wastes. The AD of farm waste should reduce the likelihood and capacity of the material to pollute controlled waters. By following the Department of Agriculture and Rural Development Code of Good Agricultural Practice for the Prevention of Pollution of Water, Air and Soil, emissions to ground and watercourses should be minimised.

Emissions to Air

3.3.9 The production and use of biogas through AD results in a number of emissions to air, including those from gas vents, engine exhausts and flare stacks. These emissions are generally minor and are unlikely to present any significant environmental problem, provided the equipment meets relevant design specifications and is properly serviced. The Department's Northern Ireland Environment Agency (NIEA) will apply Integrated Pollution Control regulations to larger plant which will control emissions; this will apply to larger on-farm schemes as well as CAD plants.

Sewage gas

Site selection, Transport and Traffic

3.3.10 In general terms, sites for sewage digestion plant will be influenced by the presence of a suitable wastewater treatment plant. At a site-specific level the location of the sludge digesters is likely to be dictated by the constraints of other systems to which they are linked at a treatment works. It is sometimes the case that some sludge is transported to wastewater treatment plants by tanker, and therefore there may be some local variation in siting in relation to the logistics of sludge transportation.

Feedstocks and Product Storage

3.3.11 Sewage sludge is not generally stored in liquid form for extended periods of time. There are however usually intermediate storage tanks which act as buffers for variations in flow or input from sludge tankers.

Odour

3.3.12 Given that sewage sludge digesters are normally located at wastewater treatment works, odour emissions are likely to be dominated by the primary treatment processes (settlement/aerobic treatment), which usually take place in open tanks.

Emissions to Air, Ground and Watercourses

3.3.13 Issues will be broadly the same as those described under anaerobic digestion. They are likely to be addressed as part of the collection of operations of a wastewater treatment works.

Landfill gas

Site selection

3.3.14 LFG plant should be located away from housing and other sensitive land uses, for reasons of safety and amenity (including potential noise). In practice this separation will rarely be difficult to achieve, given the large scale of landfill sites and the fact that they are generally situated away from residential areas.

3.3.15 The visual impact of a landfill gas generation scheme may be relatively insignificant if it is co-located with other activities such as waste disposal on a site adjacent to a completed landfill. If, alternatively, extraction and landfill works have ended and the site is undergoing restoration, the Department may wish to consider the need for mitigating measures to reduce any visual intrusion caused by the plant.

Odour and emissions

3.3.16 The statutory definition of the combustion process specifies that "'fuel' does not include gas produced by the biological degradation of waste". As such, the emissions from typical LFG plant are not currently regulated. Landfill gas fuelled generators may be regulated under EU stationary engines regulations in the near future. This is expected to result in a tightening of emissions limits.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

Anaerobic digestion

3.4.1 A planning application for an anaerobic digestion plant could usefully include the following:

- site plan and elevation drawings to help determine visual impact;
- photomontage of digester, plant building(s) and chimney stack with clear indication of building material;

- information on grid connection works, including transformer and transmission lines;
- details of potential noise or emissions to air and an assessment of their impact;
- details of vehicular access and vehicular movement;
- landscaping provisions;
- site management measures during the construction phase;
- model of emissions dispersion; and
- community consultation plans.

Sewage gas

3.4.2 An application for a sewage digestion plant could, in addition to the above, include reference to the existing wastewater treatment plant.

Landfill gas

3.4.3 An application for a landfill gas plant could, in addition to the information listed above, note that the LFG plant would require the addition of a powerhouse to a typical landfill site.

Environmental Impact Assessment

3.4.4 Developments that use waste to produce energy may require EIA. Such projects could fall within projects listed in Schedule 2.3 and/or 2.11 to the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999.

OTHER AUTHORISATIONS/CONSENTS

3.5.1 Dependent upon the level of energy generation and the details of the facility, the operations may require any of the following authorisations/consents:

- DETI consent for electricity generation over 10MW
- Abstraction License
- Pollution Control
- Waste Management License

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4. Energy from Waste (Thermal processes)

INTRODUCTION

4.1.1 There are various technological configurations adopted to extract energy from waste. These can be broadly subdivided into thermal and biological processes. Biological processes are covered under Section 3, while this section relates to the thermal processes, which use a high temperature process to release the chemical energy in the fuel.

4.1.2 This section offers guidance on types of thermal plant used to extract energy from the biodegradable fraction of waste. It discusses their main characteristics, the basic technology and their environmental implications. The Northern Ireland Renewables Obligation Order definition is adopted here as the definition of what constitutes renewable energy in relation to energy from waste, and this is defined below.

Municipal Solid Waste

4.1.3 Municipal solid waste (MSW) is the term used to describe those wastes gathered from domestic and commercial premises by the local waste collection authority. The quantity of MSW available is broadly proportional to the population of an area, but its composition will be affected by local factors such as the method of waste collection and the extent of waste recycling.

Business waste

4.1.4 Non-hazardous industrial and commercial waste arisings in the UK have been estimated to be around 25 million tonnes per year, consisting mostly of paper, cardboard, wood and plastics. The disposal route for the bulk of this waste is landfill, although a small amount is incinerated along with MSW. In general, non-hazardous business waste can be preprocessed in similar ways to MSW to enable combustion using a range of technologies.

Other relevant wastes

4.1.5 The main types of other wastes suitable for energy from waste schemes are as follows:

Sewage sludge: in 1999 (latest available figures) the UK produced 1.13million tonnes of sludge (dry solids). This corresponds to an average of about 20kg generated by each person and may be considered for combustion or other thermal processes for the disposal of this material.

Wood processing waste: small quantities of processed wood waste are produced by the furniture industries and can be classed as renewable, in their uncontaminated form.

Waste arisings and collection

4.1.6 The source and collection method of the waste material affects the scope for using it in energy generation. MSW arisings are spread through an area, and are collected by local authorities or their contractors and taken to disposal sites. Other wastes arise at specific locations and lend themselves to small-scale energy schemes. There are economies of scale with larger more centralised plants.

Implications of the Renewables Obligation

4.1.7 Only those installations that are eligible to receive Renewables Obligation Certificates (ROCs) under The Renewables Obligation Order (Northern Ireland) 2009[6] (the NIRO Order) are counted as renewable energy generation in the context of this document. Other proposals for energy from waste will be assessed under the provisions of PPS 11 'Planning and Waste Management'.

4.1.8 The NIRO Order provides that the biomass fraction of waste will be eligible for ROCs. 'Biomass' is defined here as a fuel of which at least 90% of the energy content is derived from plant or animal matter or substances derived directly or indirectly there from (whether or not such matter or substances are waste) and includes agricultural, forestry or wood wastes or residues, sewage, fungi, algae, and energy crops.

4.1.9 A generating station which is fired wholly or partly from waste is excluded from receiving ROCs unless:

- the waste is biomass in accordance with the above definition; or
- the waste is in the form of a liquid or gaseous fuel produced by advanced conversion technologies (e.g. pyrolysis and gasification); or
- the station is a Combined Heat and Power (CHP) station accredited under the CHP Quality Assurance Standard.

4.1.10 In accordance with this definition, conventional waste incinerators firing MSW will not be able to claim ROCs for the electricity they generate.

TECHNOLOGY

4.2.1 Conventional incineration and the advanced technologies defined in the Renewables Obligation above are the two technology routes most likely to be used to recover energy from solid waste in the short to medium term. The provisions of the Renewables Obligation may increase substantially the numbers of Energy from Waste installations using advanced processes in the future.

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[6] The Renewables Obligation Order (Northern Ireland) 2009 (S.R 2009 No. 154)

Direct combustion

4.2.2 The majority of MSW incinerators burn the waste stream essentially in the form it is collected. This process is called direct combustion. The combustion gases are cleaned in a sequence of processes which remove particulates, acid gases and trace organic compounds. The ash exits the process as two distinct streams – bottom ash that falls from the combustion grate, and fly ash that is separated from the flue gases. Bottom ash is considered to be inert and, after the separation of metals, is often used as an aggregate in the roads and construction industry. Fly ash can contain heavy metal contamination and so should be disposed of in a controlled hazardous waste landfill.

Pyrolysis

4.2.3 In recent years the concepts of waste pyrolysis and gasification have received considerable attention and a number of companies are offering systems for commercial installation. Pyrolysis is the process of heating fuel in the absence of air to produce charcoal and a gaseous fuel ('syngas'). These can then be burned in boilers, engines or turbines to generate heat and power. Plants with pyrolysis only are less common than those where pyrolysis is combined with gasification.

Gasification

4.2.4 Gasification is a process of partial combustion, which enables operators to effectively control the temperature of the process, with consequent mitigation of pollutants. A gas is formed when the fuel reacts with sufficient oxygen to maintain a high reaction temperature but with insufficient oxygen to complete combustion. This gas can then be used in engines, boilers or turbines to generate power.

4.2.5 For all these processes the useful energy in the waste is generally released by combustion, although increasingly syngas from pyrolysis and gasification is being used as a source of hydrogen for fuel cells. In the context of fuel cells, pyrolysis and gasification as processes have the advantage of producing a homogeneous gas from which hydrogen can be extracted.

4.2.6 Pyrolysis and gasification are still developing but experience thus far has demonstrated that the superior control of the combustion offered by these processes can create lower levels of contaminants in the exhaust gas when compared with typical grate combustion.

4.2.7 Waste can be pre-treated in a variety of ways to improve its combustion efficiency and extract recyclable materials such as metal and glass. Treatments include shredding, sorting and separation, and drying. The equipment used for sorting waste will typically include rotating and vibrating screens, magnetic separators, air separators and manual picking belts. Some more innovative systems use high temperature washing. The pressure from recycling targets has already resulted in an increase in materials recovery facilities and in future these may well be co-located with Energy from Waste installations.

Combined Heat and Power

4.2.8 The most efficient Energy from Waste schemes generate both electricity and heat, through Combined Heat and Power (CHP) plants. This method is particularly beneficial as most of the energy in the waste can be put to good use and the improvement in energy efficiency leads to a corresponding reduction in emissions. It is desirable for CHP and Community Heating Schemes to be situated close to local energy users in order to minimise the costs of the heat distribution system.

4.2.9 A typical waste-fuelled combined heat and power process will involve some or all of the following:

- waste reception and storage;
- waste processing, material sorting and recovery;
- feeding waste into the combustion, pyrolysis or gasification chamber;
- the combustion, pyrolysis or gasification reactor itself;
- generation of heat and power using steam turbines, gas engines or gas turbines;
- treating the waste gases to reduce emissions;
- handling, storage and disposal of ash; and,
- handling, storage and disposal of liquid effluents such as boiler water and surface water.

Scale of development

4.2.10 Energy from Waste plants vary in size from small installations (serving factories for example) to large-scale MSW plants. New projects therefore might either be accommodated within existing or converted buildings, or may require large new sites.

4.2.11 The costs of meeting stringent licensing standards mean that MSW plants using incineration need to achieve economies of scale to be viable. Incinerators in the UK have a waste throughput of in the region of 100,000 to 600,000 tonnes per year. A MSW plant consuming 400,000 tonnes of waste per year will produce approximately 34MW of electricity, enough to supply about 64,000 homes.

Disposal of ash and gas cleaning residues

4.2.12 There are two types of ash from conventional incinerators. The ash that falls from the combustion grate (bottom ash) is inert and can often be used as an aggregate in the roads and construction industry. The ash from the flue gas cleaning installation contains heavy metals and traces of other contaminants and should be sent to controlled landfill. The ash from gasification and pyrolysis plants may contain a higher carbon content but this is not thought to be harmful as the carbon is in its elemental form and inert. Heavy metals will still be found in the finer ash and may need disposal in controlled landfill. This will depend upon the process and appropriate treatment of this ash will be a condition of the licence to operate.

PLANNING ISSUES

Siting issues

4.3.1 The siting of an Energy from Waste plant is likely to be influenced by the following factors:

- the source of the waste;
- the economic implications of transporting the waste and disposal of any associated by-products;
- site access; and
- proposed energy use, the availability of local heat markets and ease of connection to the electricity distribution network.

4.3.2 In general, waste treatment and disposal operations are characterised to a large extent by the high volume of materials entering and exiting the site. In order to minimise the adverse environmental effects of transporting waste, they should, wherever possible, be located close to the waste source. The optimum locations for most MSW and business waste plants are therefore likely to be in or very close to urban areas.

4.3.3 The Department will take into account the waste management plans being drawn up for the Region. These should identify the spare capacity at existing plants, sites for new waste management plants, or areas of search for new sites. They should also set out the land-use criteria against which planning applications for new waste management development will be assessed.

Visual Effects

4.3.4 In many cases, Energy from Waste developments are likely to be proposed in industrial areas, where they will be broadly in keeping with the existing buildings. Even so, the developments can be prominent features, and therefore the Department will expect a high standard of design and landscaping in order to minimise their visual impact.

4.3.5 Chimney height will vary depending on a number of factors, including the scale of plant, its capacity, local conditions and on occasion, the technology used. Pyrolysis and gasification plant generally need lower stack heights than incineration. Ultimately chimney height will be determined by pollution control procedures under the Pollution Prevention and Control Regulations (Northern Ireland) 2003 or the Clean Air (Northern Ireland) Order1981, to ensure adequate dispersal of emissions in the exhaust gas.

Ambient air quality and odour

4.3.6 A plant that complies with licence requirements for air pollution might still give rise to odours. For large projects, such as MSW incinerators, odour is covered under the PPC Regulations administered by the Northern Ireland Environment Agency (NIEA), and for smaller projects it is covered under District Council PPC permits. The sources of odour nuisance may not always be emissions through chimneys and vents from the works, but could arise from open-air storage, handling or transport of waste materials or their products. In considering proposals, it should be borne in mind that some problems may be created by odour, particularly where a site is close to housing or other odour-sensitive land uses such as a school. In addition emissions from EfW plants and traffic movements associated with larger plant should be assessed taking account of any Local Air Quality Plans drawn up by District Councils.

Dust

4.3.7 With the exception of particulates from stacks, most dust is created during waste processing and ash handling operations. Practical measures for dust control include minimising, or eliminating open-air storage, water sprinkling and transportation within covered skips or lorries. On-site processing of ash can also significantly assist dust control. Emission levels are regulated through the Department's Northern Ireland Environment Agency (NIEA) or the terms of a site's Waste Management Licence.

Emissions to water

4.3.8 Water bodies may be affected either by emissions entering from the atmosphere or the by certain liquid effluents created by particular processes. The main sources of liquid effluent will be from gas cleaning systems, cooling water and surface run off. NIEA has responsibility for the control of water quality. The Department of Agriculture and Rural Development's Rivers Agency will need to be consulted if it is proposed that river water is used for cooling. The Loughs Agency may need to be consulted for proposals affecting the Foyle and Carlingford catchments.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

4.4.1 A planning application for a thermal Energy from Waste plant could usefully include the following:

- site plan and elevation drawings to help determine visual impact;
- photomontage of plant building(s) and chimney stack with clear indication of building material;
- information on grid connection works, including transformer and transmission lines;
- details of air and noise emissions and an assessment of their impacts;

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- details of vehicular access and vehicular movement;
- landscaping provisions;
- site management measures during the construction phase; and
- model of emissions dispersion.

Environmental Assessment

4.4.2 Developments that use waste to produce energy may require EIA. Such projects could fall within projects listed in Schedule 2.3 and/or 2.11 to the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999.

OTHER AUTHORISATIONS/CONSENTS

4.5.1 Dependent upon the level of energy generation and the details of the facility, the operations require any of the following authorisations/consents:

- DETI consent for electricity generation over 10MW
- Waste Incineration Directive
- Pollution Control
- Ambient Air Quality/Odour

5. Small Hydro

INTRODUCTION

5.1.1 Hydropower is well developed in Great Britain, where most sites with a potential greater than 1MW have already been developed. However, there is the potential for the development of sites in Northern Ireland in the range of 100kW (0.1MW) to 500kW (0.5MW), and the possibility for a few sites of up to 1MW, which could be economically developed as grid connected schemes. In addition, there are a larger number of locations where smaller, domestic scale schemes in the range 10kW to 50kW could be developed. This section deals with smaller hydro schemes of up to 1MW.

TECHNOLOGY

5.2.1 The technology for harnessing waterpower is well established. Water flowing from a higher to a lower level is used to drive a turbine, which produces mechanical energy. This mechanical energy is usually turned into electrical energy by a generator, or more rarely to drive a useful mechanical device.

5.2.2 The energy produced is directly proportional to the volume of water and the vertical distance it falls. Thus, a similar amount of energy could be produced from a small volume of water falling over a long vertical distance (high head), as from a larger amount of water falling a much shorter vertical distance (low head).

5.2.3 The majority of schemes are likely to be 'run of river', where water is taken from a river from behind a low weir, with no facility for water storage, and returned to the same watercourse after passing through the turbine. In addition, potential also exists for small hydro installed on existing reservoirs, but these may also be treated as 'run of river', as they do not involve the construction of a new impounding structure.

5.2.4 Pumped storage schemes are capable of being used in conjunction with more intermittent forms of renewable energy to smooth out the intermittency by providing an element of energy storage. During periods of low demand, but when the prime resource is available, excess energy is used to pump water from a lower level to a higher level reservoir. During periods when demand is high and the prime resource availability is low, the water from the higher reservoir is released via a turbine to the lower reservoir to generate electricity. Such schemes may require the construction of two new reservoirs, but apart from this, the technology employed, and the implications for the planning system, are similar to those outlined in this section. However, because of the cost involved, pumped storage schemes of less than 1MW are likely to be extremely rare.

5.2.5 The essential elements of a hydro scheme are as follows:

- a source of water that will provide a reasonably constant supply. Sufficient depth of water is required at the point at which water is taken from the watercourse, and this is achieved by building a low weir (typically up to 2 metres high) across the watercourse. This is called the ‘intake’;
- a pipeline, often known as a penstock, to connect the intake to the turbine. A short open ‘headrace’ channel may be required between the intake and the pipeline, but long headrace channels are rare due to environmental and economic constraints;
- a building housing the turbine, generator and ancillary equipment – the ‘turbine house’.
- a ‘tailrace’ returning the water to the watercourse; and
- a link to the electricity network, or the user’s premises.

These are explained below.

The Intake

5.2.6 The scale and nature of these elements depend on site conditions, and whether the scheme is low head or high head.

5.2.7 The intake typically comprises a weir, up to 2 metres high, across the watercourse. A spillway ensures that the downstream watercourse is never totally deprived of flow, and a screen or trashrack prevents floating debris or fish from entering the pipeline. A valve or sluicegate is often incorporated, and where the watercourse has a high silt load, a settling tank may be required. The Department’s Northern Ireland Environment Agency (NIEA), Land and Resource Management Unit should be consulted regarding disposal of debris from the trashrack.

The pipeline

5.2.8 The pipeline (sometimes called the penstock) connects the intake with the turbine. This is typically a pipe of steel, plastic or composite material, the diameter of which could be between 10cm and 100cm, depending on the characteristics of the site, and the capacity of the scheme. High head schemes typically have smaller diameter pipes of longer length (sometimes over a kilometre), whereas low head schemes are typified by short, larger diameter pipes. Pipes are often buried for environmental or technical reasons. Anchor blocks to restrain the pipe are required at vertical and horizontal changes of direction, but these are usually buried if the pipe is buried.

5.2.9 Open headrace channels are now rare on new schemes, but may occur if the project involves the rehabilitation of an existing scheme, particularly on old watermill sites.

The turbine house

5.2.10 The building houses the turbine, generator and ancillary equipment, and is typically a single storey building of between 3 metres by 4 metres for a small domestic scheme, to 10 metres by 10 metres for a large grid connected scheme. Occasionally, particularly on old watermill sites, the machinery may be located in an existing building. Vehicular access to the turbine house is required for construction and maintenance purposes.

5.2.11 To minimise the length of the tailrace, and to maximise the available head, the turbine house is usually located close to the watercourse.

The tailrace

5.2.12 After use, the water is returned to the natural watercourse via a concrete or masonry channel connecting the turbine house to the watercourse. To avoid flooding the turbine, this channel should have a gradient sufficient to allow free discharge of water. A screen to prevent the ingress of fish should generally be incorporated. Occasionally the tailrace is an underground structure.

Electricity connection

5.2.13 When linking to the grid the connection between the turbine house and the local electricity network is typically 3 wires, supported on single wooden poles.

The context

5.2.14 High head hydro sites require a significant fall and a significant proportion of river flow. Development is therefore likely to take place in hilly or mountainous areas, many of which may be of landscape or nature conservation interest. This can be a potential barrier to small hydro development although careful consideration of all the benefits and disbenefits of a development is required. Small hydro schemes will seek to make the most efficient use of any site in terms of water abstraction to help maximise energy production. NIEA Water Management Unit will put stringent controls on the water abstraction regime, particularly where nature conservation interests are evident, and negotiations are required between all parties at an early stage in order to reach an acceptable solution.

5.2.15 The built elements of small hydro schemes should be small and of a scale in keeping with the river valleys in which they are sited.

PLANNING ISSUES

5.3.1 The development of hydro-electric power generation schemes should be achieved in a manner which is compatible with the many other uses to which a river is put. Early liaison between the developer and the relevant statutory undertakers is essential to ensure that all statutory remits are met, and that proposals do not detract from the existing value and interest of the watercourse and its surroundings. There is some potential for environmental improvements through technical measures.

Siting and the landscape

5.3.2 As with several renewable sources of energy, it is usually only possible to exploit hydropower resources where they occur. Hydro schemes do however enjoy modest locational flexibility as the precise siting of the intake and the turbine house can sometimes be influenced by non-operational factors, including local landscape characteristics.

5.3.3 Consideration should be given to integrating a new scheme into the landscape as far as possible. Where rivers are lined with trees, for instance, it will be relatively simple to conceal hydropower facilities, particularly if the existing woodland cover is supplemented by new planting. Where the development is taking place in a more open location, built elements should either be designed to be as small as possible, having regard to operational considerations, or should be designed to be in keeping with local landscape and architectural features. In the case of schemes proposed for hillsides or other prominent locations, the landscape impact of the development in close and distant views should be appraised. Careful consideration should be given to burying the pipeline and restoration of the pipeline route.

5.3.4 In some cases, the visual appearance of waterfalls may be affected by water abstraction. In these cases, consideration should be given to potential viewers, and to the importance of the waterfall in immediate and longer distance views. Assessment of effects can usefully include photographs of the waterfalls at various flows, as existing summer flows may match the proposed flows after abstraction during the wetter months. Measures could be adopted to overcome visual objections, such as requiring abstraction to be reduced during the day in summer months when visitors are most likely to be present.

5.3.5 Measures to minimise the visual impact of pipes and power lines should also be considered carefully at the design and planning application stages.

Design Considerations

5.3.6 Although the hydro developments anticipated will generally be small in scale, their waterside location will, in many cases, place them in areas valued for their visual and natural amenity. Such schemes can operate for many decades, and their principal built elements will often become a permanent feature in the landscape. In some circumstances, weirs, fish ladders and turbine houses can become features of interest in their own right.

5.3.7 For these reasons, the Department will expect a high standard of design. Particular attention should to be given to the architectural quality of built elements, the choice of building materials, and manner in which the development is integrated with its surroundings. Design schemes that are in harmony with their surroundings, perhaps incorporating vernacular building materials and styles will be encouraged.

Hydrological Considerations

5.3.8 During operation of a small hydro scheme, water is abstracted over a short stretch of the river. The scheme does not pollute or consume water and usually returns the supply to the channel from which it was abstracted. Water that has passed through a turbine is often improved by aeration and is free of debris. NIEA will be consulted regarding the water extraction regime.

Ecological Considerations

5.3.9 The effect of water abstraction on the riverine ecology can be a concern, particularly in areas that are valued or designated for their ecological resource. Where ecological issues are considered to be important, liaison between the developer, NIEA Natural Heritage and Water Management Unit, the Department for Culture Arts and Leisure and, where appropriate, the Loughs Agency will help to establish the required environmental information to be provided at the planning application stage, and the potential impacts that are to be considered. This may include surveys of river corridor and river beds habitats, bryophytes, fish, invertebrates, amphibians, birds and mammals. The effects of changed flow regimes and water quality may need to be assessed. It is possible that impacts can be 'designed out' of the scheme with measures such as pulsed flow or seasonal operating of the plant.

Fisheries interests

5.3.10 Fish can be killed or injured by hydropower schemes. This risk can be minimised by careful design and adjustment of the seasonal operating schedule of the plant. Some types of turbine (such as low to medium head crossflow designs) can oxygenate the river water and may thereby benefit the fish population. Dams and weirs should include structures which allow free passage of migratory fish, and afford fish and other freshwater animals protection from the turbines while maintaining flows.

Noise

5.3.11 The noise emitted from a turbine should generally be well contained by the turbine house and should not be heard more than a few metres away. However, in appropriate cases, for example if the site is close to residential properties, developers will be required to submit a noise assessment to accompany their proposal and they should consult with the local District Council's Environmental Health Department.

Construction disturbance

5.3.12 In general, the construction impact of a hydro-power scheme will be no different to that of other developments of similar size. However, construction on or beside a river will often cause the water to become clouded with silt or mud. Before granting planning permission for a hydro project, the Department may, in consultation with NIEA Water Management Unit, the Department of Agriculture and Rural Development's (DARD) Rivers Agency and where appropriate the Loughs Agency, request that a developer specifies the site management measures that will be adopted to minimise this problem.

5.3.13 The construction of the pipeline and weir may have an impact on sensitive habitats. In this instance the developer may be required to submit a detailed construction specification, and in areas designated for their nature conservation or ecological importance, an officer from NIEA may be required to be present on site during certain parts of the construction process. This can ensure that construction is carried out in a manner that is most sensitive to the ecology of the site.

Operational disturbance

5.3.14 Once in operation, small hydro schemes require little maintenance. A weekly visit is usually all that is required, and a well-constructed remotely operated plant may demand less frequent visits. Depending on the design, daily cleaning of the trashrack may be required during autumn, but self-cleaning screens are increasingly common.

Recreation and Public Access

5.3.15 A small hydropower scheme will have a negligible impact on public access, though fisheries interests or other users of the river might be affected. The pipeline route may often be designed to follow the route of an existing footpath alongside a river, but impacts will be confined to the construction stage of the project where temporary diversions or closure may be required.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

5.4.1 A planning application for a hydro development should, where appropriate, include the following information:

- maps, diagrams and drawings showing the location and design of intake, pipeline, turbine and turbine house, weirs, tailrace and security fencing and lighting for urban schemes;
- details of air and noise emissions and an assessment of their impacts;
- photomontage of intake;
- grid connection works, including transformer and transmission lines;
- provision for fish passes (where required);
- information on environmental and biodiversity impacts;
- details of vehicular access and vehicular movement;
- landscaping provisions; and
- measures for management of the site during the construction phase and for long term maintenance.

Environmental Assessment

5.4.2 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 include "installations for hydroelectric energy production" within Schedule 2(3)(i). Those with a generating capacity of over 500kW (0.5MW) must be screened for the need for EIA. Where a screening opinion is required, Schedule 3 to the EIA Regulations provides selection criteria for screening Schedule 2 development.

5.4.3 An EIA is often required by NIEA Water Management Unit as part of the application for an Abstraction Licence. Consultation between statutory agencies at the scoping stage will minimise duplication of effort. In many cases, one Environmental Statement will be sufficient for both purposes.

OTHER AUTHORISATIONS/CONSENTS

5.5.1 In addition to planning permission, a hydro scheme may require any of the following authorisations.

- DETI consent for electricity generation over 10MW
- Abstraction License
- Consent to work in a water course

6. Active Solar (Photovoltaics)

INTRODUCTION

6.1.1 Active solar technology can be divided into two categories: Photovoltaic (PV) and Solar Water Heating (SWH). Solar PV is unique among renewable energy technologies in that in addition to generating electricity from daylight, it can also be used as a building material in its own right. PV can either be roof mounted or free-standing in modular form, or integrated into the roof or facades of buildings through the use of solar shingles, solar slates, solar glass laminates and other solar building design solutions.

TECHNOLOGY

6.2.1 PV systems exploit the direct conversion of daylight into electricity in a semi-conductor device.

6.2.2 The most common form of device comprises a number of semi conductor cells which are interconnected and encapsulated to form a solar panel or module. There is considerable variation in appearance, but many solar panels are dark in colour, and have low reflective properties. Solar panels are typically 0.5 to 1m^2 having a peak output of 70 to 160 watts. A number of modules are usually connected together in an array to produce the required output, the area of which can vary from a few square metres to several hundred square metres. A typical array on a domestic dwelling would have an area of 9 to 18m^2, and would produce 1 to 2 kW peak output.

6.2.3 Other forms of solar PV technology are becoming more common in the UK, such as solar tiles, which can be integrated into new buildings or refurbishments alongside conventional roofing tiles or slates. They have the aesthetic advantage of giving a roof an homogeneous appearance, virtually indistinguishable from conventional roofing materials. PV modules can be fitted on top of an existing roof using a low support structure. In this case, the panels will typically lie flush with the existing roof and not protrude above the roofline. Alternatively, and particularly in new buildings, they may form all or part of the weatherproofing element of the roof, replacing conventional slates or tiles. Where the modules form only part of the area of the roof, they can be integrated in a similar way to proprietary skylights.

6.2.4 Connections between individual panels are made either in the support structure, or inside the roof void, and are rarely visible from the exterior of the building.

Siting issues

6.2.5 For best performance, PV modules need to be inclined at an angle of 20-40 degrees, depending on the latitude, and orientated facing due south. In practical terms, this is not always possible on existing buildings, and some degree of flexibility in inclination and orientation is acceptable although this will be at the expense of best performance. To function well PV installations need to be inclined at between 10 and 60 degrees, and orientated facing from east to west (i.e. within 90 degrees of due south).

6.2.6 Although roof mounted PV is the most common, modules can also be mounted on the sides of buildings, or on free standing support structures on the ground. In some cases, particularly on institutional or commercial buildings, PV cladding on the side of the building can be an architectural feature as well as a supply of electricity. Other examples of building integrated PV include external sun shading of office windows (bris-solaires) and glass atrium roofs.

6.2.7 Shadows from buildings, trees or other structures can significantly reduce performance of the PV system and planners and designers should take reasonable steps to minimise permanent overshading of the PV.

Types of system

6.2.8 **Stand-alone systems**: PV is widely used to provide power for communications systems, domestic dwellings and monitoring systems either in remote areas or locations where connection to the grid is expensive or otherwise problematic, e.g. certain road signage. Elsewhere in the UK, the use of PV to provide energy for lighting of telephone kiosks in rural areas, bus shelter lighting, remote traffic monitoring, and railway trackside signalling is increasing as it is almost always more cost-effective than new connections to the grid.

6.2.9 **Grid-connected schemes**: In grid-connected solar PV systems NIE Energy (Northern Ireland Electricity) offers a 'Renewable Generation Contract' under which it offers small generators (up to 1MW capacity) a payment for both the NIROCs (Northern Ireland Renewable Obligation Certificates) on accredited generation and for electricity that is exported. Other contractual arrangements may be available through Second Tier Suppliers. Further information is available on the NIE Energy website http://www.nie-yourenergy.co.uk./micro.php.

The context

6.2.10 PV technology is expected to decrease in cost over the next decade and PV systems could provide a useful contribution to renewable energy generation. For its part the Department would encourage greater use of PV systems in new developments and the retrofitting or incorporation of such technology on existing buildings where appropriate.

PLANNING ISSUES

General

6.3.1 The technology will be familiar to most and from the planning point of view, whilst there are clearly implications for listed buildings and the sensitive front elevations of some conservation areas, in general 'solar panels' are to be encouraged. In most cases involving dwelling houses, provided the building is not listed or in a conservation area and the installation complies with the relevant constraints, PV will be "permitted development" and a planning application will not be required. The panels cannot however, extend more than 15 centimetres beyond the plane of any existing roof slope which fronts any road to comply with Schedule 1 Part 1, Class B1(c) of the Planning (General Development) Order) Northern Ireland) 1993. It should be noted that permitted development rights for small-scale renewable energy development are currently under review by the Department.

6.3.2 PV is particularly well suited to the urban environment and is clean and silent in operation.

6.3.3 The increasing take-up of solar PV technologies raises a number of considerations which may need to be taken into account. These include:

- whether particular systems require planning permission;
- the importance of siting systems in situations where they can collect the most energy from the sun;
- the need for sufficient area of solar modules to produce the required energy output from the system; and
- the colour and appearance of the modules.

Listed buildings and designated areas

6.3.4 The installation of a PV array on a building listed for its special architectural merit or historic interest – or on another building or structure within its curtilage – is likely to require an application for listed building consent. This will be so, even if specific planning permission is unnecessary.

6.3.5 Permitted development rights to clad the walls or alter the existing roofline of a dwelling do not necessarily apply in Areas of Outstanding Natural Beauty, Conservation Areas or Areas of Special Scientific Interest. When considering applications in these areas the potential impact on the character or appearance of the area should be considered.

6.3.6 If an application for a PV module is submitted for a building close to a conservation area, or close to a listed building, its proximity to such area or buildings may be a material consideration in deciding the application.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

6.4.1 A planning application or application for listed building consent for a solar PV system could usefully include the following information:

- the design of the module or array;
- photographs of the existing built environment;
- detail of the roof mounting arrangement, if applicable;
- indicative drawings of the module or array in place;
- connection details to the building or grid if relevant;
- if the application involves a listed building, a photomontage of the proposed collector array could be useful.

Environmental Assessment

6.4.2 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 do not include solar energy systems specifically in Schedule 1 or 2. However any industrial scale installation for the production of electricity which exceeds 0.5 hectares is listed in Schedule 2 and would therefore require a Screening Opinion. Such large scale PV installations, however, are rare in the UK. Domestic or small-scale systems are not covered by Schedule 1 or 2 and are therefore not likely to require an EIA. In AONBs, conservation areas and on listed buildings, the only issues likely to be important are visual amenity and building fabric and these can be covered by a short description accompanying the planning application.

OTHER AUTHORISATIONS/CONSENTS

6.5.1 For stand-alone systems not connected to the distribution network, no additional authorisations are required. For systems that are connected to the electricity network, prior consent of NIE must be obtained in accordance with NIEs current connection process. Small PV systems come within the scope of Engineering Recommendation G83/1 – *Recommendations for the Connection of Small Scale Embedded Generators (up to 16A per phase), in Parallel with Public Distribution Networks*, (Issue 1: 2003). NIE have increased the limit of G83 applications to 6kW per phase. Larger systems may be required to meet Engineering Recommendation G59/1/NI – *Recommendations for the connection of embedded generating plant to Northern Ireland Electricity's distribution systems*. Schemes for 10MW or more of electricity generation will require DETI consent.

6.5.2 There may be instances where the retrofitting of solar panels to an existing building will require building control consent.

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7. Solar Thermal (Solar Water Heating)

INTRODUCTION

7.1.1 Active solar technology can be divided into two categories: Photovoltaic (PV) and Solar Water Heating (SWH). The technologies appear to be similar, in that they both use roof mounted equipment to collect radiation from the sun and convert it to a useful form of energy, but they produce two different things: electricity in the case of PV and hot water in the case of Solar Water Heating. This section deals with Solar Water Heating, and describes the basic technology and applications. Some sections are common to both sections: the repetition between them is intentional.

7.1.2 Solar water heating systems can be used to heat water for a variety of purposes. Amongst the most common are domestic use, light industrial and agricultural use and the heating of swimming pools. At present, the widest use is in the residential domestic hot water sector. SWH systems are occasionally used to provide space heating.

7.1.3 There is a common misconception that solar water heating is ineffective in the UK for climatic reasons. Whilst it is clearly not as effective in the UK as it could be in Spain for instance, a good modern system will make a significant contribution to water heating requirements. The domestic sector is an obvious priority – a well-designed system should provide 50–60% of annual domestic hot water requirements, with most of this energy capture being between May and September.

TECHNOLOGY

7.2.1 The key component in a solar water heating system is the collector. Two main types are common in the UK: flat plate collectors and evacuated tube collectors. In both types, radiation from the sun is collected by an absorber, and is transferred as heat to a fluid, which may be either water, or a special fluid employed to convey the energy to the domestic system using a heat exchanger.

Flat plate collectors

7.2.2 Flat plate collectors comprise a water filled metal 'envelope' with a special black coating which improves absorption of solar energy and heat transfer. This is housed in a glazed, insulated box. The collector is connected to the hot water system of the building in a similar way to a conventional boiler, usually using an indirect coil in the hot water cylinder. Water is circulated either by thermo-syphon or, more commonly using a circulating pump. The pump is controlled in such a way that when the temperature of the collector is lower than the temperature in the hot water system, the pump is switched off. Flat

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plate collectors need to be protected against frost, and this is effected either by the addition of antifreeze to the heating circuit, or by arranging the system such that the collector 'drains down' when the pump is switched off.

7.2.3 A type of flat plate collector has the storage cylinder as an integral part of the collector, mounted on the roof. Although common in warmer climates these are rare in the UK, and normally the only part of the installation that is visible is the collector.

Evacuated tube collectors

7.2.4 Evacuated tube collectors comprise a number of vacuum tubes, typically around 100mm in diameter, and 2 metres in length containing a finned metal collector tube. Each tube is filled with a heat transfer fluid, and the upper ends of individual tubes are connected to a manifold heat exchanger, which is connected to the hot water system of the building as in the case of flat plate collectors. Evacuated tube collectors do not require protection against frost.

7.2.5 Although both types of collector will collect more energy during summer months, a significant amount of energy will also be collected on cold winter days.

Installation

7.2.6 The collector, glazing and insulation are generally mounted in a box which is usually grey or black in colour and typically 1-2m^2 in area. For an average residential domestic installation, some 4 or 5m^2 of flat plate collector, or some 3m^2 of evacuated tube are required. Typically, this would be mounted on a southerly facing roof pitch, or more rarely on a free-standing tilted frame on the ground, or a flat roof. Increasingly, collectors are becoming available that can be incorporated into a new or existing roof in much the same way as proprietary roof windows. Some systems use photovoltaics (PV) to provide power for the system pump. In this case, a separate PV module, typically 20cm by 40cm will be mounted adjacent to the solar hot water collector.

7.2.7 Collectors rarely project more than 120mm above the existing roofline. Connecting pipework is normally run from the back of the collector directly through to the roof void, and is not normally visible from the exterior of the building. Solar water heating collectors for swimming pools generally comprise a mat of neoprene, or other black rubberised material that is mounted near to the swimming pool. Typically this will have an area of about half that of the surface area of the pool. The collector may be mounted on the roof of an adjacent low building (such as a garage), or more commonly on a low ground mounted frame. The collector is often mounted flat, or only slightly inclined with the outlet higher than the inlet.

Siting issues

7.2.8 For best performance, solar water heating collectors need to be inclined at an angle of 30-40 degrees, depending on the latitude, and orientated facing due south. In practical terms, this is not always possible on existing buildings, and some degree of flexibility in inclination and orientation is acceptable although this will be at the expense of best performance. To function satisfactorily collectors can be inclined at between 10 and 60 degrees, and orientated facing from east to west (i.e. within 90 degrees of due south).

7.2.9 Although roof mounted collectors are the most common, they can also be mounted on the sides of buildings, or on free standing support structures on the ground. The latter is particularly common in the case of swimming pool heaters.

7.2.10 Shadows from buildings, trees or other structures can significantly reduce performance of solar hot water collectors, and planners and designers should take reasonable steps to minimise overshadowing.

The context

7.2.11 Solar water heating is a mature and recognised technology. A domestic system is within the economic means of many households in the UK, and the technology could provide a useful contribution to renewable energy generation. For its part the Department would encourage greater use of SWH systems in new developments and the retrofitting or incorporation of such technology on existing buildings where appropriate.

PLANNING ISSUES

General

7.3.1 The technology will be familiar to most and from the planning point of view, whilst there are clearly implications for listed buildings and the sensitive front elevations of some conservation areas, in general solar water heating systems are to be encouraged. In most cases involving dwelling houses, provided the building is not listed or in a conservation area and the installation complies with the relevant constraints, SWH systems will be “permitted development” and a planning application will not be required. The SWH collectors cannot however, extend more than 15 centimetres beyond the plane of any existing roof slope which fronts any road to comply with Schedule 1 Part 1, Class B1(c) of the Planning (General Development) Order) Northern Ireland) 1993. It should be noted that permitted development rights for small-scale renewable energy development are currently under review by the Department.

7.3.2 Solar hot water systems have some advantage over other renewable energy technologies, in that they are well suited to the urban environment: they are generally silent in operation and release no emissions.

7.3.3 The development of systems for collecting and using solar energy raises a number of considerations which may need to taken into account. These include:

- whether particular systems require planning permission;
- the importance of siting systems in situations where they can collect the most energy from the sun;
- the need for sufficient area of solar modules to produce the required energy output from the system; and
- the colour and appearance of the modules.

Listed Buildings and designated areas

7.3.4 The installation of solar water heating collectors on a building listed for its special architectural merit or historic interest – or on another building or structure within its curtilage – is likely to require an application for listed building consent. This will be so, even if specific planning permission is unnecessary.

7.3.5 Permitted development rights to clad the walls or alter the existing roofline of a dwelling do not necessarily apply in Areas of Outstanding Natural Beauty, Conservation Areas and Areas of Special Scientific Interest. When considering applications in these areas the potential impact on the character or appearance of the area should be considered.

7.3.6 If an application for a SWH system is submitted for a building close to a conservation area, or close to a listed building, its proximity to such area or buildings may be a material consideration in deciding the application.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

7.4.1 A planning application or application for listed building consent for a solar hot water system could usefully include the following information:

- the design of the collector;
- photographs of the existing built environment;
- detail of the roof mounting arrangement, if applicable;
- indicative drawings of the collector in place; and
- if the application involves a listed building, a photomontage of the proposed collector could be useful.

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Environmental Assessment

7.4.2 The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 do not include solar energy systems specifically in Schedule 1 or 2 and domestic or small-scale solar water heating collectors are therefore not likely to require an EIA. In AONBs, conservation areas and on listed buildings, the only issues likely to be important are visual amenity and building fabric and these can be covered by a short description accompanying the planning application.

OTHER AUTHORISATIONS/CONSENTS

7.5.1 There will be instances where retrofitting a SWH system to an existing building will require building control consent.

8. Ground, Water and Air Source Heat Pumps

Ground Source Heat Pumps

INTRODUCTION

8.1.1 The average ground temperature just below the surface in the UK is between 8ºC and 13ºC and this temperature remains constant throughout the year. Ground source heat pumps (GSHP) are a means of tapping into and utilising this resource. GSHP were invented more than 50 years ago, and continuous development has greatly improved their efficiency and reliability offering the opportunity for cooling as well as heating. It is now a proven, cost-effective, safe and environmentally friendly alternative to fossil fuels that is cost-effective for certain commercial and domestic applications, particularly where mains gas is not available.

8.1.2 The market for GSHP is currently small but growing – they are currently more common in the USA and the rest of Europe. The principal market for GSHP are domestic housing, commercial properties not connected to the natural gas network, and commercial industrial properties with stable heat demand. It is estimated that there is the potential for the number of installations to increase.

8.1.3 GSHP are most likely to be an option where there is no access to natural gas and so the alternative may be oil or direct electric heating (storage heaters). Heat pumps ground loops can be laid in the ground or in water such as rivers, lakes or ponds.

TECHNOLOGY

8.2.1 To access thermal energy, coils or loops of special grade pipe need to be buried in the ground either in horizontal trenches or vertical boreholes. Horizontal trenches are a cheaper option and generally used where there is sufficient space. Where there is not enough land to do horizontal trenches, vertical boreholes can be used. These normally require a depth of at least 60 meters and while the more expensive option, they provide higher efficiencies, since the temperature of the earth is higher and more stable at greater depths, and less power in pumping the fluid around the circuit. The length and size of ground loops is designed to match the heating needs of the property. The trenches or boreholes required for the ground loops can be dug and backfilled by a standard earth excavator.

8.2.2 Systems operate by circulating water (or another fluid) through pipes buried in the ground. The water temperature in the pipes is lower than the surrounding ground and so it warms up slightly. This low grade heat is transferred to a heat pump, which raises the temperature to around 50°C. Heat pumps typically provide 4 units of heat from 1 unit of electricity.

8.2.3 The building plot will need sufficient land available for installation of the ground works. The dimensions of trenches or boreholes will vary between manufacturers. The ground above where heat pipes are installed can be used for open space or covered over with hard materials. Where there are existing lakes or ponds or where it is proposed to install Sustainable Urban Drainage Systems (SUDS), the opportunity to install ground source heat pumps beneath the surface of the water should be considered. Similarly in larger developments with open space requirements, ground source heat pumps could be laid beneath green spaces. Borehole technology can however be installed under the footprint of a building if required.

PLANNING ISSUES

8.3.1 Any enlargement, improvement or other alteration to a dwelling house, or the provision, alteration or improvement of any building or enclosure within the curtilage of a dwelling house, required to facilitate heat pump development may be permitted development under Schedule 1 Part 1 Classes A and D of the Planning (General Development) Order (Northern Ireland) 1993. However, heat pumps are considered to be plant and machinery and where all or part of the equipment is not installed within an existing dwelling house or building permitted under the existing Part 1, could require a planning application. The Department has recently consulted about new permitted development rights for small scale renewable energy development associated with dwelling houses. The definition of development also includes ‘engineering operations’. Examples of activities held to fall within the definition of engineering operations include drilling of exploratory bore holes. Although, it should be noted that following the drilling and installation of heat pumps the ground can be returned to the previous state.

Archaeology

8.3.2 As the installation of ground source heat pumps will require the excavation of trenches or deep boreholes it is important to consider in advance whether archaeological remains exist on the development site and what the implications of the development might be. The needs of archaeology and development can usually be reconciled, and much potential conflict reduced. Further details on archaeology can be found in Planning Policy Statement 6, Planning, Archaeology and the Built Heritage. Information on the location of scheduled monuments, and other known archaeological sites or areas with archaeological potential is held by the Department’s Northern Ireland Environment Agency (NIEA) Built Heritage.

Contamination

8.3.3 Applicants should be aware that the construction or extraction of a borehole or well for the purpose of abstraction, or the abstraction or discharge to the water environment may require an authorisation from NIEA Water Management Unit. Applicants should contact NIEA for further details. Care should be taken when constructing boreholes to prevent contamination of the borehole itself and of the groundwater resource in general.

Water Source Heat Pumps

8.4.1 Water source heat pumps operate in a similar way to ground source heat pumps. A loop or coil is submerged in water, typically a river or lake and the heat taken from the water is transferred by the heat pump to the distribution system in the building. The use of a water source such as a river or lake may however provide lower efficiencies due to the temperature of the source being more affected by the weather, but the advantage is the relatively cheaper installation cost achieved by avoiding any ground works. Authorisation may be required from the Department of Agriculture and Rural Development's Rivers Agency.

Air Source Heat Pumps

8.5.1 Air source heat pumps, are often used in moderate climates, they use the difference in outdoor and indoor air temperatures to cool and heat the building. Air source heat pumps extract the heat in air and use a fan to draw air over coils that extract energy. This energy is then transferred to a home or building and used as part of a heating supply. Although they are less efficient than ground source heat pumps, and likely to be more variable because air temperatures fluctuate both daily and seasonally. Even when the outside temperature drops, air source heat pumps can still produce 2-3 times as much energy as they use to run. However in cold weather the evaporator coil is likely to need defrosting. The air source heat pump does have advantages in terms of lower installation costs and the fact that no ground loop negates the need for trenching.

8.5.2 Air source heat pumps can be used for a wide variety of applications such as cooling for lofts, restaurant kitchens and hotel plant rooms where the hot water can easily be used for other applications. They can provide hot water using waste heat in the air. By using waste heat, they can also remove heat from an area, such as a loft space, where it is not needed.

8.5.3 Air-source heat pumps can be located in the roof space or on the side of the building. They are similar in appearance to air conditioning boxes. There is the potential for noise to arise in association with the external fan of the heat pump and therefore careful sitting and possible noise attenuation may be needed. Where air-source heat pumps are proposed for listed buildings or in conservation areas, it will be important that they are sensitively designed and sited.

9. Passive Solar Design

INTRODUCTION

9.1.1 Passive Solar Design (PSD) has always been a feature of traditional vernacular architecture. A blend of intuition and experience ensured that domestic scale buildings captured maximum light and heat from the sun whilst being positioned in the landform to act as a buffer against the worst of the elements.

9.1.2 PSD is an environmentally benign approach to building design which allows significant lifetime savings in energy to be made without initial or running costs. As such it should be regarded as the most basic starting point onto which energy efficiency and active renewable energy measures should be added. PSD does not result in any environmental impacts but reduces those which will inevitably arise as the consequence of the occupation and use of a building for any particular purpose.

9.1.3 PSD needs to be considered at the design stage as it provides effectively a one-off opportunity to save energy during the lifetime of a building, generally at no cost. In modern housing up to 20–25% of heating and lighting energy can be saved by the application of PSD principles.

9.1.4 When PSD is applied in conjunction with other technologies as part of a low or zero energy approach, the resulting buildings can be novel or unusual and this can create interesting and varied layouts and townscape. In the case of offices or public buildings such as schools, features with a PSD function such as ventilation stacks and atria can be incorporated in ways that add interest and character.

9.1.5 However, it is very important to realise that PSD principles can be applied equally effectively in housing and commercial developments which have an entirely conventional appearance. For example, a vernacular farmhouse could provide a useful design checklist: orientation towards the south, main living room windows in the south façade with splayed side reveals to maximise light penetration, possibly a long north sloping roofline down to single storey rooms at the rear of the house accommodating the kitchen, larder and few small windows.

TECHNOLOGY

9.2.1 Virtually all buildings enjoy free energy and light from the sun; the objective in PSD is to maximise this benefit by using simple design approaches which intentionally enable buildings to function more effectively and provide a comfortable environment for living or working. It is acknowledged that not all aspects of PSD are of direct concern to Planning Control, for example the use of dense materials to store heat.

9.2.2 An important distinction must be drawn between the use of PSD in housing and other buildings. In housing the primary objectives are to capture light and heat. In the case of other buildings light is also important but generally excess heat is a problem during periods of high solar gain, making the main purpose of PSD the removal of excess heat whilst avoiding the use of air conditioning.

Tool kit

9.2.3 The items in the PSD 'tool kit' include:

- **Orientation –** The capture of solar gain can be maximised by orientating the main glazed elevation of a building within 30 degrees of due south. In urban situations this generally results in an east-west street pattern. Orientation is important for housing and schools, which can make effective use of solar heating and daylight. Using dense materials in construction will enable the building to absorb heat during the day and release it slowly at night.
- **Room layout –** Placing rooms used for living and working in the south facing part of the building, and locating storage, kitchens, bathrooms, toilets, stairways and the main entrance on the north side will make most effective use of solar heat and light.
- **Avoidance of overshadowing –** Careful spacing of buildings should seek to minimise overshadowing of southern elevations, particularly during the winter when the sun is low. On sloping and wooded sites careful consideration must be given to siting to maximise solar access. It is possible to achieve high levels of natural light penetration with tight urban form but a balance has to be struck between height and shape of enclosing buildings and the width of intervening streets and spaces.
- **Window sizing and position –** In housing, smaller windows should generally be used in north facing elevations. On the south elevation whilst larger windows increase solar gain this has to be weighed against greater heat losses in the winter and a risk of overheating in the summer. Sloping roof lights facing the sun will increase the solar radiation received. There are more benefits to be gained from reducing the size and number of north facing windows than by increasing south facing ones.
- **Conservatories and Atria –** Carefully designed conservatories and atria can contribute to the management of solar heat and ventilation. To avoid problems of excessive heat gains and losses they should be designed and used as intermediate spaces located between the building and the external environment. Conservatories and atria can be designed to assist natural stack effect ventilation in the summer by drawing warm air upward to roof vents. They can also be used as heat collectors during the spring and autumn. The net thermal benefits of conservatories will however be lost if they are artificially heated for use during the winter.
- **Natural ventilation –** This is particularly relevant to offices and public buildings such as schools. Atria and internal ventilation

stacks projecting above the general roof level can be used to vent air as the building warms during the day, with cool air being drawn in through grilles in the building façade. This approach obviates the need for air conditioning (which can be up to four times more energy intensive than providing heating), and make for a more healthy and pleasant building environment where measures may be necessary to counteract draughts and air pollution.

- **Lighting –** In offices the avoidance of deep-plan internal layouts and the use of atria, roof lights and light reflecting surfaces can help reduce the need for artificial lighting and should be used in conjunction with sensor controls.
- **Thermal Buffering –** In order to reduce heat losses, unheated spaces such as conservatories, green houses and garages which are attached to the outside of heated rooms can act as thermal buffers, the temperature of the unheated space being warmer than that outside.
- **Solar shading –** To reduce summertime overheating shading devices can be built into the building, for example overhanging eaves or projections above glazing. Alternatively solar shading can be provided by devices such as projecting blinds or brise soleil.
- **Landscaping –** Landscaping, including the use of earth bunds, is often used as part of an overall PSD approach providing a buffer against prevailing cold winds and shading for summer cooling.

Technical constraints

9.2.4 PSD must form part of an holistic design approach to reduce the need for conventional energy sources in providing heating, light and ventilation and it should be used in conjunction with other low energy and efficiency measures.

9.2.5 The application of PSD may often be constrained to an extent by building and location specific factors. However at the present time the most significant barriers to its widespread application are lack of familiarity and a perception that PSD will inevitably produce buildings which are unconventional in appearance and difficult to market.

PLANNING ISSUES

9.3.1 PSD is sometimes seen as straddling the boundary between the Building Regulations, which are concerned with energy efficiency standards and can have an influence on window size, and Planning Control which is concerned with siting, layout and appearance. Planning has an important role to play in encouraging the greater application of PSD principles, particularly amongst house builders, and in the design of public buildings such as schools and some commercial buildings.

INFORMATION TO ACCOMPANY A PLANNING APPLICATION

9.4.1 The following points should be used as a checklist when preparing a planning application.

Housing applications

Siting and Layout

9.4.2 The potential benefits of PSD can only be realised by careful siting and layout design. Sites should be planned to permit good solar orientation to as many dwellings as possible:

- the majority of residential access roads should predominantly run east-west with local distributors running north-south. This should allow one main elevation of the dwellings to face towards the south;
- houses should be carefully placed to limit the extent of overshadowing. Taller buildings should be placed to the north of the site with lower and low density buildings to the south of the site. Overshadowing resulting from landform, trees and buildings outside the site needs to be avoided as far as possible. Staggering dwellings or using stepped facades can also be of benefit;
- the majority of building facades should be set within 30 degrees of due south to enjoy the benefits of PSD; and
- the latitude band for Northern Ireland is mostly between 54^{o} to 55^{o} north.

Land form and landscaping

9.4.3 Working with the landform, landscaping should seek to act as a barrier to cold prevailing winds.

Design and fenestration

9.4.4 Given an appropriate site layout, the nature of rooms and window sizing will also influence the extent of passive solar benefit:

- in applying internal house layouts to the site, rooms which are occupied for much of the time (e.g. living rooms) should be positioned on the south side of the dwelling;
- generally windows on the north side of the dwelling should be smaller and fewer in number than those on the south; and
- garages and unheated conservatories can be used to provide thermal buffering on the north side of the dwelling but only if they are unheated.

Other buildings

Lighting

9.4.5 The design should seek to make the best use of natural light by use of orientation and elements such as a shallow floor plan, atria and roof lighting.

Heating/Cooling

9.4.6 The design should avoid using excessive glazing that will lead to overheating during the summer. Overhanging eaves and shading

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features can be used to limit solar gain during the summer. Natural stack effect ventilation driven by solar design should be used in preference to air conditioning.

OTHER AUTHORISATIONS/CONSENTS

9.5.1 PSD does not require any other consent beyond planning control. It may, however, also be relevant to the application of the Building Regulations.

Department reply re request for information re Wind Turbine Applications

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Telephone: 028 9025 6022
Email: privateoffice.assemblyunit@doeni.gov.uk
Your reference: Our reference: CQ/55/13

Mrs Alex McGarel
Clerk to the Environment Committee
Northern Ireland Assembly
Parliament Buildings
Ballymiscaw
Stormont
Belfast BT4 3XX

Date: 20 February 2013

Dear Alex,

I refer to the Environment Committee request for further information following their meeting on 14 February 2013. The Committee have clarified that the request relates to:

- how the Department is addressing the conflicting pressures associated with the increase in the number of planning applications for wind farms, particularly in the Sperrins, and if it intends to review its current planning policy statement or supplementary planning guidance to fully encompass newer technology such as larger turbines, as it becomes available and is adopted by developers.
- what consideration is taken of the Northern Ireland Strategic Energy Framework (SEF) and Programme for Government targets for energy from renewables when planning decisions are being made and what ongoing liaison DOE and/or Planning Division have with DETI in relation to how the delivery of its planning services link to the DETI targets for energy from renewable sources.

In relation to the first bullet point regarding pressures associated with the increase in the number of planning applications for wind farms, the Department offers the following comment:

The potential for cumulative impacts to arise as a result of the combined effects of multiple wind farm proposals is recognised. It is also acknowledged that a number of factors have influenced the current geographical distribution of wind farm proposals in Northern Ireland, including the distribution of viable wind resource, technical and economic constraints and electricity grid access constraints. These have tended to focus developments in a relatively limited number of areas, such as the example of the Sperrins cited by the Committee.

The policy and guidance set out in Planning Policy Statement (PPS) 18 ‘Renewable Energy’ and the associated Best Practice Guidance (BPG) document apply to all scales of wind energy development including single turbines and wind farms. PPS18 requires applications for wind energy development to demonstrate how the development proposal has taken into consideration the cumulative impact of existing wind turbines, including those that have permissions and those that are currently the subject of valid but undetermined applications.

In addition, the NIEA document 'Wind Energy Development in Northern Ireland's Landscapes' (which is to be read in conjunction with PPS 18) contains principles and guidance in relation to the assessment of cumulative impact. In particular, this guidance considers cumulative wind energy development in Northern Ireland's distinctive landscapes and highlights landscape issues that need to be carefully considered in the future. For each of the 130 individual landscape character areas (LCA's) identified this guidance indicates potential cumulative impacts and trans-boundary issues in relation to existing and approved wind energy developments and future proposals.

The Department is of the view that the policy and guidance set out in PPS18; the Best Practice Guidance document; and the Supplementary Guidance on Wind Energy Development in Northern Ireland's landscapes are together sufficient for the purposes of properly taking account of the cumulative pressures arising from increasing numbers of applications for wind turbines and as such no policy amendments are required in this respect.

In relation to the second query concerning what consideration is given to the Northern Ireland SEF and what ongoing liaison there is between DOE and DETI in relation to the achievement of renewable energy targets the Department advises as follows:

The aim of PPS18 is to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment in order to achieve Northern Ireland's renewable energy targets and to realise the benefits of renewable energy. The Department advises that there is ongoing liaison between DETI and DOE through the Department's participation on the DETI led Sustainable Energy Interdepartmental Working Group (SE IDWG).

A sub-group of this working group (the Planning and Renewable Energy subgroup) has been established to develop recommendations in relation to the planning process for renewable energy. The subgroup is currently working toward agreeing a memorandum of understanding that will establish a formal framework for the two Departments to continue to work closely together to ensure that planning, marine licensing and consent applications for energy infrastructure and installations above 10 megawatts are brought to the most appropriate decisions as quickly as possible.

I trust this information is of assistance, should you require anything further please contact me directly.

Yours sincerely,

Helen Richmond

DALO[by e-mail]

Windwatch briefing paper from informal meeting

Questions for Stormont Meetings 29 May 2013 (Political Party Environmental and Health Committees)

1 When is the Assembly going to fully implement the Aarhus Convention?

2 Wind farms have a disproportionate effect on rural areas. Does the Committee agree that the Assembly has a duty to protect all citizens of Northern Ireland and to protect the environment especially landscape character areas, AONB's, ASSI's and SAC's?

3 Why does the Assembly think that wind energy is efficient and that it will work in Northern Ireland when it has failed and is being abandoned in other countries throughout the world? Wind energy is not sustainable in Ireland; Eirgrid has paid out 142 million euros to shut down turbines.

4 When did the Assembly consult the public in relation to the setting of the Strategic Energy Framework target of 40% energy from renewables by 2020? Is it possible to provide us with a copy of the Strategic Energy Assessment (SEA) that was completed when the 40% renewables target was set?

5 How can the Assembly justify the colossal expenditure on subsidies for wind farms and single wind turbines and the charges for shutting down turbines? How much of the 18% price increase in electricity charges announced this week is to wind energy subsidies? That price hike will certainly bring more families and individuals within the fuel poverty threshold.

6 Propaganda produced by the wind industry about the benefits of wind energy is grossly exaggerated, especially in relation to the number of local jobs created. Claims that wind farms will serve so many dwellings are also well exaggerated and not based on scientific proof; the actual power produced is always a fraction of the name-plated power output. The wind industry is driven by capitalists from outside Northern Ireland.

7 Is the Committee aware that the efficiency of wind farms and single wind turbines is extremely poor?

8 Is the Committee aware that public consultation exercises conducted by the wind industry are, at present, totally inadequate?

9 Does the Committee agree that all residents within a five kilometre radius of any proposed wind farm or single wind turbine should be informed in writing by Planning Service of the proposal? At present Planning Service uses the same Neighbour Notification criteria for wind farms and single wind turbines as it does for rear extensions to dwellings. Such proposals are worlds apart in terms of scale and impact and must be treated differently by Planning Service.

10 When is the Assembly going to amend the Environmental Impact Assessment Regulations to comply with the CJEU Decision in Case C-50/09 - Commission v Ireland?

11 When is the Assembly going to amend the Habitats Regulations to comply with the CJEU decision in the Case 256/11 - Sweetman v An Bord Pleanala? When is the Assembly going to designate the remaining Priority Habitats?

12 When is the Assembly going to take note of the Decision of the CJEU IN Case C - 545/12?

13 Should, in the case of the Slieveard Wind Farm planning application (Planning Ref No: K/2013/0102/F), the developer/agent not have organised a further series of public information days/evenings as the original proposal has been changed considerably?

14 What are the guidelines for considering the cumulative effects of wind turbines?

15 Does the Committee agree that it is also imperative that the Slieveard Wind farm proposal should be considered in conjunction with two other inter-visible proposals for commercial wind farms at Lisnaharney, Gortin and the Bessie Bell extension, Newtownstewart? These three wind farm proposals are within a five mile radius of each other and will, if approved, permanently damage the rural character of the area. In addition they will be clearly visible from the Ulster American Folk Park - one of Northern Ireland's leading tourist attractions.

16 Is the Committee aware that SSE wind was recently fined 10.5 million by Trading Standards for breaching procedures? Trading Standards is also currently investigating their procedures in relation to the Lisnaharney wind farm proposal.

17 Is the Committee aware of the division that is being created in small closely knit rural communities by the wind industry? Such division can be perceived to be sectarian and it has been known to cause vitriolic division within families.

18 Does the Committee agree that the sustainability of rural communities is vital if rural education and services are to be maintained and improved?

19 Is the Committee aware that Ian Lavery, a Labour MP, has raised in Westminster, at the request of GP Practices in Aberdeenshire, an issue in relation to a significant increase in health issues that have coincided with significant wind farm development in the shire?

20 Is the Committee aware of the health issues that were raised in the Hanning/Evans article in the British Medical Journal on 10 March 2012?

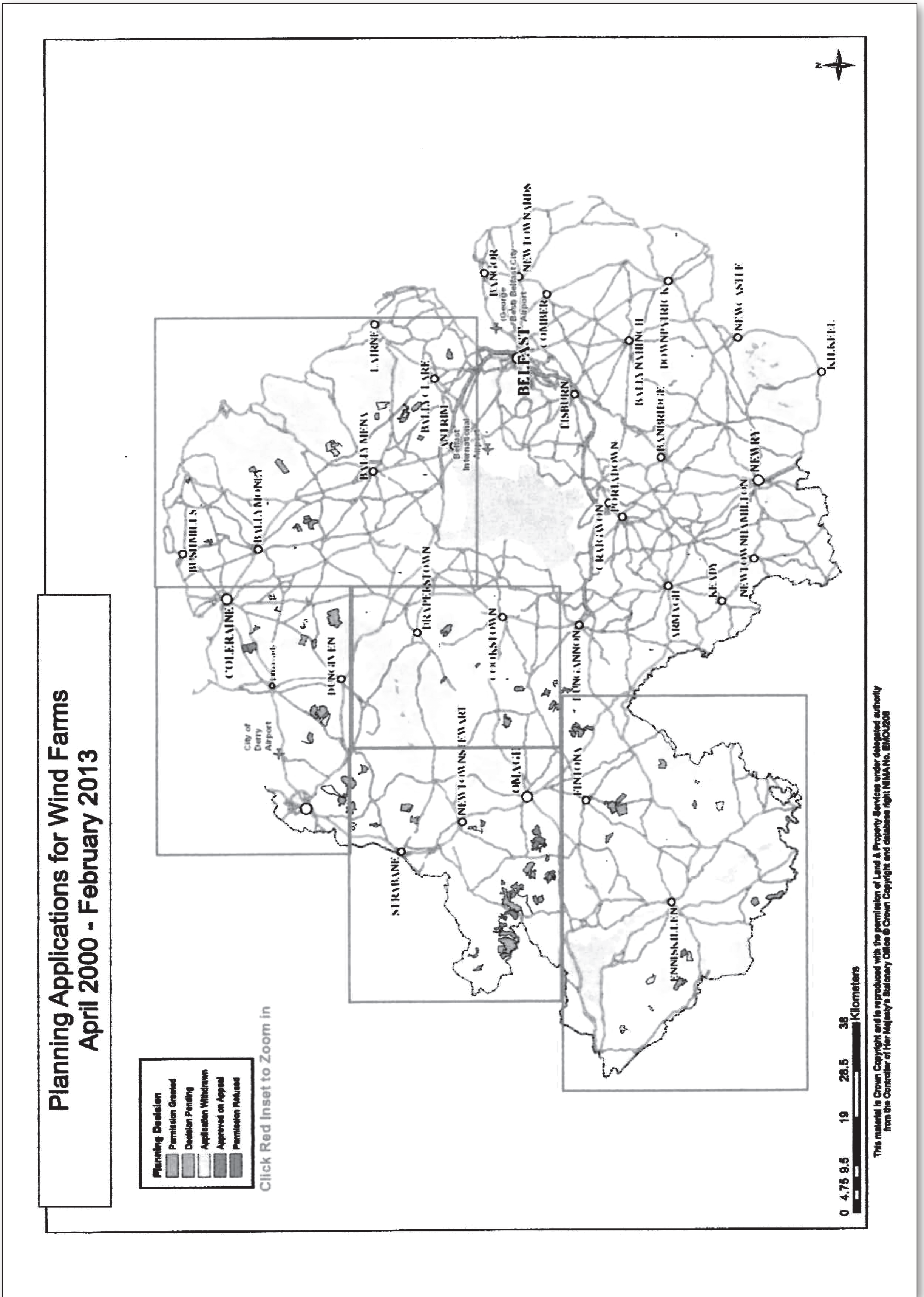
21 Is the Committee aware of the Health and Safety issues presented by wind farms and wind turbines namely ice throw, turbine collapse, turbine fires, blade fragmentation and risks to hill walkers, farming personnel, livestock and birds.

22 Is the Committee aware that the liability for third party claims will be against the landowner?

23 How does the Assembly propose to regulate and monitor the wind industry?

24 Does the Committee consider that urgent new legislation is required to regulate the wind industry? The ETSU-97 Guidelines which currently regulate the wind industry are significantly out of date given the rapid rate of technological development in the industry and are not fit for purpose.

25 Does the Committee agree that noise monitoring of wind farms and wind turbines should be carried out by accredited acousticians demonstrably independent of the wind industry, approved by the sufferers, and in a manner that will avoid any deliberate manipulation of turbine operation to reduce the acoustic emissions during testing? Acoustic results (including all raw data and associated sound files) must be made available to all parties.


Planning Applications for Wind Farms
April 2000 - February 2013
Planning Decision
Permission Granted
Decision Pending
Application Withdrawn
Approved on Appeal
Permission Refused
Click Red Inset to Zoom in
0 4.75 9.5 19 28.5 38
Kilometers
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£1.5 million paid to shut down new Scottish wind farm

One of the big six electricity companies was paid nearly £1.5 million to shut down a new Scottish wind farm before it was even formally completed, the Daily Telegraph can disclose.

EDF has been paid nearly £1.5 million to shut down Fallago Rig's turbines Photo: Getty Images

By Simon Johnson, Scottish Political Editor

6:00AM BST 24 May 2013

EDF Energy was handed £1.45 million between April 29 and May 15 to shut down turbines on the Fallago Rig wind farm, which is on land owned by the Duke of Roxburghe in Scottish Borders.

The "constraint payments", which ultimately come from electricity bills, are given to wind farm companies to compensate them for not producing power during periods of high generation and low demand.

This can happen when it is too windy, in order not to overload the National Grid, or when maintenance work on the Grid is being carried out.

But the 48-turbine development in the Lammermuir Hills only completed testing and came fully online on May 17, two days after the final tranche of the money.

The Conservatives said the payments for not producing electricity – which spiked at more than £320,000 per day – demonstrated the ludicrous consequences for consumers of Alex Salmond's drive for wind energy in Scotland.

The First Minister wants to generate the equivalent of all the country's electricity needs from renewable sources by the end of the decade despite concerns this would require the countryside to be carpeted with turbines.

Murdo Fraser, a Conservative MSP and prominent wind farm critic, said: "Here we have a French-owned multinational company benefiting from vast sums at the expense of the electricity bill payers of the UK.

"This is yet another example of the flaws of SNP energy policy causing fuel poverty for millions of Scots and enriching investors at their expense." The Duke of Roxburghe did not benefit from the payments.

According to figures provided by the Renewable Energy Foundation (REF), a charity which publishes information on the energy sector, the second largest sum of £296,457 was handed over on April 29.

It is understood the payment was so high because maintenance work on the National Grid was being carried out, requiring Fallago Rig's turbines to be shut down.

A further £59,513 was paid to EDF between April 30 and May 3 before the sums spiked again, with £114,472 being handed over on May 4 and £166,710 on May 5.

The payments increased a third time on May 11 (£97,776), rising to £109,929 the following day before peaking at £328,841 on May 13. The total fell to £177,097 on May 14 and £59,306 on May 15.

Although the wind farm started producing electricity in January, it did not complete all its testing – a process known as commissioning – until May 17.

EDF said the payments take into account all of the costs and lost revenues that the generator would incur as a result of reducing its output.

A spokesman said: "Such instructions from the National Grid are part of its daily management of the electricity system, as it works to ensure it maintains the right balance between generation and customer demand or to manage temporary technical limitations within the transmission network."

The Scottish Government did not respond to a request for a comment.

Department reply to issues raised by Windwatch

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Your reference: Our reference: CQ/124/2013

Sheila Mawhinney
Clerk to the Environment Committee
Northern Ireland Assembly
Parliament Buildings
Ballymiscaw
Stormont
Belfast BT4 3XX

Date: 17 June 2013

Dear Sheila,

A note of a meeting with Windwatch Umbrella Group has been forwarded to the Department for comment.

The Department would not routinely use the terms “industrial turbines” or “standard models” in describing wind turbines. It is a fact that over time the size of turbine being proposed by applicants has steadily increased, whether that be for wind farm or single turbine developments. The Department has been aware of this and the assessment of planning applications has reflected the fact that increased turbine size has the potential to result in greater / different impacts from those previously considered with smaller turbines.

The Department notifies and advertises all renewable energy applications in line with legislative and regulatory requirements and in accordance with published Departmental standards. The Department has not ignored the views of residents. Indeed it is in acting on behalf of residents and objectors, that the Department has challenged applicants on the content of their planning applications and environmental statements and subsequently, refused planning applications on the grounds of unacceptable adverse impacts on communities.

There will have been occasions when information submitted in support of a wind farm/ wind turbine application may have omitted information such as the location of a dwelling or a site with planning permission for a dwelling. Given the large scale of these proposals the Department would accept that omissions can occur for a variety of reasons. It is the role of the Department to apply such a level of scrutiny to the application that omissions are detected and remedied.

Planning Policy Statement 18 Renewable Energy provides policy support for all forms of renewable energy, not just wind energy. The Department considers all planning applications on their individual merits. The Committee will also be aware that the Executive, through the Strategic Energy Framework, has a 2020 target whereby 40% of electricity generation will come from renewable sources.

There is no statutory minimum separation distance between turbines and occupied properties. However the consideration of any planning application for wind turbines would involve an assessment of the amenity enjoyed by occupants of neighbouring properties, including likely impacts on the health and safety of occupants. The Department's position, on advice from the Public Health Agency, is that there is no known link between the operation of wind turbines and impacts on human health.

All planning applications for wind turbines are assessed for their potential impacts on the natural environment. The Department will receive advice from a wide range of consultees in relation to wind farm developments. In determining any proposal the Department must consider the advice and determine the weight to be given to each and ultimately reach a decision that is balanced and reasonable.

The content of an environmental statement includes, but is not restricted, to the following: an assessment of the likely impacts arising from a proposed development, proposed mitigation and an outline of the main alternatives considered. The Department routinely challenges applicants with regard to the content of their environmental statements. It is for that reason that virtually every environmental statement submitted in support of a wind farm planning application is subject to revision through submission of Further Environmental Information (FEI).

Action Points:

The Chairperson has asked for details of the independent statements of impact assessments for all wind farms operating in NI.

The Department has granted planning permission for 70 wind farm developments. Approximately 50% of those are constructed and operational. All of the planning applications were accompanied by environmental statements. Each environmental statement is a large publication running to several volumes. Each environmental statement contains:

A description of the development.

A description of the aspects of the environment likely to be significantly affected by the development including population, fauna, flora, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between these factors.

A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development. Measures to avoid/remedy significant adverse effects.

Data required to identify and assess the main effects on the environment.

An outline of the main alternatives studied and the main reasons for choice of development. I trust this information is of assistance, should you require anything further please contact me directly.

Yours sincerely,

Helen Richmond

DALO
[by e-mail]

Letter from Fermanagh Trust re Community Engagement

The Fermanagh Trust

25 JUN 2013

Ms Anna Lo MLA
NI Assembly Office
Room 378
Parliament Buildings
Ballymiscaw
Stormont
Belfast
BT4 3XX

20th June 2013

Dear Ms Lo,

I am writing to you in your capacity as Chairperson of the Committee for the Environment regarding the development of wind energy and how communities can engage with these projects.

The Fermanagh Trust which is a registered charity, manages a range of funds and programmes dedicated to strengthening and improving local communities and finding solutions to the pressing community needs in Co. Fermanagh. The Trust has experience of engaging with a number of wind farm developers and currently administers a community fund on behalf of a wind farm developer in Co. Fermanagh.

Northern Ireland has ambitious targets for the deployment of renewable energy which is currently and will continue to have significant impacts upon communities. It is therefore important that communities thoroughly engage with these developments and that the benefits are maximised.

I have enclosed a short briefing paper outlining recent announcements and publications which have important implications for communities. These include the DETI/DoE/DARD study on communities and energy soon to be published, as well as the UK Government's recently announced measures and proposals which will give communities a greater say in the development of wind farms.

It is vital that we learn from these lessons and best practice adopted in GB and elsewhere. This will help to ensure that the social and economic opportunities for communities are maximised, and that renewable energy resources are developed in a sustainable and equitable way.

If you have any questions, please do not hesitate to contact me.

Yours faithfully,

Lauri McCusker
Director

Mr Lauri McCusker - Director
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Wind energy development – community engagement and benefits

Whilst working with communities and the wind industry, Fermanagh Trust became aware of best practice of community engagement and community benefit provision in GB and in particular Scotland which warranted further investigation. This led to the Fermanagh Trust publishing the report 'Maximising Community Outcomes from Wind Energy Developments' in January 2012.

The report explored the opportunities that exist for communities to engage with commercial onshore wind energy developments. The ways in which communities can benefit from wind energy development are highlighted, including the opportunities presented by community ownership. Good practice by government, the wind industry and the voluntary sector towards engaging and working in partnership with local communities is investigated. This includes protocols and policies adopted by councils in Scotland and Wales.

The report also investigated the levels of community benefit being provided by developers into community funds in Northern Ireland. However the report showed that there was a disparity in the level of contribution being made by developers into community funds at approved wind farms in Northern Ireland in comparison with Great Britain, with host communities in Great Britain typically receiving a higher level of community benefit per MW per annum than communities in Northern Ireland.

Some communities in Scotland and Wales are for example receiving community benefit payments of £5,000 per MW per annum. Other communities have been able to avail of community ownership in a wind farm providing significant economic and social returns. **Forestry Commission Scotland and Forestry Commission Wales also introduced extensive plans to ensure that communities benefit from the development of wind farms on publically owned forestry land.**

Recent announcements

<u>DECC</u>

The UK Government has recognised the importance of giving communities a greater say in the development of wind farms.

The UK Government through Department of Energy and Climate Change (DECC) issued a Call for Evidence on onshore wind. The Call for Evidence included a focus on onshore wind costs in addition to community engagement and benefits. The retrospective Devolved Administrations in the UK including Northern Ireland were fully involved in the call for

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evidence, but reserve the right to use the evidence and adapt the outputs as appropriate for their countries.

On 6th June 2013, the UK Government published its response to the 'Onshore Wind Call for Evidence'. The changes announced in the Government's response will mean that communities will be given a greater say over the siting of wind farms and gain increased benefits as a result of hosting wind farms where they do proceed. These changes have a focus on England. However these changes are extremely important to take into account given Northern Ireland's involvement in the Call for Evidence.

The key elements of the package of measures and proposals set out by DECC include:

- New planning guidance which supports the planning framework in England, will make clear that the need for renewable energy does not automatically override environmental protections and planning concerns of local communities.

- Government will make pre—application consultation with local communities compulsory for more significant onshore wind applications. This will help ensure that community engagement takes place at an earlier stage in more cases.

- DECC will produce best practice guidance to onshore wind developers which will state the higher standards of community engagement expected and a new community engagement register will monitor best practice.

- Government will assist local people to acquire the skills they need to allow them to better engage with wind developers.

- The Government expects the wind industry to revise its Community Benefit Protocol by the end of 2013, to include an increase in the recommended community benefit package in England from £1,000/MW of installed capacity per year, to **£5,000/MW/year for the lifetime of a wind farm.** Communities agreeing a medium-sized 20MW wind farm for example could therefore receive a benefits package worth £100,000 per year, or up to £400 off each household's annual bill.

- DECC will set up a register of community benefits where the benefits will be publically recorded in a transparent manner.

- A new **Community Energy Strategy** which will be published in autumn 2013, will set out how Government can encourage ownership and investment in wind projects. There is currently a Call for Evidence on this strategy.

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DETI, DoE and DARD study on communities and energy

DETI, DoE and DARD have engaged consultants to undertake a study on communities and energy in Northern Ireland. It was due to be completed by the end of March 2013. The study focuses on the relationship between communities and the development of renewable energy as well as how communities can engage with developers and participate and/or benefit from renewable energy developments.

This report is anticipated to be published shortly and is set to make a series of recommendations.

Community Benefit Protocol for Northern Ireland

In January 2013, Northern Ireland Renewables Industry Group (NIRIG) published the 'Community Commitment Protocol' which addressed the issue of community benefits provided by wind farm developers in Northern Ireland.

The protocol sets out that a community benefit scheme will receive support equivalent to a value of at least **£1,000 per MW of installed capacity per annum** and will be index linked for the lifetime of the project. This is in line with the Community Benefit Protocol adopted by the wind industry in England.

Planning and Community Benefit Summit hosted by Minister for the Environment

On 5th June 2013, Minister Attwood hosted a Community Benefit Summit. This involved exploring how to maximise the benefits of major developments for local communities. This included benefits relating to renewable energy developments. The aims of the summit were to learn from practice in Northern Ireland and elsewhere; to explore what more could be done to further community benefit and to identify ideas and proposals for the Minister to consider.

Conclusion

Significant opportunities now exist for advancing the benefits and involvement of 'host communities' in relation to community engagement, community benefits and community energy.

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MAXIMISING COMMUNITY OUTCOMES FROM WIND ENERGY DEVELOPMENTS

SUMMARY REPORT

The Fermanagh Trust

January 2012

www.fermanaghtrust.org

Background

The development of renewable energy is of benefit to everyone, helping to meet ambitious climate change targets and generating substantial new economic activity.

Northern Ireland and the rural west in particular has one of the greatest wind energy resources in Europe. The implementation of renewable energy plans present challenges for host communities, including a range of environmental issues and will have significant impact on rural communities. However, people are entitled to see some return and benefit directly from the natural environmental assets as renewable energy development draws on collective resources and impacts on communities. These communities currently face a wide range of issues in relation to poverty, disadvantage and isolation. How does this resource benefit the local communities which host wind farms?

Taking these factors into account, this report identifies the opportunities that exist for communities to engage with commercial onshore wind energy development. In doing so, the research highlights the opportunities for the provision of community benefits associated with wind energy development and models of community ownership. Good practice towards engaging with communities is also considered.

This report examines the issues and puts forward recommendations of how, in relation to wind energy, we can share the harnessing of our resources, while preserving the integrity of our assets. The report also explores how people living in rural communities can engage and benefit from onshore wind energy development. Recommendations are made based on good practice evidenced in other countries.

Policy Context

Ambitious government targets have been set for the deployment of renewable energy in Northern Ireland. The Strategic Energy Framework (2010) states that Northern Ireland will seek to achieve 40% of its electricity consumption from renewable sources by 2020. Electricity generated from onshore wind farms has been identified as the most established, large-scale renewable source in Northern Ireland and will play a key role in achieving this target.

There is currently 378MW of installed renewable generation in Northern Ireland, of which 355MW is from large-scale wind. However, in order to meet the Northern Ireland Government target of 40% of electricity consumption from renewable sources by 2020, more renewable sources will need to be connected to the electricity network. It is estimated that between 1400MW to 1800MW of renewable generation installed capacity, depending on the energy mix in the future, will need to be connected to the network in order to meet this target. These figures show the scale of the likely future deployment of renewable energy. Given that onshore wind energy is expected to account for the majority of future renewable energy generation by 2020, it is evident that this is likely to have a significant impact on communities in counties Antrim, Derry/Londonderry, Fermanagh and Tyrone.

Key Findings

Commercial wind farm developments present significant opportunities for affected communities which host them through the provision of community benefits. Community benefits are viewed as key components of the way in which communities can engage with wind energy development. In the context of wind energy, community benefits tend to be contributions made by a developer to communities which host a development. Whilst these can provide new opportunities for local communities, it is important to recognise that the nature and scale of community benefit provision differs between sites and between developers.

Effective community engagement is critical to working with local communities. This involves implementing a well-designed proactive programme. Community engagement should not be solely focused on the planning process but throughout the life cycle of the project.

Community benefits from wind farms in the UK typically take the form of voluntary annual financial contributions from developers into a community fund. These funds can be used to help support local infrastructure projects, local activities and community groups.

Whilst community funds may be of some benefit to communities which host wind farms, it is important to recognise that greater economic and social opportunities may be made available through community ownership. There is a growing interest in the community ownership of wind farm developments and there appears to be an increasing number of developments which incorporate some form of ownership.

A number of different models of community ownership exist including: full ownership; part ownership; community/developer joint venture; and the co-operative model. However achieving community ownership in commercial wind farm development is challenging and requires much commitment from communities. Nevertheless, community ownership presents substantial financial opportunities, which can be far greater than those provided by community funds.

Community ownership can help contribute to the long-term sustainable future of communities and help address issues such as fuel poverty. The case studies of community ownership in this report show that it is possible for communities and developers to work together to achieve outcomes which benefit all stakeholders.

In addition to discussing the options available to communities, the report also investigated the provision of community benefits at approved wind farms (i.e. those that have received planning permission and are operational, consented, or under construction) in Northern Ireland. Based on the evidence gathered, a number of key findings were raised:

- The higher levels of payments into community funds in Great Britain, have generally not been achieved at approved wind farms in Northern Ireland. In Great Britain for example, amounts attaining and exceeding £2,000/MW per annum have increasingly been achieved. Only one of the fourteen community funds identified by this research in Northern Ireland was found to offer £2,000/MW per annum
- In Great Britain average levels of payments being paid into community funds have been found to be increasing through time but in Northern Ireland there appears to be a mixed picture. Whilst some wind farms have seen higher levels of payments in recent years, substantially low levels of payments are still being made into community funds for recently approved wind farms
- In Great Britain, there are numerous examples of wind farms where developers have taken very innovative approaches towards the provision of community benefits, and have incorporated community ownership into the development. In Northern Ireland, there are no instances of community ownership in a commercial wind farm development, or similarly innovative approaches

Northern Ireland will see a major expansion in the number of wind farms over the next ten years. It is proposed these wind farms are clustered in the same areas which already currently host wind farms.

In Northern Ireland, there is little consideration given to maximising the opportunities for communities to benefit from onshore wind energy development in comparison to Great Britain. In Scotland and Wales, the devolved governments take a very pro-active approach and recognise the important role which communities have to play in renewable energy development. This is evident in both national and local government policies.

At national level, for example, the Scottish Government will create a community benefits register which will detail community benefits agreed with renewable energy developers in Scotland. The new community benefits register will be open from April 2012. The register will help communities to make a comparison with similar developments to inform negotiations. The creation of a register is one of a number of pro-active steps taken by the Scottish Government.

The Scottish and Welsh Governments have also developed plans to develop renewable energy on forestry sites owned by each government. These plans will be beneficial to the devolved governments' ambitions to meet their renewable energy targets, and also present significant opportunities for private developers and affected communities, who will receive substantial financial benefits. Recent plans published by the Department of Agriculture and Rural Development in Northern Ireland and the Forestry Service, in relation to the potential of forestry sites for renewable energy initiatives are encouraging.

At a regional level, a number of councils in Scotland and Wales have developed guidance/ policy towards the issue of community benefits and how to engage with commercial wind energy development. This guidance helps to inform both private developers and local communities.

There is an increasingly joined-up approach in Scotland and Wales towards renewable energy development, which includes the Government, the private sector and communities working closely together. Northern Ireland could learn from this approach to help ensure it reaches its renewable energy targets and builds on the principles of sustainable development.

Recommendations

Communities

1. A not for profit organisation to take the lead role in establishing good practice guidance including a policy on community engagement and promoting a toolkit on community benefits. This should include a protocol on working with local communities during and after the project development process and, in particular, exploring and negotiating community participation and community benefits with communities and other stakeholders. Such guidance/policy could also be applied to other forms of renewable energy development.

2. All local communities to take an active role in relation to a wind farm development being considered in their community exploring the range of community benefits which can be provided.

3. Local community-based organisations to examine and where possible develop and implement wind farm developments based on one or more of the community ownership models outlined in this report.

Developers

4. Community Benefit Funds - local communities should be offered by developers a minimum initial payment of £2,000 per MW of installed capacity and a minimum annual payment of £2,000 per MW of installed capacity and that payment is index linked (amounts to be agreed between developer and local community representatives). This should apply to all new wind farms including those in the planning system or yet to be commissioned. In relation to community benefit funds - a percentage of the total annual funds to be utilised for local community projects, and a percentage to go specifically towards tackling fuel poverty in the area. This would establish a clear link between the wind farm and energy costs.

5. Community Ownership - has been shown to help increase levels of acceptance. Given the likelihood of clustering of wind farms especially in the rural west and the impact of further installations and associated grid infrastructure, developers should consider offering some form of community ownership as part of a community benefits package at their sites.

6. Community Engagement – large-scale commercial developers should develop clear protocols on effective community engagement for wind farm developments. This engagement should be based on models of good practice and include post construction relationships re: educational benefits etc.

Local Councils

7. Local Councils to formally establish guidance protocols (based on good practice) which provide a framework for engagement by developers with the Councils and local communities. The protocols would ensure that as a result of harnessing renewable energy resources, social and economic problems including fuel poverty can be alleviated and help towards sustaining and developing rural communities can be given.

Government

8. Department of Enterprise, Trade and Investment to actively support local communities and their potential, positive role in implementing wind farm projects and the contribution they make in the development of a low carbon society. The implementation of this policy should address the need for active community involvement in shaping Northern Ireland’s community energy agenda. Policies ensuring effective support mechanisms need to be in place, such as a local energy assessment fund.

9. The Department of Agriculture and Rural Development to ensure models of good practice, as evidenced in Scotland and Wales, are followed in relation to both engaging and working in partnership with rural communities and the private sector when developing wind farms on land managed by the Forestry Service. A coordinated proactive approach can be seen in Scotland, where the government has developed plans in which the private sector and communities can work together to benefit from renewable energy development.

10. The Department of Enterprise, Trade and Investment to develop a public register of community benefits from wind farm projects similar to that currently being established by the Scottish Government. This public register would encourage greater transparency, helping communities to make a comparison with similar developments to inform negotiations.

11. A Government Department to take the lead role in developing a more coordinated approach involving the government, the private sector and communities towards wind farm developments, which builds upon principles of sustainable development.

Conclusion

Northern Ireland has one of the greatest wind resources in Europe and has set ambitious targets for future renewable energy deployment. Meeting these targets will be challenging for everybody. However, the opportunities that exist for communities to engage with commercial onshore wind energy development can potentially be both very rewarding and of benefit to all sectors.

A common way for communities to engage with onshore wind energy development is through the provision of community benefits. Whilst the level of community benefit provision in Northern Ireland has not been as high as in Great Britain to date, this report demonstrates that commercial wind energy development can provide substantial economic and social benefits for communities which host wind farm developments.

Community ownership, as a form of benefit in particular, can help to make a large contribution to help sustain the long-term future of communities. Whilst achieving community ownership in a wind farm development can be challenging, the case studies of community ownership in this study help to show that the financial returns can be much greater than those attained through community funds. In particular the experiences of Neilston Community Wind Farm and Earlsburn help to demonstrate the substantial financial benefits which can then be used within the community. Importantly, they also show that it is possible for communities and developers to work together in order to achieve an outcome which benefits all stakeholders.

The importance of different stakeholders working together can be readily seen in Great Britain. In Scotland and Wales, governments at both a devolved national level and local level recognise the important role of communities in renewable energy development. A series of pro-active actions have been taken. Notable examples of this include the future creation of a community benefits register in Scotland, and the development of renewable energy on forestry sites with significant levels of community involvement and benefits.

The benefits of working together can also be seen with some councils producing guidance for both communities and developers surrounding issues of community engagement and the provision of community benefits. Good practice from Scotland and Wales has shown that a joined-up approach including government, the private sector and communities is essential to maximising the potential of future renewable energy deployment.

The joined-up approach that exists in Scotland and Wales shows how government, the private sector and communities can work together for the benefit of everyone. The pro-active action taken in Scotland and Wales in particular has been largely absent to date in Northern Ireland. However, with the current Programme for Government and ongoing governance and policy developments, the time is right for Northern Ireland to learn from good practice in Great Britain. This will help Northern Ireland maximise its renewable energy potential for all of society and help the government to meet its ambitious targets.

The Fermanagh Trust has undertaken this project as part of its programme of research, which it hopes will be of value to community based organisations, policy makers and the private sector.

Further copies of this report can be obtained from the Fermanagh Trust Website. (www.fermanaghtrust.org/publications)

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MAXIMISING COMMUNITY OUTCOMES FROM WIND ENERGY DEVELOPMENTS

The Fermanagh Trust

January 2012

www.fermanaghtrust.org

Contents

Foreword

Northern Ireland and the rural west in particular has one of the greatest wind energy resources in Europe. How does this resource benefit the local communities which host wind farms? This report explores how people living in rural communities can engage and benefit from onshore wind energy development. Recommendations are made based on good practice evidenced in other countries.

In particular I wish to thank Graeme Dunwoody who has carried out this research in recent months for the Fermanagh Trust. Graeme's research has involved the completion of a comprehensive analysis of onshore wind farm developments and how they relate to communities. We are confident the research findings can make a helpful contribution to the debate on how onshore wind energy and meeting the ambitious government targets for renewable energy can go hand in hand, while ensuring local communities are actively engaged and benefit directly from these developments.

Many thanks to all those who have assisted with the research. We greatly appreciate the involvement of people from across the region and also in Scotland. The engagement and support from local communities here in Fermanagh, from the broader community and voluntary sector, from individual wind farm developers and NIRIG, and the various government departments has been most helpful. The support of the Building Change Trust has also been greatly appreciated by the Fermanagh Trust.

Lauri McCusker

Director
The Fermanagh Trust

Executive Summary and Recommendations

The development of renewable energy is of benefit to everyone helping meet ambitious climate change targets and generating substantial new economic activity.

People are entitled to see some return and benefit directly from the natural environmental assets as renewable energy development draws on collective resources and impacts on communities. This report examines the issues and puts forward recommendations of how, in relation to wind energy, we can share the harnessing of our resources, while preserving the integrity of our assets.

Ambitious government targets have been set for the deployment of renewable energy in Northern Ireland. The Strategic Energy Framework (2010) states that Northern Ireland will seek to achieve 40% of its electricity consumption from renewable sources by 2020. Electricity generated from onshore wind farms has been identified as the most established, large-scale renewable source in Northern Ireland and will play a key role in achieving this target.

There is currently 378MW of installed renewable generation in Northern Ireland, of which 355MW is from large scale wind. However, in order to meet the Northern Ireland Government target of 40% of electricity consumption from renewable sources by 2020, more renewable sources will need to be connected to the electricity network. It is estimated that between 1400MW to 1800MW of renewable generation installed capacity, depending on the energy mix in the future, will need to be connected to the network in order to meet this target. These figures show the scale of the likely future deployment of renewable energy. Given that onshore wind energy is expected to account for the majority of future renewable energy generation by 2020, it is evident that this is likely to have a significant impact on communities in counties Antrim, Derry/Londonderry, Fermanagh and Tyrone.

The implementation of the renewable energy plans for Northern Ireland present challenges for host communities, including a range of environmental issues and will have significant impact on rural communities. These communities currently face a wide range of issues in relation to poverty, disadvantage and isolation.

Taking these factors into account, this report identifies the opportunities that exist for communities to engage with commercial onshore wind energy development. In doing so, the research highlights the opportunities for the provision of community benefits associated with wind energy development and models of community ownership. Good practice towards engaging with communities is also considered.

Key Findings

Commercial wind farm developments present significant opportunities for affected communities which host them through the provision of community benefits. Community benefits are viewed as key components of the way in which communities can engage with wind energy development. In the context of wind energy, community benefits tend to be contributions made by a developer to communities which host a development. Whilst these can provide new opportunities for local communities, it is important to recognise that the nature and scale of community benefit provision differs between sites and between developers.

Effective community engagement is critical to working with local communities. This involves implementing a well designed proactive programme. Community engagement should not be solely focused on the planning process but throughout the life cycle of the project.

Community benefits from wind farms in the UK typically take the form of voluntary annual financial contributions from developers into a community fund. These funds can be used to help support local infrastructure projects, local activities and community groups.

Whilst community funds may be of some benefit to communities which host wind farms, it is important to recognise that greater economic and social opportunities may be made available through community ownership. There is a growing interest in the community ownership of wind farm developments and there appears to be an increasing number of developments which incorporate some form of ownership.

A number of different models of community ownership exist including: full ownership; part ownership; community/developer joint venture; and the co-operative model. However achieving community ownership in commercial wind farm development is challenging and requires much commitment from communities. Nevertheless, community ownership presents substantial financial opportunities, which can be far greater than those provided by community funds.

Community ownership can help contribute to the long-term sustainable future of communities and help address issues such as fuel poverty. The case studies of community ownership in this report show that it is possible for communities and developers to work together to achieve outcomes which benefit all stakeholders.

In addition to discussing the options available to communities, the report also investigated the provision of community benefits at approved wind farms (i.e. those that have received planning permission and are operational, consented, or under construction) in Northern Ireland. Based on the evidence gathered, a number of key findings were raised:

- The higher levels of payments into community funds in Great Britain, have generally not been achieved at approved wind farms in Northern Ireland. In Great Britain for example, amounts attaining and exceeding £2,000/MW per annum have increasingly been achieved. Only one of the fourteen community funds identified by this research in Northern Ireland was found to offer £2,000/MW per annum

- In Great Britain average levels of payments being paid into community funds have been found to be increasing through time but in Northern Ireland there appears to be a mixed picture. Whilst some wind farms have seen higher levels of payments in recent years, substantially low levels of payments are still being made into community funds for recently approved wind farms

- In Great Britain, there are numerous examples of wind farms where developers have taken very innovative approaches towards the provision of community benefits, and have incorporated community ownership into the development. In Northern Ireland, there are no instances of community ownership in a commercial wind farm development, or similarly innovative approaches

Northern Ireland will see a major expansion in the number of wind farms over the next ten years. It is proposed these wind farms are clustered in the same areas which already currently host wind farms.

In Northern Ireland, there is little consideration given to maximising the opportunities for communities to benefit from onshore wind energy development in comparison to Great Britain. In Scotland and Wales, the devolved governments take a very pro-active approach and recognise the important role which communities have to play in renewable energy development. This is evident in both national and local government policies.

At national level, for example, the Scottish Government will create a community benefits register which will detail community benefits agreed with renewable energy developers in Scotland. The new community benefits register will be open from April 2012. The register will help communities to make a comparison with similar developments to inform negotiations. The creation of a register is one of a number of pro-active steps taken by the Scottish Government.

The Scottish and Welsh Governments have also developed plans to develop renewable energy on forestry sites owned by each government. These plans will be beneficial to the devolved governments ambitions to meet their renewable energy targets, and also present significant opportunities for private developers and affected communities, who will receive substantial financial benefits. Recent plans published by the Department of Agriculture and Rural Development in Northern Ireland and the Forestry Service, in relation to the potential of forestry sites for renewable energy initiatives are encouraging.

At a regional level, a number of councils in Scotland and Wales have developed guidance/policy towards the issue of community benefit and how to engage with commercial wind energy development. This guidance helps to inform both private developers and local communities.

There is an increasingly joined-up approach in Scotland and Wales towards renewable energy development, which includes the Government, the private sector and communities working closely together. Northern Ireland could learn from this approach to help ensure it reaches its renewable energy targets and builds on the principles of sustainable development.

Recommendations

Communities

1. A not for profit organisation to take the lead role in establishing good practice guidance including a policy on community engagement and promoting a toolkit on community benefits. This should include a protocol on working with local communities during and after the project development process and, in particular, exploring and negotiating community participation and community benefits with communities and other stakeholders. Such guidance / policy could also be applied to other forms of renewable energy development.

2. All local communities to take an active role in relation to a wind farm development being considered in their community exploring the range of community benefits which can be provided.

3. Local community based organisations to examine and where possible develop and implement wind farm developments based on one or more of the community ownership models outlined in this report.

Developers

4. Community Benefit Funds - local communities should be offered by developers a minimum initial payment of £2,000 per MW of installed capacity and a minimum annual payment of £2,000 per MW of installed capacity and that payment is index linked (amounts to be agreed between developer and local community representatives). This should apply to all new wind farms including those in the planning system or yet to be commissioned. In relation to community benefit funds - a percentage of the total annual funds to be utilised for local community projects, and a percentage to go specifically towards tackling fuel poverty in the area. This would establish a clear link between the wind farm and energy costs.

5. Community Ownership - has been shown to help increase levels of acceptance. Given the likelihood of clustering of wind farms especially in the rural west and the impact of further installations and associated grid infrastructure, developers should consider offering some form of community ownership as part of a community benefits package at their sites.

6. Community Engagement - large scale commercial developers should develop clear protocols on effective community engagement for wind farm developments. This engagement should be based on models of good practice and include post construction relationships re: educational benefits etc.

Local Councils

7. Local Councils to formally establish guidance protocols (based on good practice) which provide a framework for engagement by developers with the Councils and local communities. The protocols would ensure that as a result of harnessing renewable energy resources, social and economic problems including

fuel poverty can be alleviated and help towards sustaining and developing rural communities can be given.

Government

8. Department of Enterprise, Trade and Investment to actively support local communities and their potential, positive role in implementing wind farm projects and the contribution they make in the development of a low carbon society. The implementation of this policy should address the need for active community involvement in shaping Northern Ireland's community energy agenda. Policies ensuring effective support mechanisms need to be in place, such as a local energy assessment fund.

9. The Department of Agriculture and Rural Development to ensure models of good practice, as evidenced in Scotland and Wales, are followed in relation to both engaging and working in partnership with rural communities and the private sector when developing wind farms on land managed by the Forestry Service. A coordinated proactive approach can be seen in Scotland, where the government has developed plans in which the private sector and communities can work together to benefit from renewable energy development.

10. The Department of Enterprise, Trade and Investment to develop a public register of community benefits from wind farm projects similar to that currently being established by the Scottish Government. This public register would encourage greater transparency, helping communities to make a comparison with similar developments to inform negotiations.

11. A Government Department to take the lead role in developing a more coordinated approach involving the government, the private sector and communities towards wind farm developments, which builds upon principles of sustainable development.

1 Introduction

1.1 Research Context

Ambitious government targets have been set to increase the level of renewable energy production in the UK. The Strategic Energy Framework (2010) states that Northern Ireland will seek to achieve 40% of its electricity consumption from renewable sources by 2020. Electricity generated from onshore wind farms is the most established large scale renewable energy source in Northern Ireland and has been identified as playing a key role in achieving this target.[1] Currently, there are a large number of wind projects in the planning system in Northern Ireland and if the level of development continues, it will have a significant impact upon the environment and those affected communities.

The Draft Onshore Renewable Electricity Action Plan 2011-2020, published in October 2011, shows that there is currently 378MW of installed renewable generation in Northern Ireland, of which 355MW is from large scale wind. However, in order to meet the Northern Ireland Government target of 40% of electricity consumption from renewable sources by 2020, more renewable sources will need to be connected to the electricity network. It is estimated that between 1400MW to 1800MW of renewable generation installed capacity, depending on the energy mix in the future, will need to be connected to the network in order to meet this target.[2] Although barriers exist to the future deployment of wind energy, including issues surrounding grid infrastructure and planning, these figures help to show the scale of the likely future deployment of renewable energy. Given that onshore wind energy is expected to account for the majority of future renewable energy generation by 2020, it is evident that this is likely to have a significant impact on communities in Northern Ireland.

Although commercial wind energy developments can sometimes be met with resistance, they have the potential to present significant economic and social opportunities for communities which host them. In Northern Ireland, rural communities currently face a wide range of challenges in relation to poverty, disadvantage and isolation. It is therefore important to explore commercial wind energy development and the opportunities to help tackle these challenges and help make a positive contribution to sustaining rural communities.

Some of the opportunities associated with onshore wind energy development which exist for communities are in the form of community benefits. Community benefits tend to be contributions, which are provided by developers to communities which host wind energy developments. Whilst a range of different 'benefits' are provided, existing research has identified that community benefits from wind farms in the UK typically take the form of voluntary, annual, financial contributions from developers

[1] Department of Enterprise, Trade and Investment (2010) Strategic Energy Framework for Northern Ireland – 2010. Available able at: http://www.detini.gov.uk/strategic_energy_framework__sef_2010_-3.pdf (accessed 17/01/2012)
[2] Department of Enterprise, Trade and Investment (2011) Draft Onshore Renewable Electricity Action Plan 2011-2020. Available at: http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf (accessed 17/01/2012)

into a community fund.[3] However previous research draws on information gathered mainly from Great Britain, and, therefore, there is a lack of information regarding the provision of community benefits specific to Northern Ireland.

Recently, the issue of community ownership of renewable energy developments has received increased attention. In Great Britain, there have been growing numbers of wind farm developments which have already incorporated or plan to incorporate some form of community ownership. In Northern Ireland to date, there are no such examples of community ownership of a large scale, wind farm development. Community ownership in Great Britain has been shown to offer significant economic and social opportunities to stakeholders, and communities have played a significant role in such developments.

The importance of the role of communities in renewable energy development and the potential of communities to benefit from renewable energy development is becoming increasingly recognised. The UK Renewable Energy Strategy recognises that everybody has a role to play in achieving the renewable energy ambitions. It recognises that communities can play an important role in supporting renewable energy in their local area. This can be achieved through the involvement of individuals and communities in the formal planning process and through broader support for and involvement in developing renewable energy. The Strategy also notes that renewable energy developers have a key role in building local support for their projects, by making sure that there is effective engagement with local communities and by sharing some of the benefits from renewable deployment with host communities.[4]

In Great Britain, local communities are playing an increasingly significant role in renewable energy development. This is seen particularly in Scotland and Wales where governments at both a local and national level have introduced a range of measures to inform and help communities to benefit from renewable energy development. However, many of the pro-active approaches taken by stakeholders in Scotland and Wales have to date been largely absent in Northern Ireland. It is important to explore these opportunities further so the potential of Northern Ireland's future renewable energy development is fulfilled for everyone.

1.2 Aims and Objectives

The introduction highlights a number of key factors, including the likelihood of high levels of future deployment of wind energy; the challenges rural communities face; a lack of research into the provision of community benefits in Northern Ireland; the economic and social opportunities that may exist from community ownership of a commercial wind farm that have been absent from Northern Ireland, and the increasing recognition of the role of communities in renewable energy development.

[3] Cowell, R., Bristow, G., Munday, M, and Strachan, P. (2008) Wind Farm Development in Wales: Assessing the Community Benefits, a research project for the Welsh Assembly Government, Cardiff.
[4] HM Government (2009) The UK Renewable Energy Strategy. Available at: http://www.decc.gov.uk/assets/decc/what%20we%20do/uk%20energy%20supply/energy%20mix/renewable%20energy/renewable%20energy%20strategy/1_20090717120647_e_@@_theukrenewableenergystrategy2009.pdf (accessed 17/01/2012)

Taking these factors into account, this report aims to explore the opportunities that exist for communities to engage with commercial onshore wind energy development by examining the following:

1. **Undertake an analysis of community benefits provided by wind energy developers in the UK**
   Investigate the range of options that may be available to communities as a result of commercial onshore wind energy development. Examine how community benefit provision in Northern Ireland compares with the rest of the UK.

2. **Investigate the potential of community ownership models and identify good practice towards the provision of community benefits**
   Identify models of community ownership which currently exist and potential opportunities these may present for local communities. Explore case studies to identify approaches taken by developers towards existing community benefit provision.

3. **Investigate the approach taken by government, the wind industry and the voluntary sector in engaging and working in partnership with local communities**
   The research will also consider the role of Government in Northern Ireland, in addition to good practice followed by a range of stakeholders in Great Britain towards engaging and working in partnership with communities.

1.3 Methodology

The research included a combination of a desktop study, a questionnaire survey and stakeholder engagement. Desktop research used a wide range of sources including publications and web sources from a wide variety of stakeholders. A questionnaire survey was distributed to members of Northern Ireland Renewables Industry Group (NIRIG) in order to gather more information on the provision of community benefits in Northern Ireland. NIRIG is a joint collaboration of RenewableUK and Irish Wind Energy Association and represents the renewable energy industry in Northern Ireland. Finally, key stakeholders from the public, private and voluntary sector were engaged with through a series of meetings and conference calls.

1.4 Applications for Wind Farm Developments

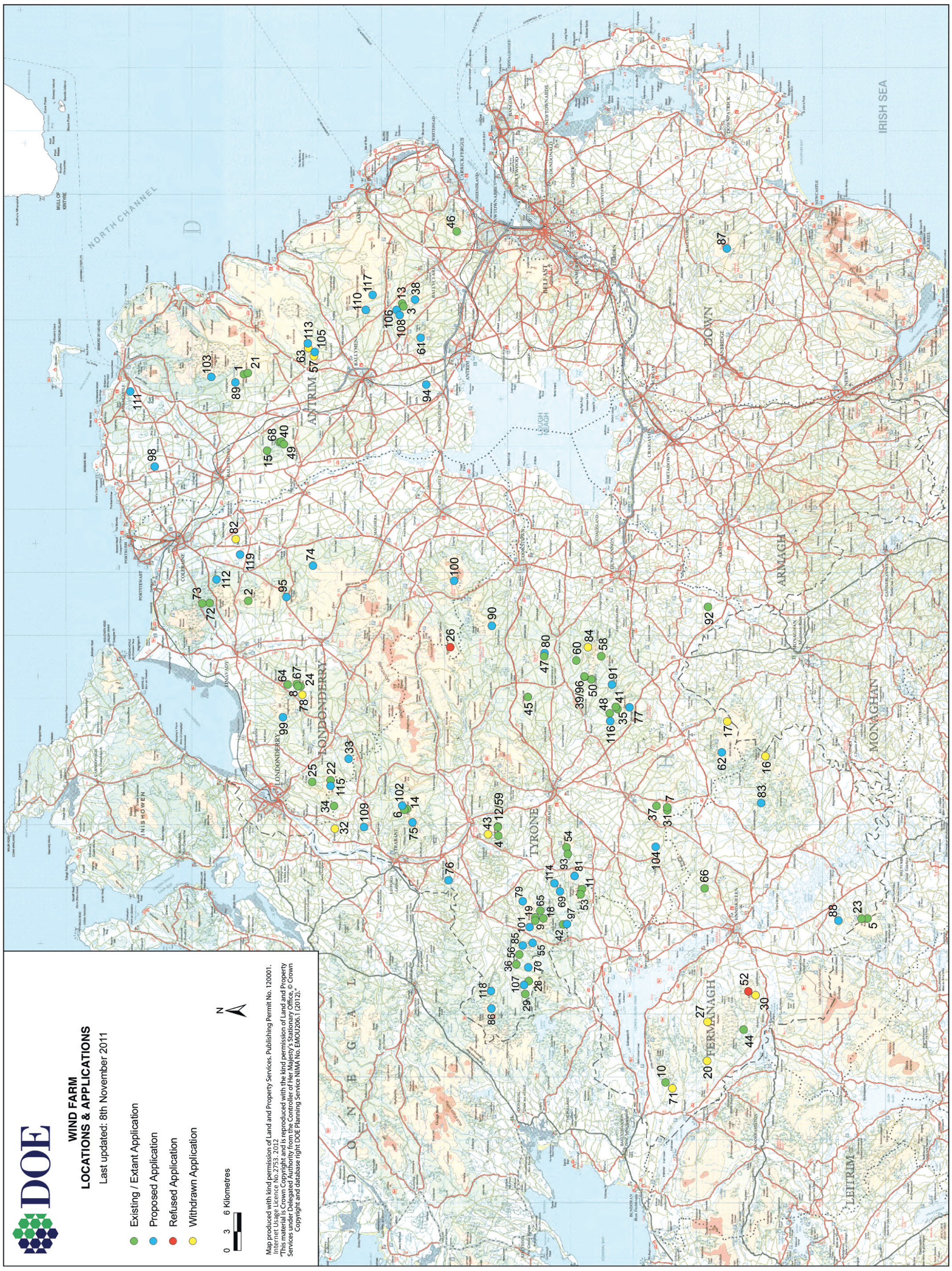
Northern Ireland is considered to have one of the greatest wind energy resources in Europe[5]. Based on the most up to date information at the time of writing (08/11/2011), a total of 56 wind farm applications had been approved by the Planning Service in Northern Ireland (this number included three single turbine applications

[5] Department of Enterprise, Trade and Investment (2011) Wind Mapping. Available at: http://www.detini.gov.uk/deti-energy-index/deti-energy-sustainable/energy-sustainable-7.htm (accessed 20/12/2011)

and three applications which have been superseded).[6] A significant number of these wind farms are not yet operational. There were a further 47 proposed wind farms in the planning system in Northern Ireland (this number includes five single turbine developments).[7] All wind farm applications except one are found to be in counties Antrim, Derry/Londonderry, Fermanagh and Tyrone (Figure 1). See overleaf.

[6] Department of Environment (2011) Northern Ireland Wind Farm Data (last updated 08/11/2011)
[7] Ibid.

Figure1: Map Outlining Wind Farm Locations and Applications in Northern Ireland



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1.5 A Comparison of Planning Consent Rates in Northern Ireland

The UK Renewable Energy Roadmap published in July 2011 analyses planning consent rates across the UK. The Roadmap covered wind projects submitted to planning since 2007. Consent rates in the UK were found to vary from around 60% in Scotland and Wales, to 80% in Northern Ireland and 54% in England.[8]

[8] Department of Energy & Climate Change (2011) UK Renewable Energy Roadmap. Available at: http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/2167-uk-renewable-energy-roadmap.pdf (accessed 20/01/2012)

2 Policy Context in Northern Ireland

2.1 Introduction

Government plays a critical role in both the development of renewable energy policy and in shaping the implementation of this policy. This section of the report looks at Government policy in Northern Ireland, with a particular focus on working with communities impacted by wind farm developments. The NI Executive work must be seen in context of wider national and European Union (EU) targets.

In meeting these broader targets the overall NI Executive and a number of government departments have an important role to play in shaping and overseeing relevant policy, including the Office of the First Minister and Deputy First Minister (OFMDFM), The Department of Enterprise, Trade and Industry (DETI), The Department of the Environment (DOE) and the Department of Agriculture and Rural Development (DARD). The areas of work of the government departments range from:

- Sustainable development
- Energy policy
- Renewable energy
- Rural development
- Environment and planning

2.2 National and International Targets

The EU is making great attempts to reduce its greenhouse gas emissions and has set a number of challenging targets for Member States which include a target of cutting greenhouse gases by a minimum of 20% by 2020.[9]

The importance of the role of renewable energy is widely recognised in helping to achieve these ambitious targets. The 2009 Renewable Energy Directive has set the UK a challenging target to achieve 15% of its energy consumption from renewable sources by 2020.[10] At present, the UK and therefore Northern Ireland energy policy is driven by Europe, and helps to demonstrate the important role we have to play as part of an international effort.

The UK Renewable Energy Strategy published in 2009 set out a plan for how the UK would achieve the EU target of 15% of energy from renewables by 2020, and includes a range of actions to help facilitate, incentivise and support the use of renewables by government, businesses, communities and individuals.[11]

[9] Department of Enterprise, Trade and Investment (2011) Draft Onshore Renewable Electricity Action Plan 2011-2020. Available at: http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf (accessed 17/01/2012)
[10] Department of Energy and Climate Change (2011) Renewable Energy. Available at: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx (accessed 20/12/2011)
[11] Department of Enterprise, Trade and Investment (2011) Draft Onshore Renewable Electricity Action Plan 2011-2020. Available at: http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf (accessed 17/01/2012)

More recently in 2011 the UK government and devolved administrations have published the UK Renewable Energy Roadmap. This sets out practical actions needed to tackle the barriers to the deployment of renewables, which will allow the level of renewable energy consumption to increase in line with the UK's targets for 2020 and beyond. It is anticipated that there will be a four-fold increase in the level of renewable energy consumption by the end of the decade.[12] Another important government publication is The UK National Renewable Energy Action Plan. This outlines a 'lead scenario' which shows that it is possible to achieve the UK's 15% target by 2020.

2.3 Sustainable Development

The OFMDFM recently launched the Sustainable Development Strategy 2010 and from this the Sustainability Development Implementation Plan 2011 – 2014. The Sustainable Development Strategy 2010 is an overarching strategic document for the NI Executive and has implications for all Departments in terms of each Departments work.

The Foreword to the Strategy by the First and Deputy First Minister states:

'We need everyone to play their part. We have consulted extensively in developing this document and listened to the views of stakeholders, but that is not enough. We need stakeholders (individuals, community groups, businesses and organisations) to take steps in driving delivery. We are now looking to those stakeholders, and to those working inside and outside of Government, to contribute to the attainment of the targets set within our Implementation Plan and support the priority areas for action. It is only by involving everyone that significant progress will become a reality.' [13]

In relation to the role of local communities and community organisations, the Strategy states:

'A key element of this Strategy is that it is inclusive and reaches all sections of society and fosters sustainable communities.

We want every community to feel involved in bringing forward and delivering this Strategy so that it is relevant to everyone and not seen as a remote government initiative.

[12] Department of Energy and Climate Change (2011) Renewable Energy. Available at: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx (accessed 20/12/2011)
[13] Northern Ireland Executive (2010) Sustainable Development Strategy. Available at: http://www.ofmdfmni.gov.uk/sustainable-development-strategy-lowres__2_.pdf (accessed 20/101/2012)

We recognise that the third sector has a wealth of experience in working throughout society on social, economic and environmental issues and we want to harness that experience by working in partnership and cooperation.'[14]

In terms of the private sector the Strategy states:

'A major feature of this Strategy is the realisation of the full potential of economic opportunities associated with the evolving sustainable development agenda.

Social and environmental concerns have sometimes been viewed as being in conflict with commercial drivers in the business sector. Equally, there is a view that enterprise and development can be seen as damaging to communities and the wider environment.

Such a one-dimensional view does not stand up to scrutiny. Society can deliver the prosperity needed to make the progress that we aspire to, and should do so in a way, which balances the development of a prosperous fair and equal society with long-term sustainability.

This multi-dimensional view is rapidly gaining widespread acceptance within the private sector. This new perspective is creating new opportunities to progress sustainable development against a background of cooperation between government and the private sector and civil society.'[15]

The Strategy successfully highlights the interconnectedness and the benefits of all sectors working together:

'To successfully achieve a peaceful, fair and prosperous society we need to involve the private and voluntary/community sectors and civic society, as well as government, in partnership. This will need processes that will facilitate stakeholder involvement in development and implementing our key programmes and strategies in a sustainable way. By taking this approach, we will better understand the different perspectives and needs of wider society, as well as the local issues that affect particular sectors and groups'.[16]

'The move towards a 'sustainability focused' society – with a shared and better future – depends upon collaboration between partners in different sectors, each of whom possesses different but potentially complementary skills, experiences and attributes.'[17]

The Fermanagh Trust fully supports the approach outlined in the Strategy.

[14] Northern Ireland Executive (2010) Sustainable Development Strategy, page 9. Available at: http://www.ofmdfmni.gov.uk/sustainable-development-strategy-lowres__2_.pdf (accessed 20/101/2012)
[15] Ibid, page 10.
[16] Ibid, page 30.
[17] Ibid, page 30.

2.4 The Draft Programme for Government

The Draft Programme for Government was circulated for consultation in November 2011. The actions set out in the draft programme include a number of plans and priorities including[18]:

- Encourage industry to achieve 20% of electricity consumption from renewable electricity and 4% renewable heat by 2015

- Ensure 90% of large-scale investment planning decisions are made within 6 months and applications with job creation potential are given additional weight

- Invest in social enterprise growth to increase sustainability in the broad community sector

- Establish the new 11 council model for Local Government by 2015

- Introduce and support a range of initiatives aimed at reducing fuel poverty across Northern Ireland including preventative interventions

- Deliver a range of measures to tackle poverty and social exclusion

Each of these actions is relevant to the development of onshore wind energy and the potential impact on rural communities.

2.5 Energy Policy in Northern Ireland

In Northern Ireland, The Strategic Energy Framework (SEF) 2010 recognises the importance of maximising renewable energy sources amongst a backdrop of concerns, including energy security and a heavy reliance on fossil fuels. The Framework sets out four main energy goals:

- Building competitive markets
- Ensuring security of supply
- Enhancing sustainability
- Developing our energy infrastructure

The SEF states that Northern Ireland will seek to achieve 40% of its electricity consumption from renewable sources by 2020. It recognizes that achieving this target will be challenging for government departments, the private sector who are involved in supplying and distributing electricity, and energy consumers who will see the construction of new renewable installations and power lines.[19]

The SEF recognizes the challenges in onshore wind farm developments in terms of public acceptance:

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[18] Northern Ireland Executive (2011) Draft Programme for Government 2011-2015. Available at: http://www.northernireland.gov.uk/draft-pfg-2011-2015.pdf (accessed 19/01/2012)
[19] Department of Enterprise, Trade and Investment (2010) Strategic Energy Framework for Northern Ireland – 2010. Available able at: http://www.detini.gov.uk/strategic_energy_framework__sef_2010_-3.pdf (accessed 17/01/2012)

'Electricity generated by onshore wind farms is the most established, large-scale source of renewable energy in Northern Ireland. Wind farms will play a vital role in meeting the new renewable electricity target. There will, however, continue to be concerns around planning and the infrastructure required to deal with increased wind generation.'[20]

The Draft Onshore Renewable Electricity Action Plan 2011-2020 (DETI) includes an assessment of the generation scenarios for onshore wind developments. The results of the assessment noted by the Plan were as follows:

'In terms of onshore wind, the results of the assessment conclude that in order to manage or limit potential adverse effects, the preferred option would be to allow onshore wind developments to continue, where possible, to cluster in existing areas of development, before moving into new areas where there is little or no existing onshore wind development. However, although there is capacity for additional onshore wind in these current areas, there is potential for significant adverse cumulative effect to occur once development reaches a certain level in these clusters.'[21]

In addition to the patterns of where wind farm applications are found in Northern Ireland, this assessment helps to highlight that certain areas in Northern Ireland may potentially be more affected than others from future, onshore wind energy deployment. It is important to note the draft document gives no indication of how local communities should be engaged or need to be engaged in this process. This is in stark comparison to the way these issues are being addressed by the Scottish and Welsh governments.

2.6 Planning

The document 'Wind Energy Development in Northern Ireland's Landscapes' (SPG)[22], identifies landscape characteristics that may be sensitive to wind turbine development. This document, when read together with the guidance notes to PPS 18 provides supplementary planning guidance on the landscape and visual analysis process, and the indicative type of development that may be appropriate across Northern Ireland.

Planning Policy Statement, PPS 18 'Renewable Energy' sets out the Department's planning policy for development that generates energy from renewable resources which requires planning permission. In the Introduction to PPS 18, it is stated:

[20] Ibid, page 14.
[21] Department of Enterprise, Trade and Investment (2011) Draft Onshore Renewable Electricity Action Plan 2011- 2020, page 21. Available at: http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf (accessed 20/01/2012)
[22] Northern Ireland Environment Agency (2010) Wind Energy Development in Northern Ireland's Landscapes Supplementary Planning Guidance to Accompany Planning Policy Statement 18 'Renewable Energy'. Available at http://www.planningni.gov.uk/index/policy/supplementary_guidance/spg_other/wind_energy_development_in_northern_irelands_landscapes_spg_for_pps18-2.pdf (accessed 19/01/2012)

'The varied nature of renewable energy technologies presents the potential to develop an indigenous renewable energy industry and provides a range of opportunities to support the Northern Ireland economy including:

- Direct and indirect employment opportunities during the construction and operational phases;
- Revenue to the owners of the land on which they are built;
- Employment in the manufacture of components and services;
- Opportunities for rural diversification, the alternative agricultural use of land and employment in the production of biomass crops;
- A beneficial route for the utilisation of residues and wastes that might otherwise be difficult or expensive to dispose of; and
- An improved source of electricity in remote locations.' [23]

There is no mention of community benefits.

The document goes on to state: 'Development that generates energy from renewable resources will be permitted provided the proposal, and any associated buildings and infrastructure, will not result in an unacceptable adverse impact on:

(a) Public safety, human health, or residential amenity;
(b) Visual amenity and landscape character;
(c) Biodiversity, nature conservation or built heritage interests;
(d) Local natural resources, such as air quality or water quality; and
(e) Public access to the countryside.'[24]

Again, any adverse impacts on communities are not reflected in the policy. However, the policy does state: 'The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given significant weight in determining whether planning permission should be granted.'[25]

It should be noted, however, that PPS 18 provides a presumption in favour of development in order to meet government targets on renewable energy and greenhouse gases emissions.[26] The Best Practice Guidance to PPS 18 does reiterate that a developer should show the 'Overall economic and social benefits attributed to the scheme' and as well as landscape, built and natural heritage, habitat impact, etc,

[23] Department of the Environment (2009) Planning Policy Statement 18 'Renewable Energy', page 2. Available at: http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18__renewable_energy.pdf. (accessed 19/012012).
[24] Ibid, page 8.
[25] Ibid, page 8.
[26] Ibid, page 9.

'size, scale and layout and the degree to which the wind energy project is visible over certain areas'.[27]

Importantly the Best Practice Guidance to PPS18 also states: 'The planning system exists to regulate the development and use of land in the public interest. The material question is whether the proposal would have an unacceptable detrimental effect on the locality generally, and on amenities that ought, in the public interest, to be protected'.[28]

In relation to education benefits of wind farms, the Best Practice Guidance to PPS 18 states:

'The educational potential of wind energy developments should also be considered. For example, there may be scope for an interpretive centre on alternative energy resources to be located at accessible location in proximity to a wind energy development. It would be helpful if established long distance walking routes/amenity rights-of-way were identified and mapped to enable an assessment both of the extent to which recreational pursuits can be accommodated and facilitated either within or adjacent to wind energy developments.'[29]

In the Best Practice Guidance to PPS 18, community groups are not listed as departmental consultees, nor are consultation documents required with the planning permission application for wind energy.[30]

2.7 Community Planning

The implementation of new community planning powers in the new 11 Local Authorities to be established in 2015 will provide a potential mechanism for effective area based considerations and more effective local input into the range of issues raised in this research. As outlined in the Community Planning Consultation paper:

'Community planning would enable councils to work in partnership with a range of other sectors, for example public bodies, businesses, and community and voluntary organisations. This would facilitate the delivery of services in their districts to provide a joined-up approach to meeting the needs and aspirations of local communities.'[31]

It is interesting to note community planning has been in place in Scotland and England for a number of years. The increased involvement of communities in wind farm developments particularly in Scotland appear to mirror the implementation of the community planning powers by local authorities there. Though the community

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[27] Department of the Environment (2009) Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy', page 11. Available at: http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18__renewable_energy__best_practice_guidance.pdf, (accessed 19/01/2012)
[28] Ibid, page 12.
[29] Ibid, page 30.
[30] Ibid, pages 31 to 34.
[31] Department of Environment (2010) Local Government Reform: Policy Proposals, Consultation Document, 30th November 2010, page 38. Available at: http://www.planningni.gov.uk/index/news/news_consultation/local_government_reform_-_consultation_document.pdf (accessed 20/01/2012)

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planning powers are due to be implemented in 2015, inertia cannot be allowed to take place until then, action is now needed.

2.8 Rural Development

The Renewable Energy Action Plan 2010 also provides an interesting insight into the increasing significance government is giving to the issue of renewable energy in rural areas:

Specifically Recommendation 4: 'Exploiting opportunities relating to energy security by displacing fossil fuel derived energy with Renewable Energy within the agricultural and forestry sectors – with a view to growing the demand and having a positive impact on energy security and carbon footprint.'[32]

The Rural Development Energy Action Plan taken together with the Forestry Service plans: 'A Delivery Plan for the Implementation of the Forestry Act (Northern Ireland) 2010' and the 'Forestry Service Business Plan 2011 / 2012' sets out some of the Departments plans in relation to renewable energy.

2.9 Summary

The overarching Sustainable Development Strategy 2010 outlines the need to work together in real and effective partnerships with local communities as an equal partner. The subsequent strategies outlined however give little consideration to the effective engagement of local communities or their potential role in contributing to sustainable development. Community planning in 2015 offers a mechanism of how this may be addressed in the medium term. In the short term the Government Departments highlighted above may find value in Chapter 8 of this report which highlights good practice elsewhere.

[32] Department of Agriculture and Rural Development (2010) Renewable Energy Action Plan 2010, page 9. Available at: http://www.dardni.gov.uk/renewable-energy-action-plan-2010.11.030_renewable_energy_action_plan_2010_final.pdf (accessed 20/01/2012)

3 Community Engagement

The manner in which local communities engage with and gain from wind power developments in the UK has tended to focus on three key issues[33]:

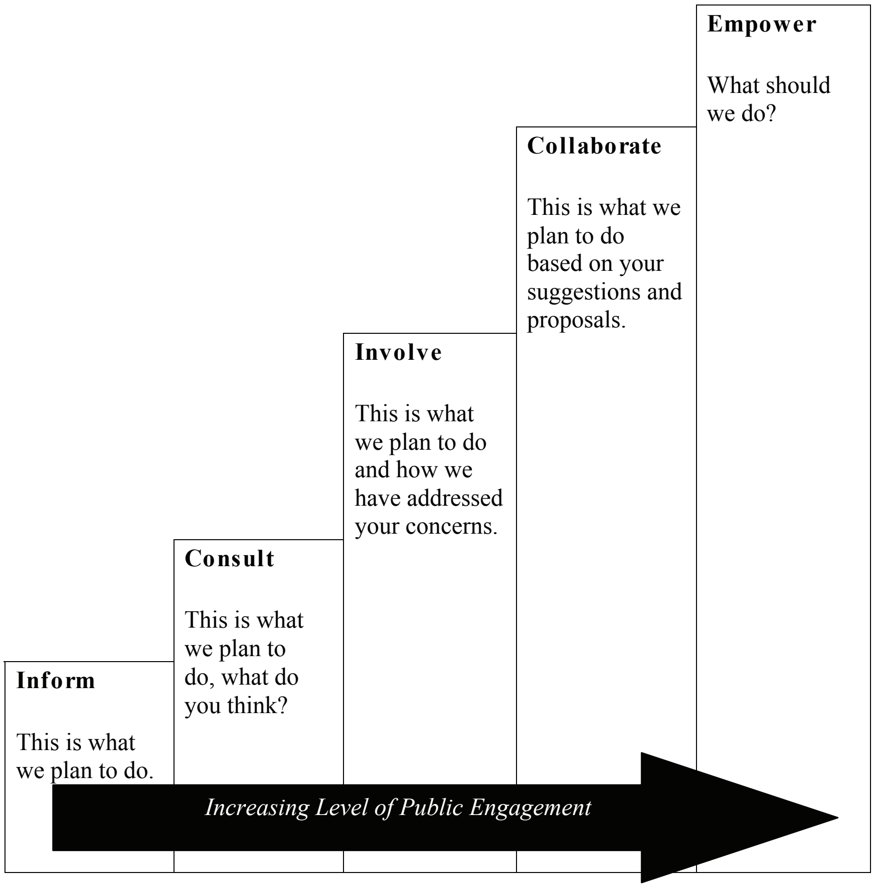
- The nature and openness of engagement with local communities during the planning process
- Direct financial contributions – a community fund of some kind; and/or
- Opportunities for community ownership or 'dividend'

This chapter of the report considers the importance of having an effective community engagement process and the benefits of this. It will also look at community engagement in Northern Ireland and highlight good practice in England and Wales, and further a-field.

Effective community engagement is centred on a well designed proactive programme which seeks out and responds to community issues. Community engagement, therefore, involves working with all relevant stakeholders to inform, listen to and consider views in order to develop the best possible initiative and ensure the proposed development is successful and welcomed by the community. Community Engagement should not be a pr exercise. In a simplified format, different levels of engagement can be characterised. See Figure 2 overleaf:

[33] Centre for Sustainable Energy & Garrad Hassan (2005) Community benefits from wind power: A study of UK practice & comparison with leading European Countries, a report to the Renewables Advisory Board & the DTI. Available at: http://www.cse.org.uk/pdf/pub1049.pdf (accessed 17/01/2012)

Figure 2: Different Levels of Community Engagement



Compiled with data from The Protocol for Public Engagement with Proposed Wind Energy Developments in England.[34]

3.1 What does Effective Community Engagement Involve?

It has been noted that 'Supporting effective engagement is not, therefore, about being in favour or against a particular proposed development. It is about trying to make sure that: (a) decisions made in the planning system are well informed, evidence-based and

[34] Centre for Sustainable Energy, BDOR and Peter Capener (2007) The Protocol for Public Engagement with Proposed Wind Energy Developments in England, a report for the Renewables Advisory Board and DTI. Available at: http://www.cse.org.uk/pdf/pub1079.pdf (accessed 18/01/2012)

timely as possible, and; (b) any development that is permitted reflects an understanding of local interests and opportunities for positive local gain'.[35]

The Protocol for Public Engagement for Proposed Wind Energy Developments in England outlines five principles of effective engagement:

- Access to information
- The opportunity to be consulted and make representations
- The opportunity to contribute ideas
- The opportunity to actively take part in developing proposals and options
- The opportunity to receive feedback and to be kept informed

Effective community and public engagement between a developer, the local community, local government and statutory organisations can help improve proposals for a development as they will:

- Reflect an understanding of local issues and concerns
- Project much more accurately the potential impacts and benefits
- Local communities can help shape the development
- Local communities can be part of the decision making process about their continuing relationship with the development once operational

3.2 Examples of Policy Frameworks for Community Engagement

In recent years, the planning system in England has been reformed to make it more flexible and responsive and more focused on sustainable development. England's planning policy on renewables, as stated in Planning Policy Statement 22, clearly endorses effective public engagement in renewable energy policy development and in renewable energy project proposals.

As part of this process, the government has outlined its principles for community involvement in the various planning statements and guidance documents. These principles include:

- The front loading of involvement – opportunities for early community involvement and a sense of ownership of local policy decisions

- Using methods of involvement which are relevant to the communities themselves

- Clearly articulating opportunities for continuing involvement as part of a continuous programme, not a one-off event

- Transparency and accessibility

- Planning for involvement. Community involvement should be planned into the process

[35] Ibid, page 7.

In addition to Government, the wind industry in England has also outlined an approach towards engaging with communities. A Community Benefits Protocol has been produced which outlines the commitment by the members of RenewableUK to deliver benefits to communities that live near onshore wind farms of 5MW and above (installed capacity).[36] The Protocol, however, is only applicable to England. Currently, in Northern Ireland, at the time of writing, no similar document has been produced by the wind industry.

The Canadian Wind Energy Association (CWEA) suggests a number of approaches to both informing and consulting the public. These include facilitated workshops and working with a local Community Advisory Committee, which provides a voice for the local community.

The CWEA states that a well-designed, community engagement programme is a proactive exercise in seeking out and responding to community issues. While recognising the goals of the developer and the stakeholders can be very different, 'the overall goal is to develop the best possible project and ensure wind energy developments are welcomed in the community'.[37]

3.3 Community Engagement in Northern Ireland

The policy framework which exists in Northern Ireland is focussed on seeking planning permission. Liaison with communities by developers in Northern Ireland follows a very standard approach, which is based around providing information on the proposed development. This is generally done prior to submitting planning permission by:

- Circulating letters / information packs to householders and local organisations
- Calling at homes in the vicinity of the proposed vicinity
- Calling / meeting local councillors
- Holding an exhibition in a local venue to show the plans

The focus is, therefore, on the pre planning application phase. In cases where local community benefits funds have been established, the relationship between a development and the local community is centred on the local groups seeking grants from the developer or an intermediary annually. Outside this process, there is, at best, a limited relationship between the wind farm and the local community in which the development is located – in terms of a local or accessible point of contact to arrange educational visits, etc.

Best Practice Guidance to PPS 18 for instance outlined in Chapter 2, notes how the educational benefit of wind energy developments should also be considered i.e. scope for an interpretive centre on alternative energy resources to be located at an accessible location in proximity to a wind energy development, such developments are not common features at many wind farms.

[36] RenewableUK (2011) A Community Commitment: The Benefits of Onshore Wind. Available At: http://www.bwea.com/pdf/publications/CommunityBenefits.pdf (accessed 10/01/2012)
[37] Canadian Wind Energy Association. Wind Energy Development – Best practices for Community Engagement and Public Consultation, page 5. Available at: http://www.canwea.ca/pdf/canwea-communityengagement-report-e-final-web.pdf (accessed 18/01/2012)

The new Community Planning powers which Local Government is due to implement as part of the reform of Local Government in 2015 provides an appropriate vehicle to oversee community engagement in the future. Effective community planning has the potential to lead to increased levels of engagement and public impact. Effective levels of engagement are outlined in the Protocol for Public Engagement with Proposed Wind Energy Developments in England (Appendix 1). It is essential, however, that this issue is not left in abeyance until 2015 and action is taken by DETI, DOE and District Councils now.

The Protocol for Public Engagement with Proposed Wind Energy Developments in England highlights the process for adopting a Community Engagement Protocol. In summary, this includes a role for all stakeholders[38]:

- Role of developers - to prepare and apply a coherent engagement plan in partnership with planners and local councils with reference to community involvement

- Role of local authorities - to support the development of the developer's engagement plan. This needs to take place while making clear that involvement in this process is not an indication of support for any application

- Role of communities - to ensure these protocols are implemented, there are clear responsibilities at community level, which include openness, transparency, constructive dialogue and clear communication lines. This process also needs to take place, while making clear that involvement in the process is not an indication of support for any application

Stakeholders in Northern Ireland should take into consideration the issues raised here in their future activities. This includes community infrastructure support organisations like The Fermanagh Trust, who have an important role in advising and supporting local rural groups. There is a tradition of community organising in Northern Ireland and each rural community is generally represented by one or more community development associations, which is helpful in having immediate points of contact for community engagement.

3.4 Good Practice Model

The Nant y Moch Wind Farm is to be located east of the A487 between Tal-y-bont village and the Nant y Moch reservoir north of Aberystwyth, Ceredigion, Wales. The wind farm is a SSE Renewables initiative. The community engagement process, which the company has established in conjunction with the local community includes:

- Appointing a bilingual, locally-based Community Liaison Officer

[38] Centre for Sustainable Energy, BDOR and Peter Capener (2007) The Protocol for Public Engagement with Proposed Wind Energy Developments in England, a report for the Renewables Advisory Board and DTI. Available at: http://www.cse.org.uk/pdf/pub1079.pdf (accessed 18/01/2012)

- Working closely with a Community Liaison group established with representation from local communities and key stakeholders

- Forming and approving the 'Community Engagement Plan.' The Plan sets out the methods, timing and transparency of SSE Renewables to consult with the local communities, interested parties and the wider public throughout the lifecycle of the development;

- Establishing a dedicated website to keep all stakeholders informed http://nantymochwindfarm.com/

Though this proposed wind farm is one of the largest onshore wind farms planned in the UK, the process and procedures adopted by SSE Renewables clearly outlines how effective community engagement can take place.

3.5 The Benefits of Effective Engagement

Much analysis has taken place into why the wind energy sector has been unable to move quicker on the transition to a low carbon economy. The long planning process is often blamed for the delay. When one looks at the decision-making process, there are three distinct parties to the process – the private developers, Government and local communities. The current process, from the initiation of a wind farm project through to a final decision, can often take 6+ years. In terms of community engagement, the potential appears to exist for each of the three distinct parties to redefine their relationships for the benefit of all parties. Effective community engagement offers the potential to build local support of wind power.

Recent research carried out by proper engagement with local residents would be 'a radical departure from the current planning process' Barry and Ellis (2010) outlines the importance of involving people;

'We are beginning to understand how the inevitable transformation of our energy economy will impact on virtually every aspect of our carbon-based society, yet we have not conceived of how to include people whose lives will be affected in the decisions which will lead to those changes. That is not just the confirmation of an important political principle (i.e. those who suffer laws and policies should have some part in their making) but also for eminently practical reasons. We believe we are *more,* not *less* likely, to get people supporting the types of changes needed if we include them in the decision making process'.[39]

The research concluded that and would increase the likelihood of gaining political support.[40]

[39] Barry, J. and Ellis, G. (2010) Beyond consensus? Agonism, republicanism and a low carbon future. In: Devine-Wright, P. (ed) (2010) Renewable Energy and the Public: From NIMBY to Participation. London:Earthscan, pages 29-42.
[40] Ibid.

3.6 Summary

In Northern Ireland currently, key engagement centres on the relationship between the Industry and Government. Effective community engagement or involvement is not a feature of any government action plans. This is very different to England, Scotland and Wales where the role of communities is considered to be extremely important. There may be historical reasons why the 'public service' and the wind industry here have not prioritised community engagement. With local authorities being given new community planning guidelines this will no longer be the case. In the meantime, it is essential that community engagement processes are an integral part of all stakeholders' strategies. It is essential that this issue is not left in abeyance until 2015 and action is taken by DETI, DOE, DARD and District Councils now.

Recommendation

Community Engagement - large scale commercial developers should develop clear protocols on effective community engagement for wind farm developments. This engagement should be based on models of good practice and include post construction relationships re: educational benefits etc.

4 How do communities benefit from wind farm development?

4.1 Types of Community Benefits found in the UK

Communities can benefit from wind energy development through the provision of community benefits. Community benefits in the context of wind energy tend to be a contribution made voluntarily by a developer to communities which host a development. Previous research has noted that there is no standard approach towards the nature or scale of community benefits by wind energy developers in the UK.[41] Nevertheless, there is a range of community benefits which can commonly be identified with wind energy development in the UK. These can be broadly categorized as follows:

1. Local contracting and jobs
2. Benefits in kind
3. Community funds
4. Community ownership (sometimes referred to as local ownership)

Whilst these are the broad categories of community benefits provided in the UK, other benefits do exist which do not fit neatly into these categories. For example this may include land rental to owners, educational visits and school support and potential involvement of local people in the development process. However, it is obvious that questions can be raised surrounding the extent to which people in the local community perceive these as a benefit. Equally, various local people may have different views about what actually is considered to be a benefit. Additionally, it is also important to recognise that some of the potential benefits are difficult to influence or enhance for a community close to a wind farm. Examples of this include the location of where wind turbine components are manufactured and ownership of the land on which a wind project is built.[42]

The four main categories of community benefits will now be discussed:

1. Local contracting and jobs

Significant sums of money are involved in the construction and operation of a wind farm. However, the extent to which the local community benefits from the

[41] Centre for Sustainable Energy & Garrad Hassan (2005) Community benefits from wind power: A study of UK practice & comparison with leading European Countries, a report to the Renewables Advisory Board & the DTI. Available at: http://www.cse.org.uk/pdf/pub1049.pdf (accessed 17/01/2012)

[42] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyATookit.pdf (accessed 10/01/2012)

investment made by the wind farm developer is dependent on a range of factors. These include, whether locally based contractors are employed during these activities and where the components of the wind farm are made.

2. Benefits in kind

It may be the case that wind farm developers may provide or pay directly for improvements to local infrastructure. They may include, for example, in-kind improvements to community facilities, roads, environmental improvements, tourist facilities or support to community energy projects.

3. Community funds

A common form of community benefit provision is the provision of a community benefit fund. A number of different ways exist for developers to link payments from the wind farm to these funds. This could be done through the following[43]:

- An annual payment per megawatt (MW). This could be for every year or for some years of the project

- A lump sum payment when the project starts operating or at some point thereafter

- An amount linked to the revenue generated by the project

- Or finally, a combination of some or all of the above

It has been recognised that payments are offered in relation to the predicted profitability of the wind farm development. This can, therefore, result in a different sum being offered into the community fund by the same company for the same scale of development at different locations.[44] Community funds may support a range of local activities and are often provided over the lifecycle of a wind farm (typically a 25 year lifecycle). Examples of this may include providing funding towards community facilities, schools, and helping to provide education about environmental issues. Indeed some funds may support sustainable energy projects, which may encourage energy efficiency measures and raising levels of awareness. There are a number of different ways in which community funds can be administered and this may vary across wind farm developments. Local charitable trusts, community foundations and social enterprises are examples of some of the organisations which are engaged to administer community funds.

[43] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyATookit.pdf (accessed 10/01/2012)

[44] Scottish Borders Council - Achieving Community Benefits from Commercial Windfarms in the Scottish Borders: A Toolkit for Communities and Windfarm Developers.

4. Community ownership

Community ownership is quite common place in European countries such as Germany and Denmark. However, implementation of community ownership schemes in the UK has been more challenging. Nevertheless, there have been a growing number of wind projects involving some form of community ownership in the UK and a number of models of community ownership currently exist. Community ownership can offer significant social and economic opportunities to communities and will be explored in greater detail later on in this report.

4.2 Case Studies

The following examples outline how developers might engage with communities through the provision of community benefits.

Altahullion (Co. Derry / Londonderry, Northern Ireland)

Altahullion Wind Farm is comprised of 20 turbines, with an installed capacity of 26MW and was commissioned in 2003. The wind farm was developed by RES Ltd and B9 Energy Services Ltd. In the pre-application stage of the wind farm a local community group made a request for tourist work to be included as part of the development of Altahullion. The wind farm developers reacted to this request by putting in place a number of measures. For example, a car park was created on site and visitors are able to use a footpath which leads to a turbine which had previously been identified as a tourist turbine. The wind farm owner provided information boards and the RSPB and the local council provide information on the wind farm and environmental issues. Annual school visits are also run by RES Ltd to the wind farm.[45]

A community fund is in place at the wind farm which contributes to local activities. The fund is divided between three local community groups which are all registered charities. These groups were selected due to their proximity to Altahullion and after consultation with the local community and their representatives. In relation to the management of the community fund, arrangements for the community fund have been formalised in an agreement between Altahullion Wind Farm and the three community groups involved.[46]

Burton Wold (Northamptonshire, England)

[45] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What we do/UK energy supply/Energy mix/Renewable energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyAToolkit.pdf (accessed 10/01/2012)

[46] Department of Environment (2007) Draft Planning Policy Statement 18: Renewable Energy. Available at: http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/pps18-draft-renewable-energy.pdf (accessed 17/01/2012)

Burton Wold is compromised of 10 turbines, with a capacity of 20MW and was commissioned in March 2006. The wind farm was developed by Your Energy. Through consultation with the local community, a community benefit scheme was established, which was designed to support energy efficiency and options for smaller-scale renewable energy projects. A community fund was set up to support these projects, as well as education initiatives. Once the wind farm was built, the community received a lump sum of £40,000 and then £10,000 per annum over the lifecycle of the wind farm. The fund is available to residents and community groups who can apply for grants and interest-free loans, which can be used to make energy efficiency improvements to their homes or premises, or to help promote energy efficiency education.[47] The community benefits fund is administered by Kettering Borough Council.[48]

Farr Wind Farm (close to Inverness, Scotland)

Farr Wind Farm is a large project which compromises of 40 turbines (92MW) and was commissioned in May 2006. The wind farm was developed by RWE npower renewables. A community benefit fund was established as a result of the wind farm to help local community projects in the areas of Strathnairn and Strathdearn. Strathnairn Community Benefit Fund Ltd and Strathdearn Community Charitable Trust administer the community fund. Both of these organisations were established by members of the local community. This helps to ensure that local representatives are able to make decisions about how the fund is allocated. In 2009, the Strathnairn Community Benefit Fund Ltd made 56 grants amounting in total to £86,070 across a range of different grant types. Examples of grants included further education and training grants for students, renewable grants and home heating grants. In 2009, the Strathdearn Charitable Trust made 13 grants totalling £21,550 to a variety of causes, which included helping to make improvements to local infrastructure.[49]

4.3 Summary

The four categories of community benefits outline the approaches taken by developers. This ranges from local people being involved in the construction of a wind farm to local people owning a stake in a wind farm. The three case studies highlight different examples from benefits in kind to how communities benefit from a range of financial contributions.

Recommendation

All local communities to take an active role in relation to a wind farm development being considered in their community exploring the range of community benefits which can be provided.

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[47] RenewableUK (2011) A Community Commitment: The Benefits of Onshore Wind. Available At: http://www.bwea.com/pdf/publications/CommunityBenefits.pdf (accessed 10/01/2012)
[48] Community Viewfinders (2007) Northumberland Protocol for Community Benefits from Wind Farm Developments, Final Report for the Northumberland Renewable Energy Group.
[49] RenewableUK (2011) A Community Commitment: The Benefits of Onshore Wind. Available At: http://www.bwea.com/pdf/publications/CommunityBenefits.pdf (accessed 10/01/2012)

5 Community Ownership

Community ownership in the UK, to date, has not been as widespread as in other European countries. Indeed, achieving community ownership in wind farm development can be challenging. Key challenges can include the regulatory environment, planning and legislative issues, the ability to access finance during the development process, time and commitment from the community, and often communities lack the technical experience or 'know-how' to progress a project. However, despite these challenges, in recent years, there have been a growing number of wind energy developments which incorporate some form of community ownership.

Indeed, the potential of community ownership is becoming increasingly recognised by the UK Government. The Office for Renewable Energy Deployment (ORED) is responsible for ensuring renewable energy targets are met. This includes unblocking barriers to the delivery of renewable energy. As part of this work the ORED is investigating ways to provide opportunities for communities to benefit through the promotion of community owned renewable energy schemes.[50]

Community ownership is recognised as presenting large, economic, social and environmental opportunities for local communities. The associated financial opportunities that arise can have a hugely positive impact for local communities, helping to sustain community infrastructure and enhance the lives of local people. The case studies that will be discussed in this chapter help to highlight the substantial financial benefits and the impacts that these can have on local communities. It is clear from these case studies that the financial opportunities from community ownership can be significantly higher than those presented by community funds. A range of benefits associated with community ownership have also been noted including[51]:

- Higher levels of social acceptance of wind energy
- The development of new local knowledge and skills
- Enhancing social and technical and social innovation
- Benefits resulting from the social interaction and cooperation and interaction which is needed to develop such a project
- Basing local incomes on a sustainable use of local resources
- Increasing stakeholders knowledge of energy and environmental issues

A notable benefit highlighted here is the relationship between community ownership and higher levels of social acceptance of wind energy. It has been recognised that

[50] Department of Energy and Climate Change (2012) Office for Renewable Energy Deployment (ORED) Available at: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored/ored.aspx (10/01/2012)
[51] Cowell, R., Bristow, G., Munday, M. and Strachan, P. (2008) Wind Farm Development in Wales: Assessing the Community Benefits, a research project for the Welsh Assembly Government, Cardiff.

social acceptance is potentially a serious barrier to achieving renewable energy targets.[52] However empirical studies have been carried out which demonstrate the contribution of community ownership models of wind farms to social acceptance.[53] This is important to take into consideration given the likelihood of high levels of future wind energy development in Northern Ireland.

There are a number of different models of community ownership which exist and which will now be described:

1. Full ownership
2. Part ownership
3. Community/developer joint venture
4. Co-operative

5.1 Full Ownership

It is possible for a community to fully own a wind farm. However, given the high capital costs which are likely to be involved with full community ownership, it is more likely that this will take place for smaller scale developments. A case study of full community ownership is the Isle of Gigha.

Isle of Gigha (Argyll and Bute, Scotland)

In 2002, a community buy-out of the Isle of Gigha took place from a private landowner. In order to take ownership of the island, the community raised over £4 million, much of which came as a result of grant funding. The island is managed by the Isle of Gigha Heritage Trust, which consists of elected members of the local community. The Trust has attempted to regenerate the economy on the island and to reverse issues of depopulation and under investment on the island. In 2003, the Trust established a community-owned wind farm to help generate an income which could be reinvested on the island. The wind farm is compromised of three refurbished 225kw turbines costing £440,000. The money was raised through grant funds, loan and equity finance, with loans being repaid within 7 years. The wind farm generates a gross annual income of approximately £150,000. This money is reinvested into a capital renewal fund to replace the turbines at the end of their lifetime and to pay for their maintenance. This results in a net income of between £75,000 and £100,000 being available every year for the community, and a fourth turbine is planned.[54]

5.2 Part Ownership

[52] Wustenhagen, R., Wolsink, M. and Burer, M.J. (2007) Social acceptance of renewable energy innovation: An introduction to the concept. Energy Policy, 35(5), pp. 2683-2691.
[53] World Wind Energy Association (WWEA) (2011) WWEA highlights Community Power. Available at: http://www.wwindea.org/home/index.php/images/stories/index.php?option=com_content&task=view&id=309&Itemid=40 (accessed 10/01/2012)
[54] The Southern Uplands Partnership (2011) A Study of Community Energy Benefits in the Southern Uplands. Available at: http://www.sup.org.uk/PDF/SUPCommunityEnergyBenefitsResearch-Rev2.0.pdf (accessed 17/01/2012)

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This may involve a community group being able to own one or more of the turbines in a wind farm development. This requires significant fundraising, financial responsibility and management from the community group.[55] However, the financial benefits and impact this can make to a community is highlighted at Earlsburn, Scotland.

Earlsburn (Stirling, Scotland)

The wind farm is compromised of 15 turbines (37.5MW) and was developed by Falck Renewables. Part of the development includes a community ownership scheme which was established with Fintry Renewable Energy Entreprise (FREE). This enabled the village (consisting of approximately 300 houses) to take a different approach to community benefits. Fintry viewed the wind farm as an opportunity which could bring benefits to all members of the community, with the potential to have an influence on energy use behaviour and attitudes within the area.

Fintry devised their own proposal for the ownership of an additional turbine, requesting that ownership would be available to all people in the village and not simply limited to those who could afford to invest. The proposal Fintry put forward was, therefore, for an additional 'community' turbine at the site, which brought it up to 15, which would be uniquely owned by the village and the revenue generated going into a community fund. With the support of Renewable Development Company (who put forward the original proposal for the Earlsburn Wind Farm along with Falck Renewables), the proposal for the wind farm was successful and planning permission for an additional turbine was granted[56].

A financial package was agreed with Falck Renewables, where the company agreed to pay the full initial cost of the additional turbine and the village will pay this back over the first 15 years of operation.[57] The Fintry Development Trust was set up to manage the revenue received from the operation of the turbine and in the first three years of the turbine operating gained an income of approximately £230,000. Fifty-eight per cent of households surveyed in the village between September 2008 and January 2009 had benefited from free insulation measures on offer. Those people receiving cavity wall and/or loft insulation on average will save £600 on their annual fuel bills. This amounts to a total increase in annual disposable income of £91,352 for the community, and if energy savings as a result of changes in behaviour are included, the increase in annual disposable income for the community is thought to be £180,000.

[55] Community Pathways (2011) Summary: Models for community benefits or shared ownership of commercial renewable energy projects. Available at: http://www.communitypathways.org.uk/approach/models-community-benefits-or-shared-ownership-commercial-renewable-energy-projects (accessed 09/01/2012)
[56] RenewableUK (2011) A Community Commitment: The Benefits of Onshore Wind. Available At: http://www.bwea.com/pdf/publications/CommunityBenefits.pdf (accessed 10/01/2012)
[57] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyAToolkit.pdf (accessed 10/01/2012)

Improvements made to households energy efficiency, significantly reduce the number of households in fuel poverty in the local area.[58]

In addition to the benefits experienced by the Fintry community, Falck Renewables provides £35,000 (which increases annually with the RPI) on a yearly basis into the Earlsburn Wind Farm Community Benefit Fund. The fund is available to applicants from Denny & District, Carron Valley & District and Cambusbarron community council areas.[59]

It is also important to recognise, that once all costs have been repaid by the Fintry community the financial benefits will increase significantly. Taking into account future fluctuations in factors such as wind speeds and electricity prices, it is estimated that Fintry will receive a profit in the region of £400,000 to £600,000 per annum once all costs have been repaid.

5.3 Community/Developer Joint Venture

In these circumstances, a 'special purpose vehicle' is created from members of a community group with a developer to form a company which will own and operate the development. This allows both the community and the developer to have equity stakes in the development. Significant investment, time and management are required from the community.[60] However, the benefits can be substantial as seen in Neilston Community Wind Farm.

Neilston Community Wind Farm (East Renfrewshire, Scotland)

The proposed Neilston Community Wind Farm is compromised of four wind turbines (anticipated wind farm size 8.2MW) and was granted planning permission in early 2011 with construction to commence shortly. Neilston Development Trust (a social enterprise) has formed a 49.9% / 50.1% joint venture with the developer Carbon Free Developments Limited ('Carbon Free'). Carbon Free has taken full responsibility for the development and planning process, and will help the community source the capital needed to fund the community's investment in the wind farm. The developer undertook all of the risk involved in the planning process. The community did not have to invest any money unless planning permission was achieved, and then, only if it considered the wind farm to be an appropriate investment.[61]

It is expected that Neilston Community Wind Farm will generate up to £11 million in profits for community use over the life of the project. Neilston is a small town with 5,000 residents and in 2009 it became Scotland's first Renaissance Town (a community-led programme empowering local people to contribute to the regeneration

[58] RenewableUK (2011) A Community Commitment: The Benefits of Onshore Wind. Available At: http://www.bwea.com/pdf/publications/CommunityBenefits.pdf (accessed 10/01/2012)
[59] Ibid.
[60] Community Pathways (2011) Summary: Models for community benefits or shared ownership of commercial renewable energy projects. Available at: http://www.communitypathways.org.uk/approach/models-community-benefits-or-shared-ownership-commercial-renewable-energy-projects (accessed 09/01/2012)
[61] Carbon Free Developments (2012) Neilston Community Wind Farm: Overview. Available at: http://www.carbonfreedevelopments.co.uk/neilston_overview.html (accessed 06/01/2012)

of their area). The Towns Charter is a manifesto for the community and proposes a 20 year vision for Neilston. The Charter identifies renewable energy developments as part of its sustainable future. The Neilston Community Wind Farm will, therefore, help to fulfil these ambitions.[62]

The joint venture model which was developed for the Neilston Community Wind Farm, was designed specifically to tackle the main reasons as to why community-led wind farms often fail. The reasons include a shortage of specialised development knowledge in a community and a lack of speculative capital needed to fund the development process.[63]

5.4 Co-operative

Co-operative businesses are owned and run by and for their members, giving members an equal say and share of profits. There are a growing number of renewable energy co-operatives in the UK with over 30 having registered since 2008.[64] The work of Energy4ALL is well known in the development of co-operatives for wind energy developments. Energy4All attempts to combine the ethics of a not-for-profit social enterprise with best business practice and has seven co-operatives with many other projects in development. To date Energy4All's main focus has been on wind power; however, it is currently working on projects involving other technologies.[65] Energy4All has established agreements with selected developers to offer communities a share in major commercial projects, and is working with local groups and landowners to develop small to medium sized projects that will be entirely community owned.[66] An example of a co-operative which Energy4All established is found at Deeping St Nicholas Wind Farm.

Deeping St Nicholas (Lincolnshire, England)

The wind farm comprises of eight 2MW turbines and became operational in 2006. As part of the consultation process for the wind farm, Wind Prospect Ltd (project developer) set up a community liaison group. Meetings were held both pre and post application. The wind farm site is popular with visitors and helps to serve as an educational tool for local schools.

Local people had the opportunity to invest directly in the wind farm. The Fenland Green Power Co-operative was established in association with Wind Prospect Ltd, and gives local people the chance to invest in wind farm developments in their area. The share offer for the wind farm raised £2.66 million. This enabled two operational

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[62] Carbon Free Developments and Neilston Development Trust (2011) Unique joint venture wind farm approved - up to £11 million for community projects. Available at: http://www.carbonfreedevelopments.co.uk/documents/Neilston.doc (accessed 06/01/2012)
[63] ibid.
[64] Willis, R. and Willis, J. (2012) Co-operative renewable energy in the UK: A guide to this growing sector. Available at: http://www.uk.coop/sites/default/files/RenewableEnergy.pdf (accessed 10/01/2012)
[65] Energy4ALL (2012) Our History. Available at: http://www.energy4all.co.uk/aboutus.asp?ID=ABT1&catID=1 (accessed 09/01/2012)
[66] Energy4All (2012) Community Solution: Co-operative Futures. Available at: http://www.energy4all.co.uk/community.asp?ID=COM1&catID=2 (accessed 09/01/2012)

2MW wind turbines to be purchased at the site. Each shareholder invested an average of £2400 and now owns a stake in the wind farm.

In addition to the educational value and co-operative arrangements, the wind farm also helps to contribute to the Deeping Fen Wind Farm Trust. The Trust Fund initially received £30,000 and then £10,000 on an annual basis from the wind farm. The Trust Committee administers the fund. Grants are awarded to local projects, mainly those which encourage energy efficiency and conservation.[67]

5.5 Summary

Community ownership in wind farm development can present substantial economic and social opportunities to help sustain communities. Although it can be challenging, community ownership in a commercial wind farm development can help contribute to the long term sustainability of communities. The large revenue streams generated can help communities tackle pressing issues such as fuel poverty.

Whilst the Isle of Gigha case-study helps to demonstrate a community-led approach, the other case studies in this chapter importantly show that it is possible for communities to work closely alongside private developers to achieve positive outcomes for all stakeholders. Many communities have adopted the Development Trust model as the most appropriate way to facilitate community ownership.

Recommendations

Local community based organisations to examine and where possible develop and implement wind farm developments based on one or more of the community ownership models outlined in this report.

Community Ownership - has been shown to help increase levels of acceptance. Given the likelihood of clustering of wind farms especially in the rural west and the impact of further installations and associated grid infrastructure, developers should consider offering some form of community ownership as part of a community benefits package at their sites.

[67] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyATookit.pdf (accessed 10/01/2012)

6 Emerging Trends in the Nature and Scale of Community Benefit Provision?

As previously noted, there is not a standard approach taken to the nature and scale of community benefits. Previous case studies help to highlight agreed levels of community benefits at existing wind farms. Recent research has, however, shown that the level of community benefit provision has been increasing in the UK.[68] [69] Several case studies will now be highlighted which show good practice in terms of the level of community benefit now being offered at some wind farms in England and Scotland. Whilst it cannot be expected that all future wind farms may offer the level of community benefit provision highlighted by these case studies, they do help to demonstrate some of the benefits that may be available to communities.

Allt Dearg Community Wind Farm (South Argyll, Scotland)

The wind farm is being developed by Lomond Energy. The wind farm, which consists of 12 turbines (10.8MW), has been granted planning permission and is currently under construction. Lomond Energy is working in partnership with local landowners – including Ormsary and Stronachullion Estates. Lomond Energy has noted a number of local benefits exist for the project including:

- Community ownership of one wind turbine. This will help to secure a long term sustainable income in support of a major regeneration project
- Local jobs through the construction and operation support
- Improved public access to the site
- Sustainability is key to the long term socio-economic and environmental future of the Ormsary and Stronachullion Estates through self ownership generated revenues [70]

The benefits from this project help to demonstrate how wind energy development can be important to the long term sustainability of rural communities.

The high level of community benefit found at Allt Dearg is not an isolated case. Indeed, at the time of writing, Lomond Energy currently has a number of projects either in planning or in development which propose to offer community ownership of one turbine (as part of the wider development) to help support local projects to communities. Examples of these include Spurlens Rig Wind Cluster – a 6 turbine

[68] The Pool in Scotland (2010) A guide for community groups on investing for community benefit, A report for Community Energy Scotland and the Scottish Community Foundation. Available at: http://www.communityenergyscotland.org.uk/userfiles/file/Investing%20for%20Community%20Benefit/Investing%20for%20Community%20Benefit.pdf (accessed 17/01/2012)
[69] Cowell, R., Bristow, G., Munday, M, and Strachan, P. (2008) Wind Farm Development in Wales: Assessing the Community Benefits, a research project for the Welsh Assembly Government, Cardiff.
[70] Lomond Energy (2011) Allt Dearg Community Wind Farm. Available at: http://www.lomondenergy.co.uk/projects/allt-dearg.html (accessed 31/12/2011)

development (12MW total capacity) proposed in the Scottish Borders[71] and Merkins Wind Farm – a 10 turbine development (25MW capacity) in West Dumbartonshire[72].

Dunbeath Wind Farm (close to Dunbeath, Scottish Highlands)

At the time of writing, Dunbeath Wind Energy Ltd (a joint venture between RDC Scotland Limited and Falck Renewables) is proposing to develop a wind farm compromising of 22 wind turbines. A planning application has been submitted and each turbine is expected to have a maximum power output of a maximum of 3MW. The community benefits package offered to the local community is very extensive.

Similar to other projects in the Scottish Highlands, Falck Renewables have offered a community benefits package in two parts: a Revenue Benefit and a Performance Payment. The Revenue Benefit will comprise of an annual payment of £1,000 per MW installed per annum over the life time of the wind farm. Secondly, the Performance Payment will compromise of a payment based on the annual output of the wind farm. Whilst this would vary on a yearly basis, it is anticipated that this will average £1,000 per MW each year over the life time of the project.

In addition to this, a local co-operative is intended to be set up with the support of Energy4All. This would give local people the opportunity to buy a stake in the wind farm. Local people would be able to join the co-operative and be able to buy shares worth between £250 and £20,000. Profits generated from selling electricity from the wind farm would then be distributed to members through an annual dividend.

Falck Renewables also notes that it is keen to further enhance community benefits provided through the 'gifting' of two of the turbines within the existing project. It is anticipated that this would provide an additional benefit of £100,000 to £120,000 per annum averaged over the lifecycle of the wind farm to the local community. This is similar to a model currently adopted at Fintry. At Dunbeath, Falck Renewables will finance, construct, own and operate the two 'community turbines' for the benefit of the community. Annual payments to the community would then be calculated by taking revenues generated from the two turbines and subtracting the proportionate share of operating costs and financing costs[73].

Falck Renewables currently have a number of other sites at the time of writing which also offer a high level of community benefit provision. Examples of these include Spaldington Airfield Wind Farm in Yorkshire and West Browncastle in South Lanarkshire, which either have been authorized or are under construction. At both of these sites a community fund will be established into which £2,000/MW constructed

[71] Lomond Energy (2011) Spurlens Rig Wind Cluster. Available at: http://www.lomondenergy.co.uk/projects/spurlens-rig.html (accessed 31/12/2011)
[72] Lomond Energy (2011) Merkins Wind Farm. Available at: http://www.lomondenergy.co.uk/projects/merkins.html (accessed 31/12/2011)
[73] Falck Renewables (2011) Dunbeath. Available at: http://www.falckrenewables.eu/attivita/elenco/dunbeath/community.aspx?sc_lang=en (accessed 20/12/2011)

will be paid annually, and Falck Renewables discusses giving local people the opportunity to purchase shares in a co-operative associated with the wind farm.[74]

M48 Wind Farm

There are a number of examples in the UK where developers are offering high contributions into community funds at the time of writing. One of these is the M48 Wind Farm being proposed by REG Windpower. If the wind farm is granted planning permission, £4,000/MW will be put aside for each year the turbines are operating.[75]

6.1 Summary

At some wind farm developments in Great Britain, very high levels of community benefits have been provided or are currently being proposed. This is encouraging for communities which may host wind farm developments in the future.

[74] Falck Renewables (2011) Spaldington Airfield. Available at: http://www.falckrenewables.eu/attivita/elenco/spaldington-airfield/community.aspx?sc_lang=en (accessed 20/12/2011)
Falck Renewables (2011) West Browncastle. Available at: http://www.falckrenewables.eu/attivita/elenco/west-browncastle/community.aspx?sc_lang=en (accessed 20/01/2012)
[75] REG Windpower (2011) Community benefits. Available at: http://www.m48windfarm.co.uk/communitybenefits.html (accessed 01/01/2011)

7 How Does the Provision of Community Benefits in Northern Ireland Compare with the rest of the UK?

7.1 Provision of Community Benefits in Northern Ireland

A combination of a desktop study and a questionnaire distributed to wind energy developers was used to identify community benefits associated with approved wind farms in Northern Ireland (those which have received planning permission and are either operational, under construction, or consented). It was possible to identify approved wind farms in Northern Ireland through the use of Planning Service data and RenewableUK's UK Wind Energy Database. Whilst there are a significant number of wind farm planning applications currently in the Northern Ireland planning system, the decision was taken to focus on projects that had already been approved in Northern Ireland. This would allow for more meaningful comparison against recent research conducted in the UK, which has focused primarily on approved wind farms.

A desktop study was initially conducted to gather data on community benefits associated with wind farms in Northern Ireland. However, a limited amount of information was found in the public domain. The level of information in relation to wind farm developments provided from developers websites and through sources such as company press releases varied between developers. Some developers provide more detailed information than others; particularly for more recent wind farm developments in planning. The questionnaire survey, which was distributed to large-scale, wind farm developers who are members of NIRIG, was, therefore, important to build up a more accurate picture of community benefit provision in Northern Ireland. NIRIG represents the majority of large-scale wind developers in Northern Ireland.

Information on community benefits for a total of 17 approved wind farm schemes in Northern Ireland was provided by developers at the time of completing the questionnaire. One of these schemes included a single turbine development.

7.2 Results

Based on the information provided by developers in the questionnaire, a number of community benefits were found to be typically provided across the 17 approved wind farms:

- The developers highlighted the support wind farm development provides to local economies. This can be seen for example through the financial benefits from construction activities and ongoing maintenance of a wind farm. The responses highlighted the use of local contractors during construction and the use of locally manufactured content. Local people may be involved in the operation and maintenance of the wind farm

- All 17 wind farms rent land from landowners(s)

- Potential involvement in the development process by local landowners, groups or individuals

- Improvements to local community facilities are a benefit which often results from wind farm development. One developer noted that this would be a typical use of community funds

- The majority of wind farms had or will soon have a community fund in place. A range of different organisations were found to be used to help administer the funds. These included local funding bodies such as community foundations

- Other community benefits which were provided included developers carrying out improvements to the local environment and wildlife habitats, as well as educational visits and support for schools

Whilst other benefits provided included sponsorship of local groups and teams and the establishment of visitor/tourist facilities, these benefits were not widespread. It is important to note that none of the 17 wind farms offered the opportunity for local residents or businesses to invest or buy shares.

The results from the desktop study reinforced the results from the questionnaire of the type of benefits typically provided in Northern Ireland. However, a noticeable result from the questionnaire was that none of the 17 wind farms incorporated a form of community ownership. The desktop research in addition to the questionnaire, found no such evidence of an approved wind farm in Northern Ireland which had incorporated some form of community ownership.

The developers who completed the questionnaire provided a degree of information on the value of some of their community funds. In addition to this information, the desktop study also discovered the value of community funds at approved wind farms provided by developers who did not complete the questionnaire.

The value of community funds was found for a total of 14 wind farms all of which had been approved after the year 2000. The values for these community funds range from approximately £500/MW per annum to £2,000/MW per annum. Only one wind farm was found to pay £2,000/MW per annum into a community fund. Most of the values paid into community funds were much lower.

At eleven of the fourteen wind farms, values currently being paid into these community funds were found to range from approximately £500/MW per annum to £1000/MW per annum. Though at one of these sites, where the community fund was valued at £1,000/MW per annum, the developer noted that the amount was due to increase in the future.

The higher values found by this research being paid into community funds in Northern Ireland were for wind farms which have been approved in the last two years. However, three wind farms, which had been approved within the last two years were found to have community funds which receive from between approximately £600 to £750/MW per annum (when calculated over the 25 year life cycle of the wind farm).

Whilst it was not possible to produce an extensive list of all community benefits provided at each approved wind farm in Northern Ireland, the research does help to highlight community benefits typically provided at wind farm developments in Northern Ireland.

7.3 How Does the Provision of Community Benefits in Northern Ireland Compare with the Rest of the UK?

It would appear that many of the types of community benefits provided in Northern Ireland are consistent with those having been already identified in the UK by previous research.[76][77] However it is important to note that there are no instances of community ownership in Northern Ireland. Examples of community ownership in Great Britain are highlighted in Chapter 5.

In relation to the provision of community funds, previous research has found that there was no standard level of payment or approach to community funds.[78] Evidence from Northern Ireland seems to support this notion that there is no standard level of payment for amounts being paid into community funds.

Some of the most recent research into the provision of community benefits has been carried out in Wales and produced for the Welsh Assembly Government in 2008.[79] The research, which assessed the provision of community benefits in Wales, attained information principally from onshore wind farms which were either commissioned, under construction or recently granted planning permission, but for which construction was yet to begin. This therefore enables a reasonably accurate comparison to be made with information gathered by this report into the provision of community benefits at approved wind farms in Northern Ireland.

The research noted that the majority of onshore wind farms in Wales provided some form of a community benefit fund. This was usually in the form of a sum per MW of installed capacity paid each year by the developer or operator to a local community body. The research noted that this type of provision has become normal and that average sums paid into these funds have increased from £1,000/MW per annum at the start of the decade commencing the year 2000, to sums attaining and exceeding £2,000/MW increasingly being achieved. However the research noted that since 1999, of the 12 projects that had been completed, four of these wind farms provide £2000/MW per annum or more and one wind farm provides £5,000/MW per annum into a community fund.[80] It is important to note that this research was published in 2008 and, therefore, it is likely a number of wind farms will have been completed since.

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[76] Centre for Sustainable Energy & Garrad Hassan (2005) Community benefits from wind power: A study of UK practice & comparison with leading European Countries, a report to the Renewables Advisory Board & the DTI. Available at: http://www.cse.org.uk/pdf/pub1049.pdf (accessed 17/01/2012)

[77] Cowell, R., Bristow, G., Munday, M, and Strachan, P. (2008) Wind Farm Development in Wales: Assessing the Community Benefits, a research project for the Welsh Assembly Government, Cardiff.

[78] Centre for Sustainable Energy & Garrad Hassan (2005) Community benefits from wind power: A study of UK practice & comparison with leading European Countries, a report to the Renewables Advisory Board & the DTI. Available at: http://www.cse.org.uk/pdf/pub1049.pdf (accessed 17/01/2012)

[79] Cowell, R., Bristow, G., Munday, M, and Strachan, P. (2008) Wind Farm Development in Wales: Assessing the Community Benefits, a research project for the Welsh Assembly Government, Cardiff.

[80] Ibid.

Other research was undertaken on a UK level in 2009 by the Scottish Community Foundation (SCF) into the provision of community benefits from wind farms. The SCF noted that whilst £2,000/MW per annum was an industry ceiling, it was becoming more normal for developers to provide this level. In Scotland, it was noted that in some cases community benefits have been set at a higher level.[81] Whilst the sums discussed here are towards the provision of community benefits in general, they do provide a good indication of the amounts that have been provided by commercial developers.

Reflecting on the existing research discussed above it would appear that:

- The higher levels of payments into community funds in Great Britain, have generally not been achieved at approved wind farms in Northern Ireland. In Great Britain for example, amounts attaining and exceeding £2,000/MW per annum have increasingly been achieved. Only one of the fourteen community funds identified by this research in Northern Ireland was found to offer £2,000/MW per annum

- In Great Britain average levels of payments being paid into community funds have been found to be increasing through time but in Northern Ireland there appears to be a mixed picture. Whilst some wind farms have seen higher levels of payments in recent years, substantially low levels of payments are still being made into community funds for recently approved wind farms

It should also be noted that there is no evidence of community ownership of a wind farm development in Northern Ireland which has been seen in Great Britain. It is also evident from case studies such as Allt Dearg, in addition to others such as Earlsburn, which were discussed in earlier chapters, that some approved wind farms have developed some very innovative approaches to the provision of community benefits in Great Britain. These case studies from Great Britain help to demonstrate a very high level of community benefit provision with substantial financial benefits for host communities. Based on the information gathered during this research, no evidence exists in Northern Ireland of similarly innovative approaches or a similarly high level of community benefit provision as seen in these case studies.

7.4 Summary

Many of the types of community benefits found in Northern Ireland are similar to those found in Great Britain, with the exception of community ownership. However there are notable differences in relation to the level of community benefit provision between wind farms in Northern Ireland and Great Britain.

[81] The Pool in Scotland (2010) A guide for community groups on investing for community benefit, A report for Community Energy Scotland and the Scottish Community Foundation. Available at: http://www.communityenergyscotland.org.uk/userfiles/file/Investing for Community Benefit/Investing for Community Benefit.pdf(accessed 17/01/2012)

Recommendation

Community Benefit Funds - local communities should be offered by developers a minimum initial payment of £2,000 per MW of installed capacity and a minimum annual payment of £2,000 per MW of installed capacity and that payment is index linked (amounts to be agreed between developer and local community representatives). This should apply to all new wind farms including those in the planning system or yet to be commissioned. In relation to community benefit funds - a percentage of the total annual funds to be utilised for local community projects, and a percentage to go specifically towards tackling fuel poverty in the area. This would establish a clear link between the wind farm and energy costs.

8 Good Practice towards engaging and working in partnership with communities

The role of communities in renewable energy development is being increasingly recognised in Great Britain compared to Northern Ireland. Indeed, there have been some very proactive approaches taken by local and national government and the private and voluntary sectors in Great Britain towards engaging and working in partnership with communities in renewable energy development. This chapter will attempt to highlight some of these approaches, with particular reference to Scotland and Wales where it is clear that stakeholders take a very proactive approach to maximizing the potential outcomes that may result from the growing renewable energy sector.

8.1 Good Practice from Scotland and Wales

The Scottish Government recognizes the potential of renewable energy sources to contribute to economic growth and the opportunities for creating new employment and manufacturing particularly in rural areas. However, it also recognizes the importance of the role communities have to play:

'The Scottish Government wishes to maximise the benefits for communities from renewable energy. We believe that there is so much more a community can gain from renewables projects, over and above the energy generated and financial benefits. For example: increased community cohesion and confidence, skills development and support for local economic regeneration.'[82]

The Scottish Government's commitment to local communities is set out in its Supporting Economic Recovery: 10 Energy Pledges. Pledge 1 states:

'We will support and accelerate the implementation of renewable energy, through our Renewable Energy Action Plan, in a way which promotes large scale, community based, decentralised and sustainable generation.'[83]

The Routemap for Renewable Energy in Scotland 2011 reflects on the challenge of meeting Scotland's renewable energy ambitions. The Routemap has set targets for Scotland to meet at least 30% of overall energy demand from renewables by 2020 and has also set a target to deliver 500MW of community and locally-owned renewable energy by 2020. Scotland has already been a leader in the UK in relation to

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[82] The Scottish Government (2011) Renewable Energy for Communities. Available at: http://scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/Communities (accessed 16/01/2012)
[83] The Scottish Government (2012) Supporting Economic Recovery: 10 Energy Pledges. Available at: http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Action/economic-recovery/10-Pledges (accessed 20/01/2012)

community-owned schemes over the past decade with over 800 schemes having been supported.[84]

The Scottish Government has noted that with the arrival of Feed in Tariff and the Renewable Heat Incentive "the time is right to capitalise on this experience and transform the scale of local ownership, thus allowing communities and rural businesses to take advantage of the significant revenue streams that can accrue from this form of asset ownership."[85]

In Scotland, there has been growing interest from communities who would like to develop their own renewable energy projects. The CARES loan fund was announced in early 2011 with the purpose of supporting locally-owned renewable energy projects which provide wider community benefits. The scheme provides loan finance towards the pre-planning consent stage of renewable energy projects which have considerable community engagement and benefit. The high risk cost of this stage is often viewed as a barrier to community groups and businesses who would otherwise consider developing a renewable energy project. A feature of the project is that it supports projects up to 5MW. CARES is managed on behalf of the Scottish Government by Community Energy Scotland.[86]

Community Energy Scotland (CES) is an independent Scottish Charity which provides free support and advice for renewable energy projects which are developed by community groups. The services provided by CES are also available to non-profit distributing organisations such as housing associations and social enterprises. CES's aim is to build confidence, resilience and wealth at community level in Scotland through sustainable energy development. CES has a network of development officers and helps to support and empower communities.

The Scottish Government has also published a Community Renewable Energy Toolkit. The toolkit aims to contribute to helping Scotland achieve its renewable energy targets, by galvanising and providing guidance to community groups to find ways of maximising community involvement and benefits from renewable energy.[87] The toolkit helps communities to think about how they can benefit from renewable energy projects, regardless of whether they are community-led or through the development of partnerships with others. The toolkit provides information, advice and possible sources of funding.

A number of local authorities in Scotland and Wales have also produced their own guidance on community benefits associated with commercial wind energy development. Local authorities which have developed their own toolkits or guidance include:

[84] The Scottish Government (2011) 2020 Routemap for Renewable Energy in Scotland – Executive Summary. Available at: http://scotland.gov.uk/Publications/2011/08/04110353/2 (accessed 16/01/2012)
[85] ibid.
[86] Scottish Government (2011) Community And Renewable Energy Scheme. Available at: http://scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/Communities/CRES (accessed 01/12/2011)
[87] Community Energy Scotland Limited (2009) Community Renewable Energy Toolkit. Available at: http://scotland.gov.uk/Resource/Doc/917/0115761.pdf (accessed 16/01/2012)

The Highland Council – Community Benefit

The Highland council wants to ensure that local communities benefit directly from the use of their local resources. The council has developed a policy in relation to the provision of community benefits. The council's policy is 'to seek funding and/or in-kind contribution from developers towards local community initiatives in respect of development, such as large renewable energy schemes, which have a long term impact on the environment, of not less than £5,000 per installed Megawatt linked to the Retail Price Index. This contribution is referred to as community benefit.'[88]

The Highland Council has also recently agreed for a new Concordat to be set up, which will outline the terms of a new relationship between the Council and developers. As part of this agreement, the Council will be responsible for providing the framework and infrastructure for receiving and then disbursing Community Benefit and through which developers will agree to provide not less than £5,000 per installed megawatt annually that will appreciate each year in line with the UK Retail Price Index.[89]

As well as this, the Highland Council has produced a range of guidance for developers and for communities. The guidance note produced for communities is targeted towards community groups and community councils and provides information on planning for and setting up a legal framework to help manage community funds. Advice on community engagement and legal issues is also covered by the guidance note.

Scottish Borders Council – Achieving Community Benefits from Commercial Windfarms in the Scottish Borders: A Toolkit for Communities and Windfarm Developers

The Council has produced a toolkit which aims to help communities and developers in negotiations surrounding community benefits from commercial wind farm development. The toolkit covers key issues surrounding the planning system, the options for community benefits, the establishment of legal agreements and the allocation of community benefits.

Argyll and Bute Council – Policy on Community Benefits from Windfarms

The Council has taken a very proactive approach to renewable energy. It recognises that managing these resources in a sustainable manner can help to address social and economic problems experienced by local people. The Council has developed its own policy towards community benefits and aims to build strong long-term relationships with renewable energy companies and achieve maximum benefits for communities. A process has been developed by the Council which involves renewable energy companies voluntarily entering into an agreement under a Strategic Concordat with the Council. Through this they agree to provide funding at a preset rate to the immediate community and to Argyll, Lomond and Island Energy Agency

[88] The Highland Council (2011) Community Benefit. Available at: http://www.highland.gov.uk/livinghere/communityplanning/communitybenefit/ (accessed 16/01/2012)
[89] The Highland Council (2011) Community Benefit. Available at: http://www.highland.gov.uk/livinghere/communityplanning/communitybenefit/ (accessed 16/01/2012)

(ALIenergy). A range of stakeholders including the developer, the community, the Council and ALI Energy are involved in the negotiation and agreement of individual Trust Fund details.

Details of the agreed Community Wind Farm Trust Fund (CWFTF) are outlined in the Concordat. The agreed arrangements then apply to all future wind farm developments between the Council and the developer. Principles for the CWFTFs include:

- The Council recommends that a sum of £2,000 per megawatt of installed capacity per year should be the minimum payment for community benefit with an additional £1,000 per megawatt based on the actual annual output of the wind farm

- Developers will be encouraged to split future trust funds in the following way: 60% to the immediate local community through a local trust fund or equivalent, and, 40% to the wider Argyll and Bute Community through supporting the work of ALIenergy

Scottish Power UK plc was the first energy company to develop a Concordat with the Council; since then Scottish and Southern Energy (SSE) have also been noted to have entered into an agreement. As a result of the Council's work in creating this approach to managing community benefits from wind farm developments, the Council received a Royal Town Planning Institute (RTPI) award for quality in planning.[90]

Other proactive action taken in Argyll and Bute includes the development of The Renewable Energy Action Plan, which is a key action within The Argyll and Bute Community Plan 2009-2013. Argyll and Bute Council have also developed a very interactive website which provides information on renewable energy development in the area. This includes an interactive community benefit map on its website which allows the public to search for information on community benefit funds in Argyll and Bute. The interactive map includes information on community benefit funds received by local communities, by development, community benefit area and location.

Dumfries and Galloway Council – Windfarm Community Benefit Framework

Dumfries and Galloway Council produced a Windfarm Community Benefit Framework in 2005, which was later revised in 2011. The Council has produced information for both developers and communities and the revised framework has set out a number of key elements. This includes making community benefits from wind farms being secured by means of a legal agreement negotiated during the pre-planning application stage. This results in a Head of Terms agreement, which will be binding on the developer only if planning permission is received. The Framework also notes that there will be a 50:50 split in terms of how community benefit funds are

[90] Centre for Sustainable Energy, Garrad Hassan & Partners Ltd and Peter Capener & Bond Pearce LLP (2009) Delivering community benefits from wind energy development: A Toolkit, for the Renewables Advisory Board. Available at: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1_20090721102927_e_@@_DeliveringcommunitybenefitsfromwindenergyATookit.pdf (accessed 10/01/2012)

used. This will involve 50% of community benefit funds going to communities which host a wind farm and 50% going towards a region wide fund.

The purpose of the region wide fund is to invest in social, economical and environmental projects which support a sustainable low carbon economy. The region wide fund will accept applications from community groups, communities, and organisations including the public sector from the Dumfries and Galloway region. A standard minimum rate of contribution by developers has also been set at £5,000 per megawatt per annum based on the installed/consented capacity of the wind farm. The rate is index linked and based on the Retail Price Index.

Another key element of the revised framework also encourages equity shareholding in the proposed wind farm. The Council refers to equity shareholding as meaning that the community would own one or more turbines and that this ownership would provide an income by selling the power generated, or the community would own an equity share in a wind farm and receive income from a share in profits.[91]

Powys County Council – Community Benefits from Wind Energy Developments: Guidance Protocol

The Board of Powys County Council adopted a guidance protocol which sets out the council's perception of good practice to obtaining and managing community benefits from wind energy developments. The protocol helps to underpin the support which the Council offers to communities and developers negotiating benefits resulting from wind farm development. The purpose of the Protocol is to help communities and wind farm developers who want to negotiate community benefits which may result from wind farm development. Importantly it provides a framework for community engagement. It outlines procedures that will be expected to be applicable to all future wind farm developments which involve local communities, the developer and the Council.

The Protocol suggests that 70% of community benefits should be invested in the most affected communities, with the other 30% being directed towards a wider geographic trust. The idea of this is to support communities that might not necessarily be directly impacted by the development site, but will be impacted upon due to construction and operational activities. Due to a major focus of the Protocol being on encouraging negotiated engagement between communities and developers, there is the opportunity for different/better terms to be negotiated for individual schemes.[92]

8.2 Summary of good practice by local authorities

The proactive approach taken by these councils is very encouraging and helps to show how government, the private sector and communities can work together in commercial wind farm development. Whilst determining the extent of the success of

[91] Dumfries & Galloway Council (2011) Windfarm Community Benefits – Revised Approach 2011. Information for Developers. http://www.dumgal.gov.uk/CHttpHandler.ashx?id=8765&p=0 (accessed 03/01/2012)
[92] Powys County Council (2009) Community Benefits from Wind Energy Developments: Guidance Protocol – Background and Overview. Available at: http://www.powys.gov.uk/uploads/media/briefing_note_en.pdf (accessed 16/01/2012)

each of these guidance notes/policies was beyond the scope of this report, there is evidence that developers are paying attention to guidance produced by councils. For example, Scottish Power Renewables at the time of writing have noted, for a number of their proposed wind farms, which are either in planning or in development, that it is the company's policy to offer £2,000 per MW per year to the community to be used in support of projects. This includes, for example, Dyfnant Forest Windfarm, Mynydd Mynyllod Windfarm and Halsary Windfarm. Scottish Power Renewables, when discussing these sites, go on to note that how this money will be administered will depend on whether the Council has an existing policy/protocol; or, alternatively, on a number of their other sites, community trust funds have been administered through local community trusts.[93] [94] [95]

Indeed, there is evidence the impact of Dumfries and Galloway's pro-active approach is beginning to be seen. For example, at the time of writing, E.ON UK has proposed to build a wind farm known as Quantans Hill. Part of the community benefit package proposed at Quantans Hill includes a community benefits fund potentially worth up to £450,000 a year, with local representatives making decisions on applications. E.ON UK notes that this equates to a minimum of £5,000 for each MW installed and paid into a fund on an annual basis, as set out by Dumfries and Galloway Council following their new Community Benefits Fund protocol.[96]

8.3 Renewable energy development on forestry sites in Scotland and Wales

Both Scotland and Wales have plans to develop renewable energy land managed by the Forestry Commission Scotland (FCS) and the Forestry Commission Wales respectively. It is important to highlight these plans as they recognise the benefits renewable energy development can bring to communities.

Scotland

The FCS manages a large area of land known as the National Forest Estate on behalf of the Scottish Government, and covers nearly 10% of Scotland. The FCS aims to develop the potential of the Estate in ways that:

- Contribute to the Scottish Government's renewable energy target
- Maximise the financial returns from the National Forest Estate
- Secure benefits for local communities [97]

[93] Scottish Power Renewables (2012) Benefits. Available at: http://www.dyfnantforestwindfarm.com/about-benefits.aspx (accessed 16/01/2012)
[94] Scottish Power Renewables (2012) Benefits. Available at: http://www.mynyddmynyllodwindfarm.com/about-benefits.asp (accessed 16/01/2012)
[95] Scottish Power Renewables (2012) Benefits. Available at: http://www.halsarywindfarm.com/about-benefits.asp (accessed 16/01/2012)
[96] E.ON UK (2012) Community Benefits. Available at: http://www.eon-uk.com/generation/3551.aspx (accessed 16/01/2012)
[97] Forestry Commission Scotland (2012) Potential of the National Forest Estate for wind and hydro power. http://www.forestry.gov.uk/website/forestry.nsf/byunique/infd-7stf2a (accessed 16/01/2012)

At present, the FCS is attempting to develop the potential of the estate by working with a number of energy developers to construct wind and hydro projects on national forest land. Scotland has been divided into five "Lots" and a number of development partners selected.

Part of this programme focuses heavily on ensuring that communities can benefit from the development of wind energy on the National Forest Estate. A number of options have been created to enable communities to benefit from these developments. In relation to potential wind energy developments that may arise the options for communities are:

- On occasions where developers are progressing projects on land which is managed by FCS, communities are offered a community benefit payment of £5,000 per MW of installed capacity of the renewables scheme each year

- On occasions where developers are progressing projects on land which is managed by FCS, there is also an option for communities to invest in the project

- On sites which are not selected by developers, communities may apply to lease land through the National Forest Land Scheme for their own renewable energy developments[98]

In accordance with this programme the FCS has published guidance to the options available to communities. This provides detailed advice and information to community groups on the ways in which they can work with the selected developers to capitalise on the benefits associated with the programme. Community investment opportunities along with illustrations of typical costs and incomes associated with a 1.5MW and a 20MW scheme are provided.

An area of Scotland which does not form part of this programme is the Borders and the Central Belt. FCS is currently working with Partnerships for Renewables (A Carbon Trust Enterprise) to explore the potential of wind energy projects on its sites in the Borders and Central Belt. For sites which are deemed to be appropriate for development, communities will be offered the opportunity to benefit economically and be involved in the site development process.[99]

Wales

Forestry Commission Wales manages the Welsh Government's Woodland Estate and has a responsibility to help the Welsh Government meet its renewable energy targets. The promotion of wood energy along with wind and hydro energy are seen as playing an important part in this. The Welsh Government recognises the importance of

[98] Forestry Commission Scotland (2011) Renewable Energy on the National Forest Estate. Wind Generation Schemes: A Guide to Community Options. Available at: http://www.forestry.gov.uk/pdf/windcommunitiesguidance.pdf/$FILE/windcommunitiesguidance.pdf (accessed 16/01/2012)

[99] Partnerships for Renewables (2011) Our work with Forestry Commission Scotland. http://www.pfr.co.uk/forestrycommissionscotland/234/About-the-Project/ (accessed 08/12/2011)

onshore wind farms in helping it meet its renewable energy targets, and has requested Forestry Commission Wales to oversee The Wind Energy Programme. The Wind Energy Programme involves working with selected developers to help achieve approximately 80% of the Welsh Government's onshore wind energy target, by incorporating wind energy development into the sustainable management of the Woodland Estate. The Wind Energy Programme has significant economic, social and environmental benefits. It is estimated that the Programme will deliver £293 million over its life time to the Welsh Government and £71 million for community-based projects. Environmental benefits include opportunities for Forestry Commission Wales to plan for landscape scale improvements in line with current forestry strategy in Wales.[100]

It is clear that the devolved governments in Scotland and Wales have recognised the importance of a joined-up approach involving the private and community sectors to maximise the potential of renewable energy development and help meet renewable energy targets.

8.4 Development of a Community Benefits Register

The Scottish Government has recently announced that it will create a new public register that will include details of community benefits which have been agreed with renewable energy developers in Scotland. This new register, which will open from April 2012, will help communities make a comparison with similar developments allowing them to be more informed when entering negotiations. Energy Minister Fergus Ewing noted that:

'This new register will allow local communities to enter negotiations with developers - from those putting up single turbines on farms and estates to those building the largest schemes - on an even footing. An established renewables developer will always know what the 'going rate' for community benefits is - but a community which has never negotiated before, and those rural businesses developing for the first time, may not. This register will give everyone in Scotland the information to be able to share in the opportunities new renewable energy development brings.'[101]

This was one of the proposals which came from the Securing the Benefits of Scotland Next Energy Revolution consultation document.

8.5 Good Practice WIND (GP WIND)

The Scottish Government is playing a leading role in a European wide project known as GP WIND. The project aims to 'address barriers to the deployment of onshore and offshore wind generation, specifically by recording and sharing good practice in reconciling objectives on renewable energy with wider environmental objectives and actively involving communities in planning and implementation.'[102] The project

[100] Forestry Commission Wales (2011) Wind Energy Programme. http://www.forestry.gov.uk/forestry/INFD-8JTE8F (accessed 08/12/2011)
[101] The Scottish Government (2011) Community benefits from renewables. Available at: http://www.scotland.gov.uk/News/Releases/2011/12/01135633 (accessed 16/12/2011)
[102] Good Practice Wind (2012) Welcome to the GP WIND Website Project. Available at: http://www.project-gpwind.eu/ (accessed 19/01/2012)

involves bringing together a range of stakeholders from different countries to share their experiences. The project will develop a best practice guide and a toolkit, in addition to a set of recommendations towards how to deal with the applications for the development of wind farms and the implementation of environmental directives.

8.6 Summary

Evidence from Scotland and Wales show that both national devolved governments and local authorities take a very proactive approach to engaging and working in partnership with communities. The Scottish Government clearly recognises the important role communities have to play in renewable energy development and this is evident in policy it has developed. The creation of a community benefits register for renewable energy developments is very encouraging for communities and will help communities to be in a more informed position to negotiate with developers in Scotland. The production of a community renewable energy toolkit by the Scottish Government is an example of a pro-active strategy to galvanise, inform and maximise benefits from renewable energy.

A joined-up approach has been developed in Scotland and Wales whereby government, the private sector and communities can work together in order to achieve positive outcomes for all stakeholders. Developing forestry sites on public land helps to highlight this. This will help to meet renewable energy targets and provide economic and environmental opportunities for stakeholders involved.

Pro-active approaches taken by both the devolved governments and local authorities in Wales and Scotland, as outlined above, have been largely absent from policy in Northern Ireland. However, there is the opportunity for government at different levels to take action. For example, future strategies relating to energy issues such as the Sustainable Energy Action Plan and the Green New Deal, have the opportunity to address the role of communities. Additionally, proposed future changes to the role of local councils in Northern Ireland presents an opportunity to consider developing similar approaches as those taken by some local authorities in Scotland.

Recommendations

A not for profit organisation to take the lead role in establishing good practice guidance including a policy on community engagement and promoting a toolkit on community benefits. This should include a protocol on working with local communities during and after the project development process and, in particular, exploring and negotiating community participation and community benefits with communities and other stakeholders. Such guidance/policy could also be applied to other forms of renewable energy development.

Local Councils to formally establish guidance protocols (based on good practice) which provide a framework for engagement by developers with the Councils and local communities. The protocols would ensure that as a result of harnessing renewable energy resources, social and economic problems including fuel poverty can be alleviated and help towards sustaining and developing rural communities can be given.

Department of Enterprise, Trade and Investment to actively support local communities and their potential, positive role in implementing wind farm projects and the contribution they make in the development of a low carbon society. This implementation of this policy should address the need for active community involvement in shaping Northern Ireland community energy agenda. Policy to include ensuring effective support mechanisms are in place such as a local energy assessment fund.

The Department of Agriculture and Rural Development to ensure models of good practice, as evidenced in Scotland and Wales, are followed in relation to both engaging and working in partnership with rural communities and the private sector when developing wind farms on land managed by the Forestry Service. A coordinated proactive approach can be seen in Scotland, where the government has developed plans in which the private sector and communities can work together to benefit from renewable energy development.

Department of Enterprise, Trade and Investment to actively support local communities and their potential, positive role in implementing wind farm projects and the contribution they make in the development of a low carbon society. The implementation of this policy should address the need for active community involvement in shaping Northern Ireland's community energy agenda. Policies ensuring effective support mechanisms need to be in place, such as a local energy assessment fund.

A Government Department to take the lead role in developing a more coordinated approach involving the government, the private sector and communities towards wind farm developments, which builds upon principles of sustainable development.

9 Conclusion

Northern Ireland has one of the greatest wind resources in Europe and has set ambitious targets for future renewable energy deployment. Meeting these targets will be challenging for everybody. However, the opportunities that exist for communities to engage with commercial onshore wind energy development can potentially be both very rewarding and of benefit to all sectors.

A common way for communities to engage with onshore wind energy development is through the provision of community benefits. Whilst the level of community benefit provision in Northern Ireland has not been as high as in Great Britain to date, this report demonstrates that commercial wind energy development can provide substantial economic and social benefits for communities which host wind farm developments.

Community ownership, as a form of benefit in particular, can help to make a large contribution to help sustain the long-term future of communities. Whilst achieving community ownership in a wind farm development can be challenging, the case studies of community ownership in this study help to show that the financial returns can be much greater than those attained through community funds. In particular the experiences of Neilston Community Wind Farm and Earlsburn help to demonstrate the substantial financial benefits which can then be used within the community. Importantly, they also show that it is possible for communities and developers to work together in order to achieve an outcome which benefits all stakeholders.

The importance of different stakeholders working together can be readily seen in Great Britain. In Scotland and Wales, governments at both a devolved national level and local level recognise the important role of communities in renewable energy development. A series of pro-active actions have been taken. Notable examples of this include the future creation of a community benefits register in Scotland, and the development of renewable energy on forestry sites with significant levels of community involvement and benefits.

The benefits of working together can also be seen with some councils producing guidance for both communities and developers surrounding issues of community engagement and the provision of community benefits. Good practice from Scotland and Wales has shown that a joined-up approach including government, the private sector and communities is essential to maximising the potential of future renewable energy deployment.

The joined-up approach that exists in Scotland and Wales shows how government, the private sector and communities can work together for the benefit of everyone. The pro-active action taken in Scotland and Wales in particular has been largely absent to date in Northern Ireland. However, with the current Programme for Government and ongoing governance and policy developments, the time is right for Northern Ireland to learn from good practice in Great Britain. This will help Northern Ireland maximise its renewable energy potential for all of society and help the government to meet its ambitious targets.

Appendix One – Levels of Engagement

INCREASING LEVEL OF PUBLIC IMPACT

Public Participation Spectrum

Developed by the International Association for Public Participation

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:
To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions	To obtain public feedback on analysis and/or decisions.	To work directly with the public throughout the process to ensure that the public issues and concerns are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solutions.	To place final decision-making in the hands of the public
Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:
We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and issues are directly reflected in the alternative development and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation on formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Source: Compiled with data from *The Protocol for Public Engagement with Proposed Wind Energy Developments in England.*[103]

[103] Centre for Sustainable Energy, BDOR and Peter Capener (2007) The Protocol for Public Engagement with Proposed Wind Energy Developments in England, a report for the Renewables Advisory Board and DTI. Available at: http://www.cse.org.uk/pdf/pub1079.pdf (accessed 18/01/2012)

The Fermanagh Trust has undertaken this project as part of its programme of research, which it hopes will be of value to community based organisations, policy makers and the private sector.

Further copies of this report can be obtained from the Fermanagh Trust Website. (www.fermanaghtrust.org/publications)

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Windwatch briefing paper – 27th June 2013

I

Presentation to MLAs at Silver Birch Hotel Omagh, 27.6.2013.

John Peacocke, Wind Watch, Tyrone.

I am resident in County Down, having lived and worked in Tyrone. I am not as closely involved with the wind farm consequences as others have been. County Down is having a different kind of experience with Wind Power.

As a retired engineer, I have maintained an interest in "alternative" energy generation. I have found an excellent source of information relating to this topic.

Professor DavidMacKay 's book "Sustainable Energy-Without the Hot Air" is in the form of a degree student source book. It deals with Renewable Energy problems on the global scale. The author emphasises that any attempt to harness diffuse renewable energy to replace fossil fuels must produce disruptive effects to large areas of the earth's surface.

The author does not dig deeply into the social or political aspects of these matters.

In the short time allotted to me, I will not attempt to persuade this panel on behalf of the local objectors' points of view.

I have come to believe that the disturbing consequences of developments such as Wind Farms could have been made less severe if the community had been properly educated about the global necessity for the development , and if the community share offered were to be made more proportionate to the value of the income produced.

By the "community" I am referring not only to the close neighbours, but to all those whose homes become affected , for instance, by visible degradation of the landscape. The Planning system is being heavily criticised in respect of this issue.

The need for transparency has been indicated by recent revelations that organisations such as Starbucks and Amazon have been able to operate freely in GB but take their profits and pay negligible amounts of tax.

Foreign businesses will use wind farming in the same way. Some enterprises have declared that they will install turbines solely for the export of power by overseas connector. This offers the prospect of further impact upon the environment , over and above what the community might be expected to tolerate.

There is a feeling among the community that the system is unfair , in that wealthy individuals and foreign companies are to make very large profits (particularly in regard to incentives) while reducing the standard of living for everyone else.

The awareness that this development is being subsidised by consumer surcharges makes the pill even harder to swallow.

I recommend the Professor's book to you, and I append my notes and internet references which arose from recent study and discussions with community members.

Since the publication of the book, new projects have arisen. However, the fundamental things still apply and all public representatives must become and remain aware of the technical as well as the political aspects of Renewable energy.

3

The question of storage of energy . AC power depends upon exact control of voltage and synchronisation, modern electronic devices are essential. Speed of response to changes involving extremely heavy machinery is required.

STORAGE. Batteries are for the military, isolated pioneers, traffic signs etc. They are too small and costly for domestic development. The electric plug-in car may well change this.

There is not enough pumped storage on demand, either in GB or Ireland. Page 190.

PUMPED HYDRO STORAGE see page 192-193 and options following.

SPIRITOFIRELAND see Mayo Glinsk Hydro www.organicpower.ie/pdf/glinsk/T1S5O3-slides.pdf. Massive projects involving ruthless use of mountain tops to construct seawater lagoons.

Existing Turlough Hill Dublin, Shannon Hydro, Dinorwig in Wales are examples of fast acting hydro..

Hydro storage can come on in 12 seconds and run for 6 hours.

Buy electricity cheaply to pump up, release when demand ie price is high. (Prices from £20 to £120 per MWhr.)

Where pumped storage could have been useful……

There is 500 MW installed of wind today in N.Ireland. The record for wind power produced stands at 378 MW.

This power had to be given priority, so 378 MW, approx. the power of Kilroot, had to be diverted, or kept idling at speed until the wind dropped. Power may have been shunted away via N/S interconnector or via Moyle i/c.; or a gas turbine taken off line.

Renewable Incentive . The ROC is a valuable certificate awarded to a "green" energy producer .It is purchased by "carbon emitting" entities such as manufacturers using fossil fuels.

http://www.detini.gov.uk/existing_and_confirmed_roc_per_mwh_levels_from_1_may_2013.pdf

ROCs.....Single turbine, on-farm type, 250KW or less , subsidised by payments of 4ROC , but a bigger turbine than 250KW attracts only 1 ROC, as set by NI Assembly.

One ROC worth appx £40 ie the avge price of 1 MWHr.

This fourfold incentive is disproportionate to any observer.

http://www.eirgrid.com/media/All-Island%20GCS%202012-2021.pdf is eirgrid summary of all generation to 2020.

INTERCONNECTION to GB and Scotland and Republic is vital.

Interconnection is not just help and sharing, it must be capable of shunting massive amounts of power over international circuits at immediate notice.

4

This means more massive pylons and transformer sites and connections to remote rural wind power zones.

DC cables require cathedral sized terminal buildings and large switch parks. See

http://www.eirgrid.com/aboutus/eirgridtv/east-westinterconnectoranimation /

Back up power called spinning reserve by gas powered sites is and will be more and more essential as wind power increases in the land. This is expensive and hard on generating plant. http://www.clepair.net/windsecret.html (concerned professionals opinion).

Other renewables.. https://restats.decc.gov.uk/app/pub/repd/operational/region/ni/tab/applications/ shows working plant currently installed in NI.

https://restats.decc.gov.uk/cms/wind-generation-by-country / pie chart showing percentage of wind power in NI compared with UK.

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https://restats.decc.gov.uk/app/pub/repd/operational/region/ni/tab/applications / shows makeup of NI renewables.

http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/c517-i/c517-i.htm a well conducted discussion. Questions of lack of community investment, local resentment of imposition of new construction, ineffective objection, as well as technical matters were well aired.

Note the confident assertion that a surcharge of one penny per unit could cover all renewables development, and that the price of oil and gas imports is the main driver for high electricity prices.

Omagh and Strabane District Councils briefing paper – 27th June 2013

Written Evidence presented to the Northern Ireland Assembly's Environment Committee from Omagh District Council and Strabane District Council's Wind farm Working Group

Thursday 27 June 2013

1. Introduction

1.1 The wind farm working group for Omagh District Council and Strabane District Council commend the Assembly's Environment Committee for meeting in West Tyrone and focusing on the highly emotive subject of wind farms.

1.2 During this meeting the delegated witnesses from the wind farm working group wish to:

- To outline the background to the wind farm working group
- Illustrate West Tyrone's unique experience to date on wind farms Lobby the Committee for the full implementation of the Department of Energy and Climate Change's Government response to: *the Onshore Wind Call for Evidence on Community Engagement and Benefits* in Northern Ireland.
- Provide the Committee with some further suggestions on how to alleviate some of the unique issues experienced in West Tyrone.

2. Background to the Wind farm Working Group

2.1 Omagh District Council and Strabane District Council have established a collaborative wind farm working group due to the concentration and proliferation of wind farm developments in West Tyrone.

2.2 The working group aims to ensure that the benefits from hosting the onshore wind industry are fully realised and any adverse impacts are robustly addressed. The working group also wish to ensure that onshore wind energy developments are carried out with the broad support of the host community.

2.3 Omagh District Council and Strabane District Council are not in opposition - nor directly in favour of wind farms. As a statutory consultee, Councils consider each planning application on its own merit, taking into account specialist advice and wider implications. In addition, each Council's Environmental Health department is a statutory consultee within the planning process.

2.4 The group have been meeting since January 2012 proactively engaging with a range of people and organisations. The group have:

- Raised local issues, and offered solutions to: - the Minister for the Environment, the Minister for Enterprise Trade and Investment and the Minister for Agriculture and Rural Development.
- Prepared a draft guidance protocol on the payment of community benefits locally.
- Prepared an upheld response to the Department of Energy and Climate Change's call for evidence on community benefits

- held meetings with the Northern Ireland Renewable Energy Industry Group (NIRIG), MLAs, Political party spokespersons, NILGA, local community organisations, planning officials, lobby groups and developers
- Attended the Action Renewables consultation event in relation to the joint research commissioned by DETI/DoE and DARD on renewable energy and community benefits.
- Attended the recent Ministerial summit on Community Benefits

3. The Industrialisation of West Tyrone

3.1 There is a significantly high level of onshore wind energy development in West Tyrone. It is a special case.

3.2 West Tyrone accounts for 14% of Northern Ireland's landmass (1,992 Km2). It currently hosts: 44% of all proposed and approved applications for large wind farms in Northern Ireland. Due to Northern Ireland Electricity's clustering policy, West Tyrone will continue to witness a major extension in the number of wind farms over the next 10 years.

3.3 A report by Landscape Architects, commissioned by Planning Service Northern Ireland in 2008 said: "West Tyrone is already at a point of near capacity and there is only limited scope for further wind turbine development". This research has since been superseded by further planning approvals and applications pending.

3.4 Moreover, West Tyrone also suffers unique transboundary issues given its proximity to Donegal in the Republic of Ireland with its similar, inherent high wind energy resource.

3.5 A significant proportion rural people in West Tyrone are living within close proximity to wind farms. Supplementary planning guidance states that a wind farm should be sited no less than 500 metres or 10 x the rotational diameter of the turbine. Some residents living within Strabane District are living closer than 500 meters to wind farms. The Councils would suggest that this separation distance needs reviewed given the increasing size and scale of turbines.

3.6 A recent report by BIGGAR Economics states that onshore wind farms create 1,100 jobs and £84m of investment at a local authority level in which the wind farm is cited. Strabane District Council and Omagh District Council would refute this claim. The economic benefits of hosting wind farms need to be better established and understood. Investment in training and development is required so that local people can become employed in the manufacturing, construction and service industries supporting the development of onshore wind.

4. Concerns regarding the impact of this industrialisation of West Tyrone's landscape.

4.1 The Committee will receive witness evidence from a local opposition lobby group called "West Tyrone against Wind farms and Turbines". This group hosted a wind watch symposium on 02 Feb 2013 which was very well attended by local people. They also have made strong and compelling representations to each Council, the wind farm working group and to the media. During their representations they have argued that:

- There are detrimental health impacts associated with low frequency noise, particularly for children
- Wind farms reduce property values
- Wind energy is inefficient
- There is a significant carbon output in creating wind farms (particularly in terms of construction on blanket bog)
- There is a significant negative impact on biodiversity
- The industry is leading and influencing central government for their own profit

- Local people's health and livelihoods were being "*sacrificed*" in order for Government to achieve the targets within the Strategic Energy Framework.

4.2 Both Council's Environmental Health Departments are currently investigating increased complaints from local residents about the noise from wind farms. Both Councils have had to provide additional resources (in terms of noise monitoring equipment and Environmental Health staff) in order to address the increased planning application consultations and noise complaints from residents.

4.3 The ETSU-R-97 regulations are used for the assessment of noise from wind farms. According to these regulations, it is acceptable for wind farms to be noisier at night[1]. Sleep deprivation from noise from wind farms is the most frequently alleged negative health impact. The wind farm working group would argue that these regulations need to be changed to ensure that wind farms are quieter at night than during daytime hours.

4.4 Councillors have also been engaged in complaints regarding shadow flicker, television reception, flickering lights and there have been significant concerns about the impacts on our landscape heritage and biodiversity.

4.5 It is also important to highlight that local people's ability to shape or influence the planning process in West Tyrone is limited. West Tyrone has been without an Area Plan since 2001. The Committee will be very aware that Local government has yet to assume planning responsibility and community planning will not become statutory until the Local Government Re-organisation Bill is passed. Local people feel somewhat powerless whilst witnessing this industrialisation of their landscape. PPS18 also strongly favours development. Planners are required to evidence both an "unacceptable" and an "adverse impact" in refusing a planning application. In the absence of an Area Plan locally, the wind farm working group would suggest that a specialist subject plan on onshore wind farms should be developed in West Tyrone.

4.6 There is a high degree of suspicion, misinformation and fear in West Tyrone in relation to wind farms. Local people are concerned. Both Councils would argue that an evidence base - addressing the allegations that onshore wind has a negative and detrimental impact is required.

5. Onshore Wind Call for Evidence

5.1 Omagh District Council and Strabane District Council submitted a detailed submission to the Department of Energy and Climate Change's Call for Evidence in Onshore Wind (Community Engagement and Benefits) in November 2012. Both Councils are delighted with the outcome of this research which was published on 06/06/2013. It has vindicated both Councils' approach to community benefits and reinforces the arguments previously presented to the industry.

5.2 The UK Government's response sets out a package of measures and an action plan aimed at strengthening engagement and empowering local people as follows:

- Compulsory pre-application consultation with local communities in planning for onshore wind
- The provision of clear and reliable evidence on the impacts of onshore wind, through a evidence toolkit
- Engagements guidance – benchmarking and monitoring of good practice
- Fivefold increase in community benefit package value to £5,000 per mega watt per annum
- A register of community benefits
- A community energy strategy to promote community ownership and buy-in
- Enhancing local economic impacts via the production of guidance for potential supply-chain business

1 43 dB(A) at night maximum compared to 35-40 dB(A) range during daytime hours.

5.3 Both Councils would now **call on the Committee to fully utilise this evidence and fully implement all the outputs in Northern Ireland** in order to address some of the concerns raised by the host communities locally.

6. Community Benefit paid locally

6.1 A report by the Fermanagh Trust entitled 'Maximising Community Benefits from Onshore Wind in Northern Ireland', published in early 2012, provided clear evidence that host communities in Northern Ireland are receiving a significantly lower level of community benefits compared to that offered in mainland UK, Scotland and Wales.

6.2 Details of the (known) community benefits offered by commissioned wind farm developments in West Tyrone are detailed below:

- Bord Gais, (Owenreagh Wind Farm) offer no community benefits (despite offering £833 per MW per annum to a wind farm in Tipperary)
- ESB (Carrickatane Wind farm), which is under development and to be operational in 2013, do not currently have a community benefits package.
- SSE / Airtricity wind farms offer 0.5% of revenue or 1% of revenue, depending on when the wind farm was built. (It is notable however that there is a clear disparity in the treatment of communities living in Northern Ireland and Scotland where they pay an additional £2,500 per MW per annum into a Scottish Regional Fund. This funding is not available to the Northern Ireland community.)
- Energia have offered £1,000 per MW per annum for the 1st year of operation and an average of £780 per MW per annum thereafter for the lifetime of the Wind farm.
- DW Walker Consultancy has offered £2,500 per MW of installed capacity.

6.3 It is important to highlight, that since the publication of the DECC Call for Evidence results RES have engaged both Councils in relation to a wind farm in Killeter and have offered a £5,000 per MW per annum. This is the highest community benefit package offered in West Tyrone to date. Previously RES offered £1,000 per MW per annum or £2,000 per MW per annum, depending on when the wind farm was built.

6.4 NIRIG published their community benefit policy on 31.01.2013. This policy states that the industry should pay a £1,000 per Mega Watt per annum community benefit fund as a minimum. Both Councils strongly argue that this is not enough.

6.5 The wind farm working group argue that there is a lack of transparency in relation to what each developer is paying into a community benefit fund. Communities are being asked to negotiate a community benefit payment with no prior knowledge of what is an acceptable payment. The community does not have the capacity to do this effectively. Local people are at a distinct disadvantage when engaging with a multi-million pound industry (which is perceived as being subsidised by government through the Renewables Obligation Certificates).

6.6 Both Councils would also argue that there needs to be a reinstatement of Annex 3 that was provided in the draft PPS18 in relation to community benefits. Council would argue that the scope within Article 40 of the Planning Act for the payment of community benefits should also be fully utilised.

7. Omagh District Council and Strabane District Council's draft guidance protocol on the payment of community benefits

7.1 The working group has developed a draft guidance protocol on the payment of community benefits. The draft document states that the developer should commit to making an initial payment based on installed capacity coupled with contributions payable annually - set at a standard rate of £5,000 per megawatt of installed capacity per annum, index linked. The protocol states that all contributions will be directed exclusively to local projects within 8 miles of the exterior boundary of the wind farm. It stipulates that 70% of the fund should be allocated to the community living within 5 miles of the site and the remaining 30% being allocated to the community living within 8 miles of the site[2].

7.2 This draft document will now be presented to both Councils for approval as a result of the Department of Energy and Climate Change's Call for Evidence on Community Benefits.

8. Conclusion

8.1 West Tyrone is a special case. It is experiencing unique cumulative impacts from the concentration of on-shore wind farms. The support of central government is needed to ensure that the benefits from hosting this industry are fully realised and that any adverse impacts are robustly addressed. The development of wind energy should be carried out with the broad support of the host community.

8.2 The wind farm working group would strongly argue that the recently published outputs from DECC as a result of their call for evidence should be fully implemented in Northern Ireland. Namely,

- Compulsory pre-application consultation with local communities in planning for onshore wind
- The provision of clear and reliable evidence on the impacts of onshore wind, through a evidence toolkit
- Engagements guidance – benchmarking and monitoring of good practice
- Fivefold increase in community benefit package value to £5,000 per mega watt per annum
- A register of community benefits
- A community energy strategy to promote community ownership and buy-in
- Enhancing local economic impacts via the production of guidance for potential supply-chain business

8.3 These outputs will help alleviate some of the unique challenges presented by the growth in onshore wind in west Tyrone.

8.4 The Wind farm working group would also lobby the committee for: A review of the required separation distances of wind farms from homes, particularly given the increased size and capacity of turbines

- A review of the ETSU-R-97 Regulations which stipulate that wind farms can emit higher noise levels at night
- Given the absence of an Area Plan in West Tyrone since 2001, the development of a specialist subject plan on onshore wind farms in West Tyrone
- A review PPS18 in relation to the requirement to consider whether planning applications for wind farms are both "negative" and "an adverse impact" and also reinstate the Annex 3 in the draft document – Fully utilise article 40 of the planning act to ensure community benefits are an integral part of planning for onshore wind.

Omagh District Council and Strabane District Council's

Wind farm working group, Written Evidence, 27 June 2013

2 Where it is not possible to allocate 70% of the funding within 5 miles of the outer boundary of the wind farm, any unallocated funding shall be distributed within the wider proximity threshold of 8 miles.

Department reply to issues raised by Omagh and Strabane District Councils

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Date: 10 July 2013

Dear Sheila

Thank you for your letter of 28 June asking for this Department's consideration of the written evidence submitted to the Environment Committee by the Strabane and Omagh District Councils' Joint Working Group on Wind Energy.

In relation to the points raised by the report which are relevant to the work of the Department, I would make the following comment:

Pre application consultation with local communities

In relation to the issue of pre-application consultation with local communities raised by the Working Group, Committee members will already be aware of the provisions of the Planning Bill which includes a requirement for developers to give the Department 12 week's notice of their intention to submit a planning application for a major development and a further requirement to carry out a public consultation before submitting an application for a major development. The Committee will be aware that the Bill completed its initial Consideration Stage on 25 June.

Regulations will prescribe the minimum requirements that a developer must meet in carrying out such a consultation and establish the thresholds for the types of development that will be subject to these new requirements. These Regulations will themselves be subject to consultation.

Community Benefits

As the Working Group is aware, the Department of the Environment and the Departments of Enterprise, Trade and Investment and Agriculture and Rural Development have jointly commissioned consultants to undertake a study on Communities and Renewable Energy in Northern Ireland. The report will consider the relationship between communities and the development of renewable energy, and how communities can engage with developers and participate and/or benefit from renewable energy developments. The work is now substantially complete and will be published shortly.

The report covers many of the issues raised by the Working Group's evidence paper including the need to take into account the recent and pending Department of Energy and Climate Change (DECC) work on communities and energy; opportunities for funding community energy projects; the need for best practice guidelines for the way renewable energy developers engage with communities; improving the capacity of communities to deal with issues raised by development of renewable energy; community benefit levels in Northern Ireland; and the need for a community benefits register.

Furthermore, in June the Minister facilitated a Summit on Community Benefits. The aims of the Summit were to learn from practice here and elsewhere; to explore what more could be done to further community benefit throughout the planning system, and to identify ideas and proposals for the Minister to consider. A report on the findings of the summit is currently being finalised. A further Summit will take place in September to consider progress on this matter.

Specifically in relation to the call for a five-fold increase in the level of community benefit value to £5000 per MW per annum. This is based on Renewables UK plans to offer this level of community benefit for onshore wind-farms in England. The Department's understanding is that this will be for new wind-farms entering the planning system in the future. Furthermore, this is on a voluntary basis and is not required by Department of Energy and Climate Change (DECC).

The Northern Ireland Renewable Industry Group (NIRIG) Community Commitment protocol currently offers a minimum payment of £1000/MW of installed capacity to communities. However it is important to note that these payments are voluntary goodwill payments to the community and are not required by planning policy. While the Minister has made clear that he wishes to see communities maximise the level of benefit they can obtain from developers, the Department cannot require the level of support to be increased in the way the Working Group appear to indicate.

Article 40 agreements

The Working Group has specifically requested that the Department utilise Article 40 of the Planning (Northern Ireland) Order to ensure community benefits are an integral part of planning for onshore wind. Article 40 enables any person who has an estate in land to enter into a planning agreement with the Department. A planning agreement may facilitate or restrict the development or use of the land in any specified way, require operations or activities to be carried out, or require the land to be used in any specified way and are made between a developer and the Department. They can be used to mitigate the impact of a proposal and overcome a barrier to development, for example, the funding or provision of road improvement schemes or the inclusion of open space and recreational facilities. All such contributions must be reasonable and related to the development proposal in question. While it is possible that such agreements may be used to provide some community benefit that is directly related to the proposal (such as an upgraded road junction or access to a nearby site of archaeological interest in the vicinity of the proposal) it is beyond their scope to provide or secure the provision of some unrelated community benefit. This could only be offered on a voluntary basis by the Developer to a community or negotiated between a community and a developer.

PPS 18 'Renewable Energy'

PPS 18 requires development that generates energy from renewable resources to demonstrate that it will not result in an unacceptable adverse impact on public safety, human health, or residential amenity; visual amenity and landscape character; biodiversity, nature conservation or built heritage interests; local natural resources, such as air quality or water quality; and public access to the countryside.

In particular, for wind energy development, the policy required that proposals should demonstrate that:

- the development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size and siting of turbines;
- that the development has taken into consideration the cumulative impact of existing wind turbines, those which have permissions and those that are currently the subject of valid but undetermined applications;
- that the development will not create a significant risk of landslide or bog burst; that the development will not cause significant harm to the safety or amenity of any sensitive receptors1 (including future occupants of committed developments) arising from noise; shadow flicker; ice throw; and reflected light; and

Furthermore it advises that any development on active peatland will not be permitted unless there are imperative reasons of overriding public interest.

In relation to the issue of transboundary impacts with the Republic of Ireland raised by the Working Group, the Northern Ireland Environment Agency (NIEA) document 'Wind Energy Development in Northern Ireland's Landscapes' identifies potential cumulative impacts and transboundary issues in relation to existing and approved wind energy developments and future proposals for a number of Landscape Character Areas. This document is a material consideration in the determination of planning applications for wind energy development. The Department regards these provisions as appropriate to address the planning issues associated with this form of development.

Separation Distance

The Working Group specifically raises the issue of the separation distance set out in PPS18. This states that, for wind farm development, a separation distance of 10 times rotor diameter to occupied property, with a minimum distance not less than 500m, will generally apply.

While this separation distance will help minimise noise impacts upon sensitive receptions from wind farm development it is imposed for reasons of general amenity (including visual amenity). This is a minimum recommended separation distance and does not prevent the adoption of a greater separation distance where assessment of noise impacts or other material considerations indicates this is appropriate. The Department does not propose to review this aspect of the policy at this time.

ETSU-R-97

In common with the planning policy approach in England, Scotland and Wales the Best Practice Guidance which accompanies PPS 18 advises that the standard 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97), should be used in the assessment and rating noise from wind energy developments (including wind turbines and wind farm developments).

The ETSU-R-97 methodology was developed by the Energy Technology Support Unit of the former Dept. of Trade and Industry (now the Department of Energy and Climate Change) in Britain. It is intended to offer a reasonable degree of protection without placing unreasonable restrictions on wind farm development.

At the request of DECC, the Institute of Acoustics (IoA) established a working group to examine the application of ETSU-R-97. The document "A Good Practice Guide to the Application of the ETSU-R-97 for the Assessment and Rating of Noise from Wind Turbines' was published in May 2013. There are currently no plans to review the recommend use of ETSU-R-97 for the assessment and rating of noise from wind turbines.

Development Plans

In relation to the issue of the absence of an Area Plan in West Tyrone I can advise that the Department has now agreed to commence initial preparatory work on development plans in conjunction with the voluntary and/or statutory transition committees. It is important that this preparatory background work starts as soon as possible if the new councils are to produce new plans within reasonable timescales. In the interim the PPS 18 and the existing plan provides an adequate planning policy framework.

Health Impacts

Where matters of public health are raised in relation to a proposal for wind energy development, or where an assessment of scientific research in this area is required, it is the Departments standard practice to consult with the Public Health Agency (PHA) which possesses the relevant expertise in this area.

The advice of the PHA is that, in general, provided established guidance and best practice in relation to placement of wind turbines and mitigation measures is undertaken, there is minimal to no risk to the health of the population associated with such facilities.

SPPS

The Committee will be aware that it is the intention of the Department to develop a single Strategic Planning Policy Statement (SPPS). The purpose of this SPPS is to provide a comprehensive consolidation of existing policy including review of some elements where necessary. The Department intends that the draft SPPS will be published for public consultation by the end of the year. PPS 18 will form part of this consolidation and should issues with planning policy in respect of renewable energy be raised in response to the SPPS consultation my Department will consider these before finalising the policy.

I trust this information is of assistance, should you require anything further please contact me directly. The Department would be happy to brief the Committee further in relation to the contents of the Working Group statement

Yours sincerely,

Helen Richmond

DALO
Via email

DARD letter to Committee re Wind Energy

Corporate and European Services Division
Central Management Branch

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

AN ROINN
Talmhaíochta agus
Forbartha Tuaithe

MÄNNYSTRIE O
Fairms an
Kintra Fordèrin

Sheila Mawhinney
Clerk to the Committee for the Environment
Room 416
Parliament Buildings
Ballymiscaw
Belfast
BT4 3XX

Dundonald House
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Belfast BT4 3SB

Tel: 028 9052 4331
Fax: 028 9052 4884
E-mail: paul.mills@dardni.gov.uk

Our Ref:
Your Ref:
Date: 17 July 2013

Dear Sheila

Wind Energy

Thank you for your letter dated 28 June 2013 regarding Wind Energy.

You may be aware that the Department of Agriculture and Rural Development (DARD) does not have policy responsibility for wind energy. Overall responsibility for renewable energy policy rests with colleagues in the Department for Enterprise, Trade and Investment who may be in a better position to provide comment on policy matters raised by the Councils' Joint Working Group.

DARD is involved in biomass energy but only in support of agriculture activity. The Department would also support rural community groups in their efforts to obtain the best return on any renewables investment in what is essentially a commercial matter.

You may also wish to note that DARD Forest Service is currently considering the potential for wind farm development on its land but as yet no sites are operational or under development.

I am copying this letter to Stella McArdle, Clerk to the Agriculture and Rural Development Committee.

Yours sincerely

for
Joe Cassells
Departmental Assembly Liaison Officer

If you have a hearing difficulty you can contact the Department via the textphone on 028 9052 4420

INVESTOR IN PEOPLE

Emails from West Tyrone Against Wind Turbines

Good evening,

I hope you are enjoying your break and also this fine weather.

I came across this article in the Daily Mail and thought you would find this of interest.

The amount of evidence and reports into the scam that is the wind industry is substantial, with reports coming out practically on a daily basis from all around the world.

It is now time to stand up for the people you represent and say enough is enough.

This so called "green energy" is a complete farce and waste of money and has numerous serious consequences. Division among families and rural tight knit communities, adverse health impacts on people as a result of industrial wind turbines being sited too close to their homes, damage to wildlife and the killing of bats and birds, the damage to the environment and to streams and rivers, the negative visual impact of our beautiful countryside much of which are Areas of Outstanding Natural Beauty and widely promoted as a popular tourist destination and the loss of jobs in this sector as a result, the devaluation of property as a result of industrial wind turbines / wind farms being sited too close to their property, this will also have a negative impact on any future planning applications for any dwellings and this will lead to a fall in revenue in the amount of rates being paid by these properties, the list goes on.

The environmental damage carried out by and hidden by the wind industry was also exposed by Channel 4 News. Please take the time to google "Rare Earth Elements" (John Snow's picture is on the home page).

This tells the story of the extraction of rare earth elements required in the manufacture of a wind turbine. Each wind turbine requires two tonnes of these rare earth elements. The story uncovers how the local farmers were deprived of their land and promised to be relocated to new settlements, another empty promise, they are now left with land they cannot use with no running water and lakes of toxic waste, but no one was meant to find this out because this is suppose to be "Free and Green".

Increasing electricity bills, almost 40% increase since the renewable energy programme was launched, this madness is driving more people into fuel poverty and businesses facing closure or relocating overseas with further job losses as they cannot compete with their competitors overseas because their running costs are much higher.

The front page of the Sunday Telegraph recently ran the story that subsidies paid out to the wind industry equates to £100,000 per employee. This is staggering and hard to believe but it's true.

If the wind industry was so great as they would have us believe, surely then the wind industry would be able to stand on it's own two feet and NOT depend on any subsidies at all. This point proves that the wind industry is Unsustainable and Unreliable because it is depending on substantial subsidies. This money would be better spent on our schools and hospitals where it Will do some good and we can see the benefits.

In this day and age people are more aware of their spending and looking for value for their money, more so than ever before.

Ask yourself this question: Are we getting value for our money which is being paid in subsidies to the wind industry to do all the damage and all the hidden costs which I mention above?

People are now waking up and starting to question what is being pulled over their eyes and what is being taken out of their pocket.

Why does the wind industry gag their landowners?

Why does the wind industry bribe people by offering their neighbours £200 off their electricity bill?

Why does the wind industry bribe the councils by so called “community benefits” when the money is coming from that community through hidden charges in their electricity bills in the first place?

How do you determine community as to who benefits?

I asked this question to the members of the working group from the Omagh and Strabane District Councils at a meeting with them in January last, they could not give me an answer.

The reason I mention this point is because a recent advert in a local newspaper relating to a wind farm in Castlederg said that community groups from within a 10km radius of that wind farm could apply for this so called “community benefit”.

Is that an admission of liability from the wind farm developers that people living from within a 10km radius of that wind farm are effected in a negative way as a result of that wind farm being sited too close to heir homes?

“Free and Green” they proclaim!

Well the truth is, It’s certainly not Free and It’s far from Green!

Best regards,

Owen McMullan Chairman

West Tyrone Against Wind Turbines

http://www.dailymail.co.uk/news/article-2362762/The-dirty-secret-Britains-powermadness-Polluting-diesel-generators-built-secret-foreign-companies-kick-theres-windturbines–insane-true-eco-scandals.html

Sent from my iPad

Good morning,

Further to my previous email

I saw this story on the BBC News iPad App and thought you should see it:

Energy firm warns of bill increases

Household energy bills are likely to rise £100 a year more than the government projects, says energy firm RWE Npower.

Further increases on energy bills which are already increased by 40% to date.

How much more information do you need to realise that this is a complete and utter scam that is driving more and more people into fuel poverty and forcing businesses to close down or relocate abroad resulting in more job losses?

Renewable energy, especially wind "energy" does NOT reduce the use of fossil fuels, it actually INCREASES THE USE OF FOSSIL FUELS.

What happens when the wind does not blow?

The blades of the Industrial Wind Turbines will warp if they do not keep turning, so they actually require the use of electricity (which is unmetered and charged to the public in hidden charges on their electric bill) to keep the blades turning.

Surely this defeats the purpose.

As the wind does NOT blow all the time, these energy companies CANNOT GUARANTEE a constant supply of electricity, hence the threat that the lights will go out.

In a recent conversation I has with a wind farm developer RES about a proposed wind farm in KILLETER, outside Castlederg, they claimed that these 5 industrial wind turbines would generate electricity for 7000 homes.

When I asked them the question, would these industrial wind turbines generate electricity to these 7000 homes 24/7 all of the time with constant power, He could not answer me.

THESE SO CALLED ENERGY COMPANIES ARE NOT TELLING THE TRUTH THEY ARE DRAINING OUR FINANCIAL RESOURCES AND RIPPING PEOPLE OFF THEY ARE BRIBING COUNCILS THROUGH THE PROMISE OF COMMUNITY BENEFITS WITH MONEY THEY TAKE FROM THAT COMMUNITY WITHOUT TELLING THEM THEY DO NOT ENGAGE WITH THOSE COMMUNITIES AND MORE IMPORTANTLY

ALL THE WIND FARMS OPERATING IN NORTHERN IRELAND ARE DOING SO ILLEGALLY THEY ARE IN BREACH OF EUROPEAN LAW

Now as elected representatives

We want to know what you are prepared to do about this scam.

There must be a complete halt on any further construction of industrial wind turbines and industrial wind farms including those in construction and the planning process at present.

An investigation must be carried out to see who and why was the go ahead for these 70 wind farms to be constructed without the proper community engagement and environmental impact assessments being carried out which are set out in the Aarhus Convention and are being ignored.

You are also aware that the current guidelines (ETSU -97) which the wind industry work to was published by the wind industry for the wind industry in 1997 which states that these guidelines were to be reviewed within 2 years.

To this day, that has not happened. Why?

By their own admission, the wind industry have said that these guidelines was to be reviewed 14 years ago thus making the current guidelines deemed “not fit for purpose” as they are 14 years out of date considering the fact that the industrial wind turbines being constructed today are 5 or 6 times bigger than the ones being put up in the late 1990’s.

As part of the Windwatch Umbrella Group which consists of action groups across the province which is also very much a cross community group, we now ask you to take up this issue as a matter of urgency before further damage and suffering is inflicted on people, wildlife and the environment.

We look forward to seeing action been taken sooner rather than later.

Yours sincerely,

Owen McMullan. Chairman

West Tyrone Against Wind Turbines

Read more:
http://www.bbc.co.uk/news/business-23323318

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Sent from my iPad

Good morning,

Please read this link below.

This is an excellent account which sums up the wind industry in a nutshell.

This story is from Australia and it is the same story everywhere the wind industry has been.

The same thing is happening here in Northern Ireland and also in England, Scotland, Wales, Republic of Ireland and throughout Europe.

Please do something about this to prevent further destruction of our beautiful countryside and the environment, before more division among families and rural tight knit communities is caused, before more people suffer from the adverse health effects from these monstrocities, before further job losses in the tourism sector and the manufacturing sector as a result of less tourists to these shores and ever increasing energy costs, prevent more properties from being devalued even further as a result of the erection of industrial wind turbines being sited too close to them, prevent more and more people from falling into the fuel poverty as a result of significant rising energy costs........ The list goes on.

As the old saying goes ...”ACTION SPEAKS LOUDER THAN WORDS”

We are watching this space.

Yours sincerely,

Owen McMullan

West Tyrone Against Wind Turbines

http://stopthesethings.com/2013/05/07/press-release-the-wind-power-fraud-rally-june-18-2013-parliament-house-canberra/

Sent from my iPad

Good morning,

Further to recent emails, this story on the link below from the Guardian yesterday confirms my earlier comments about the increase in fossil fuels.

As the wind does not blow all the time these industrial wind turbines require back up from power stations to keep the blades on the wind turbines turning in order to prevent the blades of the wind turbines from warping, thus defeating the purpose of which they were intended.

European countries like Germany for example and building more power stations at present to help meet with their increasing demand as their huge investment in wind power is proving to be a massive failure and even the UK government is getting the French to build two nuclear power plants to provide a constant and reliable source of power at a fraction of the cost of their investment in their failing wind energy programme.

This use of electricity to the wind turbines is unmetered with the cost passed on to the consumer in hidden charges on their electric bill.

The wind industry also claim that the use of wind energy reduces carbon emissions.

This is another false claim.

Something the wind industry is very good at is making false claims, increasing energy costs and delivering empty promises.

Withdraw their substantial subsidies and then we can see how good and efficient the wind industry is.

Best regards,

Owen McMullan
West Tyrone Against Wind Turbines

http://m.guardian.co.uk/environment/2013/jul/25/coal-one-third-uk-energy

Sent from my iPad

Letter from ORRA Action Group

1st July 2013

Environment Committee
Chairperson
Ms Anna Lo MLA
88 University Street
BELFAST
BT7 1HE

03 JUL 2013

Re: Proposed Erection of Wind Turbines in the Town lands of Altaveedan South, Altaveedan North, Aldorough and Shelton South, Loughguile, Co Antrim Application No. D/2010/0356/F

Dear Ms Anna Lo

We read with interest your recent visit to Omagh together with the Northern Ireland Assembly Environment Committee, to visit an operational wind farm but unfortunately were unable access to the wind farm site. I also read from your press release that you have always taken a strong interest in the environmental aspects of wind energy and the potential impact of wind farm development on health, natural habitat and the effect on the economy on which this area so depends.

We would be only to happy to show you 4 wind farms here in Loughguile. We have Corkey and Gruig 21 operational turbines, Slievenahanaghan non operational the first one ever erected in Northern Ireland which has not worked for years and stands broken and unable to be decommissioned and the proposed site Altaveedan 9 turbines of 102mts high and as close as 800mts to the back of residents homes, a total of 31 all within a radius of 5km where you could view from the road if unable to gain access from RES.

We have been fighting the above proposal for the past three years and have invited Mr Attwood Minister for Environment to come and have a look at the devastating impact such a proposal would have on the area, so please do come and have a look

Yours sincerely

ORRA ***Action Group***
E'mail:

Page 1

Omagh and Strabane District Councils response to Committee

Strabane
District Council
Comhairle Ceantair
an tSratha Báin
Stràbane Destrick Cooncil

Environment Committee Office
Room 247
Parliament Buildings
Belfast
BT4 3XX
Tel: 90 520358
Fax: 90 521795

Re: Your Ref: ENV494

02 September 2013

Dear Antoinette,

Thank you for your correspondence dated 28 June 2013 which related to the Envirinment Committee meeting held in Omagh on 27 June 2013.

Please find attached or detailed below the following information requested by the Committee:

1. **A list of meetings** of Omagh District Council and Strabane District Council's windfarm working group, detailing any outcomes/actions is attached.

2. **Potential difficulties that may be experienced by both Councils while implementing the Clean Neighbourhoods and Environment Act**

In the event of a noise nuisance complaint in relation to a wind farm, there is an anomaly under the Clean Neighbourhoods & Environment Act (NI) 2011, whereby councils cannot require information (eg wind data) from the windfarm operator which is necessary for the purposes of a noise investigation. The Clean

Neighbourhoods and Environment Act (NI) 2011 does not replicate the power to require information contained in the previous noise nuisance legislation [Pollution Control & Local Government (NI) Order 1978, Art 72].

Where co-operation is not forthcoming from the developers, the council is required to independently measure wind speed and direction at a significant cost to Councils.

3. **A Committee member also sought the views of the Omagh/Strabane District Councils Joint Working Group on the ETSU - Assessment and Rating Noise from Wind Farms document**.

Night time levels prescribed in the ETSU-R-97 procedure still exceed daytime levels by 3dB. The committee will be aware that the majority of the alleged detrimental health impacts associated with wind farms relate to sleep deprivation. Omagh District Council and Strabane District Council would therefore strongly argue that the ETSU-R-97 regulations should be reviewed again to reconsider day time and night time thresholds.

I trust that this leaves everything in order, however if you have any more queries please do not hesitate to contact me.

Yours truly,

Rachelle Craig
Corporate Policy Officer
Strabane District Council

List of meetings held by the Windfarm Working Group of Omagh District Council and Strabane District Council

Date	With whom	Rationale	Actions/Outcome
20.01.2013	Fermanagh Trust	Launch of their report	A joint collaborative group established
20.02.2013	Gary Connolly – Chairman of NIRIG	To raise concerns regarding levels of community benefit	NIRIG members to be informed of concerns in West Tyrone. A community benefit protocol to be developed by NIRIG. Scoping paper prepared by WFWG.
12.03.2012	Airtricty Community Funds information event in Ederney	To outline concern in relation to disparity in funds in NI v GB	Airtricity agreed to a further private meeting with the Wind farm working group.
27/04/2012	Principal Planning Officer (Renewable Energy) DoE	To examine the planning policy context for renewables in more detail	Raised awareness within the group of the planning process for renewables
22/05/2012	Airtricty Director of Corporate Affairs	To ascertain why Airtricty pay lower amounts to WT	Received further information on the groups who have successfully drawn down funds. WFWG to raise awareness within WT community of the funding package and encourage applications.
19/06/2012	Minister for the Environment	To lobby for reinstatement of Annex 3 of PPS18 and a fairer and more equitable community benefit fund	Minister stated that he would consider the approach taken to community benefits within the planning framework and noted the concerns

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Date	With whom	Rationale	Actions/Outcome
29/06/2012	Scraghey and District Community Association	To listen to their concerns about the growth in windfarms and lack of community dividend	Agreed to draft a community benefits policy for WT
29/06/2012	NIE	To ascertain plans for grid investment infrastructure	More fully informed working group of additional challenges regarding grid investment and installation.
10/07/2012	Party political spokespersons on Renewable Energy	Roundtable discussion to raise awareness of opportunities and challenges and seek support	Raised awareness of unique issues in WT. Sought assembly support for fair and equitable CB package in NI and the development of CB register.
07/09/2012	NIRIG Chairman and policy officer	To outline concern on the £1k proposed CB policy proposed	Sought information from NIRIG in relation to the 'unsustainability' of the £5k per MW per Annum policy. Agreed to proceed with the £5k threshold given NIRIGs minimalist approach
14/11/2013	Doreen Walker Developments Ltd	To review proposals for Sliveglass windfarm and forthcoming planning appeal	£2.5k per MW per annum package presented. DW stated that WFs in Scotland do not pay rates and therefore are incomparable (Later research proved that this was incorrect.)
18/12/2013	PAC	To support proposed WF (Slieveglass)	
21/01/2013	West Tyrone against Wind farms and Wind turbines	To listen to their concerns regarding wind farms development and alievate any	Agreed to attend symposium

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Date	With whom	Rationale	Actions/Outcome
		concerns regarding the role of the group	
22/01/2013	DARD Minister	To lobby for more CB funds on forestry sites	Agreed a robust CB fund and/or a community ownership model from forestry sites. A pilot to start in Fermanagh. Windfarm programme manager to be appointed. Community clauses also to be built into procurement. DARD asked for a copy of draft CB policy prepared by the group. Need to engage DoE regarding proximity thresholds
02/02/2013	West Tyrone Windwatch symposium	To listen to concerns	N/a
20/02/2013	Action Renewables Consultation (CAFRE Centre)	To input into DOE/DETI/DARD commission on community benefits in NI	
20/03/2013	DETI Minister	To lobby on all the issues	Report to be issued in May/June to ensure communities are suitably engaged and supported in the development of wind energy. Minister to discuss PPS18 with the Env Minister. Minister to challenge the developers in relation to their inconsistent approach to CB. Need to liaise with the Department of Health regarding alleged

3

Date	With whom	Rationale	Actions/Outcome
			detrimental health impacts
26/04/2013	Group Chief Environmental Health Officer	To ascertain EH's approach to the windfarms	Noise recordings from WFs listened to. An understanding of the different noise levels at night and during the day according to ETSU-R-97
31/05/2013	DoE Principal Planning Officer	To review approach to planning for renewables with pending devolution of planning to local government	
28/06/2013	Ministeral Planning and community benefit summit	To review approaches and planning frameworks to enable Community Benefit in all large scale infrastructural investment	Minister to consider concerns raised and host another event late August.
27/06/2013	Environment Committee Meeting		

NIRIG briefing paper – 12th September 2013

NIRIG
NORTHERN IRELAND
RENEWABLES INDUSTRY GROUP

The voice of IWEA & RenewableUK in Northern Ireland

Forsyth House
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Web: www.ni-rig.org

NIRIG Paper to the Environment Committee

12 September 2013

The Northern Ireland Renewables Industry Group (NIRIG) is a joint collaboration between the Irish Wind Energy Association and RenewableUK. NIRIG represents the views of the large and small scale renewable electricity industry in Northern Ireland, providing a conduit for knowledge exchange, policy development support and consensus on best practice between all stakeholders in renewable electricity. Our membership has developed approximately 85% of Northern Ireland's wind resources and comprises large- and small-scale wind and offshore and marine technologies.

RenewableUK is the UK's leading not for profit renewable energy trade association and represents more than 600 member companies. Their vision is for renewable energy to play a leading role in powering the UK.

The Irish Wind Energy Association (IWEA) is the national association for the wind industry in Ireland. With more than 200 members IWEA is committed to the promotion and education of wind energy issues and plays a leading role in the areas of conference organisation, lobbying and policy development on the island of Ireland. The transition towards a low-carbon electricity system in Northern Ireland is well underway. We have 31 wind farms, comprising 518MW of installed capacity currently connected to the NI grid. We also have a number of other sources of renewable energy, including landfill gas, hydro power, photovoltaic and smaller single turbines, and these currently total approximately 30MW of installed capacity. Northern Ireland also has a pipeline of renewable energy which includes a further 600MW onshore wind with planning permission, 45MW of small-scale generators, 5MW of domestic PV and 600MW of offshore wind. It is estimated that the SEF targets will require between 1350-1600MW renewable energy to be installed in NI.

Why Renewable Energy?

International and UK frameworks

Over recent decades, the EU has introduced several Directives aimed at addressing energy issues in Europe: the Renewables Directive (2001/77/EC), the Energy Trading Directive (2003/87/EC) and Emissions Trading System Directive (2009/29/EC), and Directive 2001/77/EC, which requires Member States to take appropriate steps to encourage greater consumption of electricity produced from renewable energy sources in conformity with national indicative targets. The 2009 EU Renewable Energy Directive (Directive 2009/28/EC) develops the framework for the promotion of energy from renewable sources and sets mandatory national targets for the overall share of energy between each member state.

IWEA Irish Wind Energy Association | renewableUK | NIRIG is a collaboration between the Irish Wind Energy Association and RenewableUK

The UK Government's Energy White Paper, 'Meeting the Energy Challenge' states that renewables are key to the UK strategy to tackle climate change and deploy cleaner sources of energy. The UK Renewable Energy Strategy provides an action plan to ensure 15% of energy comes from renewable sources by 2020, in implementation of Directive 2009/28/EC. Considerable work is on-going to reform the UK electricity market to attract infrastructure investment, meet the projected future increases in electricity demand from the electrification of sectors such as transport and heat and make sure the UK remains a leading destination for investment in low-carbon electricity.

Northern Ireland energy strategy

Northern Ireland's Strategic Energy Framework 2010 outlines the need to balance our energy mix in order to improve security of supply, reduce exposure to the volatility of world energy prices and reduce reliance on fossil fuels that contribute to climate change. At the heart of the SEF is a target for 40% of our electricity to be provided from renewable energy sources by 2020.

The Regional Development Strategy – Building a Better Future 2035 is the Executive's spatial strategy and aims to deal with climate change as a key environmental and economic driver. It also complements the Sustainable Development Strategy themes, which include delivering a secure & sustainable energy supply (RG5); and reducing our carbon footprint and facilitating mitigation and adaption to climate change whilst improving air quality (RG9).

The Sustainable Development Strategy for Northern Ireland (2010) reinforces commitment to ensure that the principles of sustainability reach into all activities of Government. Two key priorities within this strategy will be met in no small part by the development of wind energy: driving sustainable, long term investment in key infrastructure to support economic and social development; and ensuring reliable, affordable and sustainable energy provisions and reducing our carbon footprint.

Reducing carbon emissions and tackling climate change

All government departments bear a collective responsibility in achieving the NI Executive's Programme for Government target to reduce greenhouse gas emissions in 2025 by 35% from 1990 levels. Northern Ireland must play its part in reducing emissions as the costs of mitigation are substantially lower, and pose less of a threat to economic growth and human welfare, than the damage costs of uncontrolled climate change.

Carbon reduction is calculated by multiplying the installed wind energy capacity in megawatts by the average load factor as a fractional percentage of 1, multiplied by the number of hours in the year (8760), multiplied by the number of grams of CO2 saved per kilowatt hour, divided by 1000 (to align the units, as grams of CO2 is expressed in kWh). As DECC uses a carbon saving figure of 430g/kWh[1] and the average capacity factor for NI from 2005-11 was 31.4%[2], this represents 573,646 tonnes of CO2 savings in 2012-13 from wind energy (485MW) in Northern Ireland.

Energy payback

There is some energy required to develop and install a wind farm. This includes the manufacture of materials, transportation of parts to the site, construction of the turbines and supporting infrastructure and decommissioning. A number of factors will affect the energy balance and energy payback period of a wind farm, including wind speed and the size, number and type of turbines installed. A 2010 review[3] shows that the average wind farm is

1 http://webarchive.nationalarchives.gov.uk/20120403171904/http:/www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/saving_energy/analysis/fes-appendix.pdf

2 http://www.eirgrid.com/media/All-Island_GCS_2013-2022.pdf

3 Kubiszewski, i. Clevelan, C.J., Endres, P.K (2010). Meta-analysis of net energy return for wind power systems. Renewable Energy, 35, pp.218-225

expected to generate between 20-25 times more energy over its lifetime than was required in building and running it. This 'energy return on investment' (energy generated/energy required) compares favourably with coal (EROI of 8) and nuclear (EROI of 9). The payback period for an average windfarm is therefore somewhere between 3 and 7 months.

Increase energy security

As noted in the SEF, a more diverse energy mix is a more secure energy mix, less vulnerable to fluctuations in the availability of any one fuel. Northern Ireland currently relies on imported fossil fuels for the vast majority of its energy needs (including heating and transport). However, in 2012 renewable energy contributed significantly - just under 14% - of Northern Ireland's electricity needs. The vast majority of this was provided by onshore wind. Compliance with EU Emissions Directives from 2016 is expected to result in the withdrawal of some generation capacity at Ballylumford and place restrictions on generation at the Kilroot plant. Northern Ireland needs to diversify its generation capacity and become less reliant on imported fossil fuels and wind energy has an important role to play in this.

A hedge against fossil fuel price volatility

It is important to consider the potential impact of not fully developing Northern Ireland's renewable energy resource, particularly if the price of fossil fuels continues to rise. A report commissioned by NIRIG in 2012 outlines a diverse generation fleet by 2020 comprising a mix of renewable and nonrenewable generation technologies and NIRIG believes that such a mix will best serve Northern Ireland in the medium to long term as increasing generation from wind reduces the average wholesale electricity within the Single Electricity Market. The scale of this reduction increases as the price of fossil fuel increases.

In the long term, better utilisation of renewable electricity will permit the growth of its overall contribution to energy demand to beyond 40%. Technologies such as electricity storage, increased interconnection, enhanced thermal generation, heat from electricity and electric transport will all help improve the utilisation of Northern Ireland's renewable electricity resources.

Jobs and investment

The development of renewable energy sources in Northern Ireland affords a great economic opportunity. A Deloitte report from 2009 indicates that between 25 and 30% of capital investment in wind generation projects is retained in the local economy[4]. Economic benefit flows to the community through land lease payments, local road upgrades and community funding; to the local District Council through business rates; and to local companies through construction, legal, finance and other professional services.

For example, at a recently constructed wind farm in Northern Ireland, an estimated 120,000 working hours went into construction, equivalent to the creation of 42.6 full-time local construction jobs. At its construction peak, more than 150 people were employed on site, drawn from over 20 locally based suppliers in the engineering, construction and services sectors.

A recent Redpoint study assessed the impacts of NI reaching its 2020 target of 40% electricity from renewable energy sources. At its peak in 2017, it is estimated that close to 2,000 additional jobs will be created in NI – mostly in planning and construction. Once all capacity is installed in 2020, an estimated 584 ongoing jobs will have been created in the sector. Using avoided welfare, with a total of 15,505 'job-years' created, the estimated potential benefit to the NI economy over the 2011-20 period will be around £100m in 2011

4 "Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy" Deloitte/IWEA 2009

terms. With 584 ongoing jobs created by 2020, enduring benefits of up to £2.3m per annum (NPV, in 2011 terms) are estimated[5]

Why Wind Energy?

Onshore wind is crucial to reaching the SEF target because it is cost-effective, efficient, and utilises wind: a readily-available resource that Northern Ireland has in abundance and indeed has among the best in Europe.

Cost-effective

Generation of energy can be broadly categorised as being either expensive machines for converting free or low-cost energy into electrical energy, or else lower cost machines for converting expensive fuels into electrical energy. The evidence demonstrates that wind energy is cost competitive with conventional electricity generation over the lifetime of the plant.[6]

Table 1: Levelised costs of onshore wind in 2012 (UK)[7]

Generation type	£/MWh
Gas CCGT	80
Coal - Advanced Super Critical with Flue Gas Desulphurisation (ASC with FGD)	102
Coal - Integrated Gasification Combined Cycle (IGCC)	122
Onshore wind >5MW	93

Northern Ireland generators all operate within the all-island Single Electricity Market (SEM). Commodity prices are the key determinant of wholesale prices in the SEM, given that the market bidding principles oblige generators to submit bids reflecting the spot price of the underlying commodities (oil, coal, gas and carbon). Gas-fired capacity is expected to remain the dominant fuel type in SEM throughout the next decade, and therefore a rise in the price of gas will have a significant impact on consumer bills. However, with increased wind penetration in the SEM, and particularly if both NI and ROI reach their 40% targets, wholesale electricity costs will reduce – up to 11.5% as outlined in an IWEA-commissioned study carried out in 2011.[8] It is important to note that wind is not driving large rises in household energy bills. In a recent presentation to the ETI Committee (7 June 213) the Utility Regulator noted that tariff changes are largely driven by wholesale and generation cost changes, particularly an increase in the cost of gas.

In order to meet targets for reducing carbon emissions electricity suppliers are required to purchase an increasing number of ROCs (Renewables Obligation Certificates) each year from renewable energy generators. A fine is paid by those suppliers who have not met their obligation, with the revenue being distributed to those who have. Financial support from the government is provided by the administration and regulation by Ofgem. In September 2011 the total recovered for NI was £3.6 million, which represents 0.22% of the total value of the scheme for 2011-12.[9]

5 This is likely to provide a conservative estimate, as it does not take account of the higher income achievable in wind sector employment relative to that provided by welfare payments.

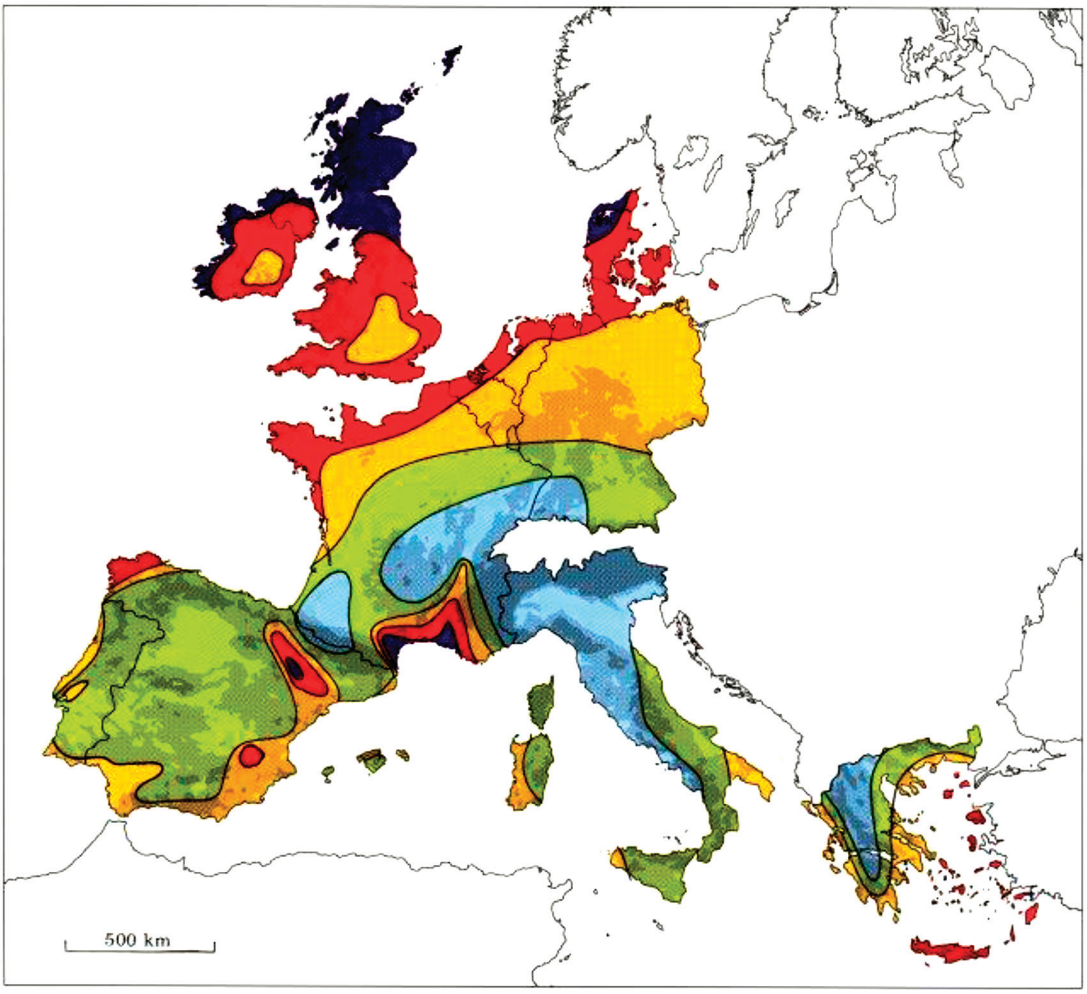
6 Sustainable Development Commission. Wind Power in the UK (http://www.sdcommission.org.uk/data/files/publications/Wind_Energy-NovRev2005.pdf) and DECC. UK generation Costs update: A report by Mott MacDonald

7 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65713/6883-electricity-generationcosts.pdf

8 http://www.iwea.com/contentFiles/Documents%20for%20Download/Publications/News%20Items/Impact_of_Wind_on_Electricity_Prices.pdf?uid=1298912434703

9 https://www.ofgem.gov.uk/ofgem-publications/58143/renewables-obligation-annual-report-2010-11.pdf

Wind atlas of Europe



Wind resources[1] at 50 metres above ground level for five different topographic conditions										
	Sheltered terrain[2]		Open plain[3]		At a sea coast[4]		Open sea[5]		Hills and ridges[6]	
	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0- 8.5	400- 700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400

Good Practice

Further to the energy policies driving increased development and use of renewable energy resources noted above, there are numerous planning policies relevant to wind farm developments in Northern Ireland. We believe that the guidelines in place to are broadly balanced and fit for purpose and have allowed considerable progress to be made towards the SEF targets, while allowing for mitigation of impacts of development. NIRIG members work with communities, policy makers and other stakeholders to inform and deliver responsible wind farm development.

Planning Policy

Key relevant planning policy documents for Northern Ireland include Planning Policy Statements (PPSs), which set out the policies of the DOE on particular aspects of land use planning. These include PPS 1 (General principles), PPS 3 (Revised) Access, Movement and Parking, PPS 6 Planning, Archaeology and the Built Heritage, PPS 15 (planning and flood risk) and PPS 21 Sustainable Development in the Countryside. A key planning policy is PPS18:

Renewable Energy, which sets out DOE's policy for development that generates energy from renewable resources.

Each of the issues noted in Policy RE1 is subject to an assessment or series of assessments to ensure compliance by renewable energy developments and these are captured in the Environmental Statement. An Environmental Impact Assessment will identify and assess the likely environmental effects of the proposed development and establish an appropriate range of mitigation measures in order to reduce adverse impacts where possible and the findings are contained within the Environmental Statement.

The assessments include a Landscape and Visual Impact Assessment, Hydrology Assessment, Geology and Hydrogeology Assessment, Electromagnetic Interference & Aviation assessment, Transport Assessment, Acoustic Assessment, Shadow Flicker Assessment and Health and Safety Assessment. The distance from the nearest occupied dwelling is also taken into account and assessed against the minimum recommended distance. Furthermore, the supplementary planning guidance 'Wind Energy Development in Northern Ireland's Landscapes' is taken into account in assessing all wind turbine proposals as this is based on the sensitivity of Northern Ireland's landscapes to wind energy development.

Landscape and Visual Impacts

In accordance with the EIA Regulations, planning policy and best practice guidance an LVIA will include the identification and objective analysis of the key landscape and visual effects of a wind farm based on professional expertise and impartial judgement. In all instances the assessment will be made through the identification of the most significant effects.

Ecology and Habitat impacts

An Ecological Impact Assessment is based mainly on a study area surrounding the proposed wind farm and associated infrastructure. Identification and evaluation of likely significance of effects associated with the proposed wind farm during construction, operation and decommissioning phases is followed by the recommending of appropriate mitigation measures to avoid and/or reduce the predicted adverse effects of the proposed development on the recorded ecological receptors identified as part of the baseline survey. A Habitat Regulations Assessment (HRA) is required where a project may give rise to likely significant effects upon a Natura 2000 site.

Noise

Within Northern Ireland, noise from wind farms is defined within the planning context by PPS18. Best Practice Guidance to PPS 18 refers to the use of the Department of Trade and Industry's 'The Assessment and Rating of Noise from Wind Farms' - ETSU-R-97. It is considered that the use of ETSU-R-97 as a criterion for assessment of wind farm noise fulfils the requirements of PPS18. The methodology described in ETSU-R-97 was developed by a working group comprised of a cross section of interested persons including, amongst others, environmental health officers, wind farm operators and independent acoustic experts. Based on the advice of planning policy as outlined above a wind farm which can operate within the noise limits which have been derived according to ETSU-R-97 is considered to be acceptable.

More recently, the Good Practice Guide[10] issued by the Institute of Acoustics in May 2013, provides guidance on all aspects of the use of ETSU-R-97 and develops the recommendations of a 2009 Acoustics Bulletin article[11] with regard to propagation modelling and wind shear.

10 http://www.ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf

11 Institute of Acoustics Bulletin Vol. 34 No. 2, March/April 2009 (Institute of Acoustics, 2009)

Human health

Numerous credible peer-reviewed studies and various government reports in the U.S., Canada, Australia and the U.K. refute the claim that wind farms cause negative health impacts. In January 2012 wind energy got a clean bill of health from a panel of independent experts established by the Massachusetts Departments of Environmental Protection and of Public Health[12]. and more recently in May 2013 Simon Chapman, the respected Professor of Public Health at the School of Public Health, at the University of Sydney compiled a list of 19 reviews on health effects of wind farms, nearly all with an "independent" provenance, which have found no evidence that turbines harm people.[13]

Here, the PHA have restated their position that in general, provided established guidance and best practice in relation to placement of wind turbines and mitigation measures is undertaken, there is minimal to no risk to the health of the population associated with wind turbines.

The important thing to remember is this; because wind power displaces emissions of air pollutants and toxic materials like mercury, its effect on public health is strongly positive.

Community Commitment

In January 2012 NIRIG launched a Community Commitment protocol for large-scale onshore wind. These are voluntary schemes set up by developers in recognition of local communities' commitment to accommodating onshore wind farms. They are in turn a commitment by developers to ensure that a proportion of the benefits delivered by these projects are realised within the communities that live near them. Community protocols exist in Wales, England and Northern Ireland. The protocol for England is currently being revised, and NIRIG is also discussing revision of our own protocol.

Community engagement is a key method of interacting with local people in the vicinity of a proposed or operational wind farm. Voluntary pre-application community consultation takes place in a variety of ways, including public exhibitions, leaflets drops, information days, door-to-door meetings, presentations to local Councils and interested groups, advertisements in local papers and more.

In May of this year NIRIG held a workshop with NIEA on peat enhancement and mitigation to promote awareness of good practice on peatland development. We have followed this with a joint trip to visit examples of good practice of peatland development. We also hold an annual NIRIG planning seminar, which is an opportunity for Councillors, planners and interested stakeholders to learn about different aspects of renewable energy development and visit a wind farm. The next seminar takes place in Strabane on 12th September and more than 85 people have registered for this free event.

Conclusion

NIRIG is keen to promote and share the principles of responsible development and hopes to continue to work with all stakeholders in achieving our Strategic Energy Framework targets and beyond. We believe that Northern Ireland has an ambitious and achievable Strategic Energy Framework and as an industry we are fully committed to achieving the targets set out within it. The wider UK, Ireland and European trajectory is towards increasing electricity generation from renewable sources and Northern Ireland has some of the best renewable resources in Europe. We cannot afford to be complacent about the development of these resources.

12 http://www.mass.gov/dep/energy/wind/impactstudy.htm

13 http://tobacco.health.usyd.edu.au/assets/pdfs/publications/WindHealthReviews.pdf

NIRIG briefing note on Wind Turbine Noise

SINCLAIR KNIGHT MERZ

SKM

Northern Ireland Assembly
Environment Committee
Evidence Session 12th September 2013

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Contents

1. Introduction

This briefing note on wind turbine noise aims to provide an introduction to the subject for the members of the Northern Ireland Assembly Environment Committee, and to provide references for them to consult should they wish to research the subject further. This note has been prepared by SKM Enviros Ltd on behalf of the Northern Ireland Renewables Industry Group (NIRIG).

Whilst every effort has been made to make this briefing note clear and concise, acoustics is a branch of physics and the use of technical terms is unavoidable. To aid readers without a background in acoustics, the format used is that of 'frequently asked questions' and all technical terms are explained.

2. Are wind turbines noisy?

In common with many other machines, wind turbines do produce some noise, although they are designed to operate quietly. Wind turbine noise is generated by two different types of noise source:

- **Mechanical noise** – caused by the rotating parts such as the gearbox, and reduced to negligible levels for modern turbines due to the acoustic insulation of the nacelle (or hub).
- **Aerodynamic noise** – caused by the blades passing through the air, and increases with wind speed up to a certain point.

The Best Practice Guidance which accompanies Planning Policy Statement 18 (PPS 18) provides indicative noise levels for wind turbines and everyday activities (see paragraph 1.3.43 and Table 1):

- *A wind farm at 350m would result in a noise level of 35-40dB(A),*
- *A quiet bedroom would be 35dB(A)*
- *A car at 40mph at 100m would be 55dB(A)*

When considering wind turbine noise it is useful to place the noise levels experienced by wind farm neighbours in the context of the wider population. The UK National Noise Incidence Study 2000/2001 carried out by the Building Research Establishment (BRE) for the Department for the Environment, Food and Rural Affairs (DEFRA) and the Devolved Administrations, found that:

- 67% of the population experienced noise levels above 45dB(A) at night
- 54% of the population experienced noise levels above 55dB(A) during the day

The majority of the UK population experience noise levels in excess of those associated with wind farms.

Further information:

- Planning and Environmental Policy Group (2009) Planning Policy Statement 18 Renewable Energy. Department of the Environment Northern Ireland. http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18__renewable_energy.pdf
- Planning and Environmental Policy Group (2009) Best Practice Guidance to Planning Policy Statement 18 Renewable Energy. Department of the Environment Northern Ireland. http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18__renewable_energy__best_practice_guidance.pdf
- Skinner C and Grimwood C (2002) The UK National Noise Incidence Study 2000/2001. Noise Forum Conference 20 May 2002. http://www.bre.co.uk/pdf/NIS.pdf

3. How are the noise effects of wind turbines assessed?

Throughout the UK the effects of wind turbine noise are assessed in accordance with a document published in 1996 by the Energy Technology Support Unit of the former Department of Trade and Industry entitled *'The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)'.*

This document was put together by a working group which included representatives from the fields of acoustics, environmental health and the wind energy industry. Its aim is to offer an assessment framework which:

- *offers a reasonable degree of protection to wind neighbours,*
- *without placing unreasonable restrictions on development,*
- *or adding unduly to administrative burdens of local authorities.*

The Best Practice Guidance to PPS18 states that the ETSU-R-97 methodology:

'should be used in the assessment and rating noise from wind energy developments'.

The noise limits ETSU-R-97 puts forward are related to background noise levels measured in the area around the proposed wind farm. Since background noise levels vary with wind speed, and turbine noise levels also vary with wind speed, ETSU-R-97 sets out noise limits which also vary with wind speed. Wind speeds can vary with height above ground level. For ease of comparison, ETSU-R-97 recommends the use of wind speeds at 10m above ground level.

Separate noise limits are normally proposed for daytime and night-time. A single set of noise limits (derived from an analysis of the combined day and night data) can be set if it is agreed by the developer and local planning authority that the background noise levels are similar during the day and night time periods. The noise limits apply to total wind turbine noise at a residential property i.e. to cumulative noise levels from all wind farms in the area.

Further Information:

- DTI (1996) 'The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)' https://www.dropbox.com/sh/3g5h5trluqjmvat/f7zyWutab0/Reference%20Documents/ETSU-R-97%20-%20SEARCHABLE.pdf

4. Why are night-time noise limits sometimes higher than daytime noise limits?

Both daytime and night-time noise limits are based on a level of 5dB(A) above the existing background noise levels. To put this into context, a 3dB(A) increase is generally considered to be the minimum perceptible change in a steady, non-mobile noise source, whereas a 10dB(A) increase would be subjectively considered a doubling of noise levels. The background noise level is characterised by the L_{A90} parameter and is the noise levels which is exceeded for 90% of the time, i.e. it represents the quietest 10% of the time period of interest.

The noise limits for the daytime period are derived from background noise levels during the evenings and weekends (known as the amenity hours), to avoid undue influence from noise created during the working day.

According to ETSU-R-97, in low noise environments, a level of 5dB(A) above background would be:

'unduly restrictive on developments recognised as having wider national and global benefits'

Therefore, a fixed lower limit applies, which represents the minimum noise limit recommended by ETSU-R-97. These are:

- Daytime – L_{A90} 35-40dB
- Night-time – L_{A90} 43dB

Both sets of noise limits apply to outdoor locations. The night-time fixed lower limit is higher than that for the day, since local residents will be indoors and some additional protection is provided by their houses, even when windows are open. The night-time noise limits have been set with an emphasis of preventing sleep disturbance. The daytime noise limits have been set to protect the amenity of residents' outdoor areas, but the choice within the 35-40dB(A) range provided can be influenced by the number of dwellings affected, the energy being generated by the wind farm, and the duration and level of noise exposure.

Further Information:

- DTI (1996) 'The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)' https://www.dropbox.com/sh/3g5h5trluqjmvat/f7zyWutab0/Reference%20Documents/ETSU-R-97%20-%20SEARCHABLE.pdf

5. Do night-time noise limits exceed WHO guidelines?

The ETSU-R-97 noise limits are consistent with the WHO Guidelines for Community Noise published in 1999.

The more recent WHO Night Noise Guidelines (NNG) for Europe (2009) are based on a different noise descriptor and are not therefore directly comparable to the ETSU-R-97 noise limits. The NNG is an average of night time noise levels over a year, whilst the ETSU noise limits are maximum noise levels. Since wind turbine noise is influenced by wind speed and direction, noise levels will only be close to the noise limits for a proportion of the year, with turbine noise levels well below the limits on other occasions.

Further Information:

- Berglund B, Lindvall T, Schwela D (eds) (1999) Guidelines for Community Noise. World Health Organisation. http://www.who.int/docstore/peh/noise/guidelines2.html
- World Health Organisation Europe (2009) Night Noise Guidelines for Europe. http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf

6. Is the ETSU-R-97 methodology still relevant to modern wind turbines?

The ETSU-R-97 methodology is recommended by the Best Practice Guidance to PPS18, which remains extant policy.

The application of the ETSU-R-97 assessment methodology has recently been reviewed by the Institute of Acoustics (IoA), at the requested of the Department for Energy and Climate Change (DECC). In May 2013, the IoA published the document *'A Good Practice Guide to the Application of ETSU-R-97 For the Assessment and Rating of Wind Turbine Noise'*. Whilst the review of the noise limits proposed by ETSU-R-97 was excluded from the scope of the Good Practice Guide (GPG), it does provide recommendations on the following topics:

- **Engagement** - with stakeholders including Environmental Health Officers and local residents.
- **Monitoring of background noise levels** – choice of monitoring location and duration and timing of survey.
- **Measurement of wind speed** – includes advice on dealing with the issue of wind shear, where wind speeds at height can be higher than those measured at 10m in accordance with ETSU-R-97.
- **Data Analysis and Noise limit derivation** – ensuring the noise limits are based on typical and representative background noise levels.

- **Predictions of turbine noise** – sets out a calculation methodology and recommends certain data inputs to ensure realistic predictions of turbine noise levels.
- **Cumulative noise issues** – provides advice on the apportionment of the ETSU-R-97 noise limits between wind farms.
- **Planning Conditions** – an example planning condition is provided which addresses noise limits, recording keeping, complaint response requirements, and compliance monitoring.

The GPG has been endorsed by the DECC, the Scottish and Welsh Governments. The Department for the Environment in Northern Ireland has acknowledged receipt of the document, but have yet to comment on it.

Further Information:

- Cand M, Davis R, Jordan C, Hayes M, Perkins R (2013) A Good Practice Guide to the Application of ETSU-R-97 For the Assessment and Rating of Wind Turbine Noise. Institute of Acoustics. http://www.ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf
- Press release with links to Government endorsements: http://www.ioa.org.uk/about-us/news-article.asp?id=272

7. What is wind shear and how does it affect noise levels?

Wind shear describes how wind speed varies with height above the ground. This variation is affected by ground roughness and atmospheric conditions, with atmospheric conditions in turn varying by day and night. Generally, wind speeds increase with height above ground level, but the rate of this increase is determined by the level of wind shear. A low level of wind shear means that the wind speed at the hub height of the turbines is not much greater than that near the ground, whereas a high level of wind shear means that the wind speed at hub height is significantly greater than that near the ground.

Turbine noise emission data are published referenced to a wind speed at 10m, but assume a 'standard' level of wind shear. The question then arises, what if the level of wind shear at a particular site is different to that assumed by the turbine manufacturers? For example, if the wind speed at 10m height is 8m/s, the hub height wind speed could be approximately 10m/s at a site with 'standard' wind shear. At another site with a particularly high level of wind shear, the wind speed at hub height could be greater than 10m/s. Since noise emissions of turbines depend on the hub height wind speed, noise emissions at sites with high wind shear could be greater than suggested by turbine noise emission data for a given wind speed.

It is important to note that sites with high wind shear do not increase the maximum level of noise emissions from a turbine, but it does alter the wind speed at 10m at which those maximum noise levels occur.

This issue is addressed by the IoA GPG, which includes recommendations on the measurement of wind speeds. In the section on background data collection it states that:

'Noise measurements should be correlated with values of standardised 10 metre wind speed, calculated from hub height wind speed'

Three methods of determining the hub height wind speeds are provided by the GPG. Assessments conducted in accordance with the GPG will therefore take wind shear effects into account.

Further Information:

- Cand M, Davis R, Jordan C, Hayes M, Perkins R (2013) A Good Practice Guide to the Application of ETSU-R-97 For the Assessment and Rating of Wind Turbine Noise. Institute of Acoustics. http://www.ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf

8. Do wind turbines cause high levels of low frequency noise?

Low frequency noise is often defined as noise having a frequency of up to 200Hz. Sources of low frequency noise include rivers, waterfalls, the wind, road traffic and aircraft.

When it is generated, wind turbine noise is broadband i.e. it contains noises over a range of different frequencies. As for all noise sources, higher frequencies attenuate more quickly with distance, so as the distance from the turbine increases, the proportion of low frequency noise increases. Similarly, a building envelope will attenuate higher frequencies to a greater degree, hence why when a neighbour is playing music next door, the bass is more noticeable in your home.

A 2006 study undertaken by Hayes Mackenzie Partnership on behalf of the DTI measured noise levels at three wind farms sites and concluded that whilst low frequency noise levels where measurable on occasion, levels were below the internal night-time DEFRA guidelines.

Further Information:

- The Measurement of Low Frequency Noise at Three UK Wind Farms, Contract Number W/45/00656/00/00, URN Number 06/1412, 2006, Hayes McKenzie Partnership Limited for DTi

9. What is infrasound and is it associated with wind turbines?

Infrasound is defined as noise occurring at frequencies below that at which sound is normally audible, i.e. less than approximately 20Hz. However, infrasound can be heard and felt at very high noise levels, over approximately 100dB(A). Sources of infrasound include waves on a beach, rapids in a river, and transportation including cars, aircraft and trains.

The 2006 study by the Hayes Mackenzie Partnership concluded that infrasound from modern wind turbines was below recognised thresholds of perception, and based on WHO information there was no reliable evidence that it could be injurious to health.

Geoff Leventhall, author of a DEFRA review of research on low frequency noise and its effects, has stated that there is no significant infrasound from current designs of wind turbines.

Further Information:

- The Measurement of Low Frequency Noise at Three UK Wind Farms, Contract Number W/45/00656/00/00, URN Number 06/1412, 2006, Hayes McKenzie Partnership Limited for DTi

10. Can wind turbines cause vibration?

A 1997 study for the DTI concludes that vibration on the wind farm site itself was below levels set for people working in precision laboratories.

The authors of a Keele University study carried out for the DTI, the British Wind Energy Association and the Ministry of Defence have stated that there is no possibility of humans sensing the vibration generated by wind farms.

Further Information:

- ETSU (1997) Low frequency noise and vibrations at a modern wind farm' (ETSU W/13/00392/REP)
- Styles P, Stimpson I, Toon S, England R and Wright M, (2005) Recommendations on the Siting of Windfarms in the Vicinity of Eskdalemuir, Scotland. Available at: http://www.keele.ac.uk/geophysics/appliedseismology/wind/Final_Report.pdf

PAGE 7

11. What is Amplitude Modulation?

This is commonly described as the 'blade swish' characteristic of wind turbine noise. The noise generated by a turbine blade varies as it turns through a full rotation, and is greatest when in the 3 o'clock position. The blade swish is most noticeable in close proximity to turbines, but normally becomes less distinct at typical residential distances. ETSU-R-97 acknowledges that all turbines exhibit blade swish to a certain extent, and the noise limits take this into account.

At a small number of sites, the blade swish is more pronounced that usual. This is sometimes called 'other' or 'excess' amplitude modulation (OAM or EAM). A report carried out by Salford University in 2007 on behalf of DEFRA, the Department for Business, Enterprise and Regulatory Reform (BERR) and the Department for Communities and Local Government (CLG) identified the following:

- Amplitude modulation was a definite factor in complaints at 4 of the 133 sites operational at the time
- Conditions associated with AM occurred at these sites for 7-15% of the time.

The causes of EAM/OAM have not been conclusively proven, although some authors have put forward certain risk factors. Thus it is not possible at present to predict when any EAM/OAM will occur, or its severity should it occur.

Planning conditions have been proposed to guard against the effects of EAM/OAM, such as those at Swinford and Den Brook Wind Farms. However these have been criticised for being imprecise, un-necessary or failing to detail a validated method of assessing the impact significance. Some Planning Inspectors (such as those for Wadlow, Spaldington Common and Airfield, Kelmarsh and Watford Lodge) have concluded that a planning condition to protect against EAM/OAM is not appropriate for varying reasons including:

- The subject is not one that in the present state of knowledge , can be suitably safeguarded against by planning condition
- That the condition proposed could lead to false positives
- EAM condition would fail planning tests

According to the IoA GPG:

'The evidence in relation to "Excess" or "Other" Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM'

Renewable UK have commissioned further research into this area, which is currently ongoing.

Further Information:

- Research into Aerodynamic Modulation of Wind Turbine Noise: Final report, Contract number NANR233, July 2007, University of Salford for DBERR. Available at http://usir.salford.ac.uk/1554/1/Salford_Uni_Report_Turbine_Sound.pdf

12. Are there any health effects associated with exposure to wind turbine noise?

Reports of various health effects allegedly associated with wind turbine noise can be found on the internet. The term 'wind turbine syndrome' has been used by some authors to describe a range of symptoms which they attribute to exposure to wind turbine noise. Several reviews of the literature examining a possible link between wind turbine noise and health have been undertaken. Three key reviews are summarised briefly below:

a) **Colby et al 2009** - Authors were a panel of medical doctors, audiologists and acousticians which concluded:
- There is no evidence that audible or subaudible turbine noise has any direct adverse physiological effects
- Ground-borne vibrations are too weak to be detected by humans
- Noise from turbines is not unique – there is no reason to believe turbine noise could have direct adverse health effects

b) **Massachusetts Departments of Environmental Protection and Public Health (2012)** – the panel of medical sleep specialists, engineer, environmental and public health experts concluded:
- There is no evidence for Wind Turbine Syndrome

c) Professor Chapman et al , University of Sydney (2013)
- 18 reviews of the research literature on wind turbines and health all concluded evidence for turbines being directly harmful to health is poor.

As with any other audible noise source, some individuals will experience annoyance on hearing wind turbine noise. This level of annoyance can be influenced by a number of factors, (such as attitude to the noise source, visual impacts experienced etc) of which the noise level experienced is just one. Annoyance can lead to increased stress levels, which in turn can result in health effects including sleep disturbance. However, wind turbines are not unique in causing annoyance, with many sources of environmental noise (including transportation and industrial and agricultural noise sources) causing annoyance for a certain number of individuals.

Further Information:

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- Chapman S, St George A, Walker K, Cakic V, (2013) Spatio-temporal differences in the history of health and noise complaints about Australian wind farms: evidence for the psychogenic, "communicated disease" hypothesis. Available at:
- http://waubrafoundation.org.au/wp-content/uploads/2013/07/Spatio-temporal-differences-in-the-history-of-health-noise-complaints.pdf
- Colby D, Dobie R, Leventhall G, Lipscomb D, McCunney R, Seilo M, Sonergaard B (2009) Wind Turbine Sound and Health Effects An Expert Panel Review. Available at: http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf
- Ellenbogen J, Grace S, Heiger-Bernays W, Manwell J, Mills D, Sullivan K, Weisskopf M,(2012) Wind Turbine Health Impact Study: Report of Independent Expert Panel. Prepared for Massachusetts Departments of Environmental Protection and Public Health. http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

13. Conclusion

The ETSU-R-97 assessment methodology remains in common use for the assessment of wind turbine noise. It is referred to by extant policy or guidance documents in Northern Ireland and other areas of the UK, and has been upheld at numerous Planning Inquiries.

Research into low frequency, infrasound, vibration and amplitude modulation has been undertaken, and turbine noise is generally considered to be broadband in nature, not dominated by low frequency noise or result in perceptible levels of infrasound or vibration. Amplitude modulation is taken into account by the ETSU-R-97 guidelines, with occurrences of excess amplitude modulation being rare. Evidence linking health effects with wind turbine noise exposure is far from conclusive, with reviews by expert panels concluding there is insufficient evidence of any direct physiological effects.

Robust noise conditions are available to protect the amenity of local residents, with the noise limits recommended by ETSU being consistent with relevant WHO guidelines on sleep disturbance.

NIRIG follow up information from briefing on 12th September 2013

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Sean McCann
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27th September 2013

Dear Sean,

The Northern Ireland Renewables Industry Group (NIRIG) is a joint collaboration between the Irish Wind Energy Association and RenewableUK. NIRIG represents the views of the large and small scale renewable electricity industry in Northern Ireland, providing a conduit for knowledge exchange, policy development support and consensus on best practice between all stakeholders.

Please find attached references to the surveys and reports we referred to during our presentation to the Environment Committee on 12th September 2013. Given the level of interest in noise we are also attaching a separate briefing note on this issue. We hope that these are useful.

The Centre for Sustainable Energy also published a very useful reference document in May 2011 *'Common Concerns about Wind Power'* which addresses many of the public concerns about wind power. This document can be found at the link below:

http://www.cse.org.uk/pdf/common_concerns_about_wind_power.pdf

We welcomed the opportunity to present to the Committee and we are keen to continue the discussion on a sustainable energy future for Northern Ireland.

If we can be of any further help, please let me know.

Yours,

**sent by email, no signature required*

Meabh Cormacain
NIRIG

IWEA Irish Wind Energy Association | renewableUK | NIRIG is a collaboration between the Irish Wind Energy Association and RenewableUK

Tourism

- The Scottish Government commissioned a report into The Economic Impact of Wind Farms on Tourism in Scotland (2008)
  http://www.scotland.gov.uk/Resource/Doc/214910/0057316.pdf
- In 2011, VisitScotland commissioned omnibus research to learn more about UK consumer attitudes to wind farms, in order to inform VisitScotland policy:
  http://www.visitscotland.org/pdf/Revised%20Oct%2012%20%20Insights%20Wind%20Farm%20Topic%20Paper.pdf

Separation distances

- The Department for Communities and Local Government published planning practice guidance for renewable and low carbon energy in July 2013
  https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225689/Planning_Practice_Guidance_for_Renewable_and_Low_Carbon_Energy.pdf

An excerpt states:

> *"16. Local planning authorities should not rule out otherwise acceptable renewable energy developments through inflexible rules on buffer zones or separation distances. Other than when dealing with set back distances for safety, distance of itself does not necessarily determine whether the impact of a proposal is unacceptable. Distance plays a part, but so does the local context including factors such as topography, the local environment and nearby land uses. This is why it is important to think about in what circumstances proposals are likely to be acceptable and plan on this basis."*

- In Scotland there is currently a consultation on Scottish Planning Policy (SPP). Current SPP gives guidance to local authorities to consider a buffer zone of 2km between settlements and areas of search. Areas of Search are part of guidance that local authorities give in their local development plans. It is perfectly acceptable to develop a windfarm outwith an area of search – and many consented sites under SPP are considerably closer than 2km. The current consultation proposes a new policy of 2.5km between settlements identified in the local development plan and windfarms. This is only a consultation at the moment and we will not see a new policy until June next year

Legality of wind farm developments

On 27 August 2013, an article published in the Independent claimed that the recent ruling of the United Nations in respect of the UK's NREAP calls into question the legal validity of any further planning consent for all future wind farm developments. We note the following:

- The current ruling only concedes that the National Renewable Energy Action Plan (NREAP) should have been consulted on in line with the Aarhus Convention, instead of the weaker requirements set out in the Renewable Energy Directive. Similar claims of non-compliance with the Convention made against other policies and plans (particularly those related most closely to planning decisions) were thrown out.
- The recommendation of the ruling merely states that future NREAPs should be consulted on in line with the Convention's detailed requirements.
- Because of the previous ruling, the EU is already thinking about how to implement the changes that the current ruling calls for. Nothing else falls out of it, and if anything, some useful clarification is provided on other matters (e.g. that the Scottish planning policies noted and planning process were deemed to be in compliance with the Convention, and that the requirement to have regard to views expressed as part of consultation does not amount to a right to veto).

- A link to a briefing paper on the ruling http://www.eversheds.com/global/en/what/articles/index.page?ArticleID=en/Energy/UN_ruling_wind_farm_developments_130910
- The full paper trail for the case: http://www.unece.org/env/pp/compliance/compliancecommittee/68tableeuuk.html

Embrace Wind

- Action for Renewables was developed by RenewableUK in 2005 as the Embrace Wind campaign, as a public facing campaign to increase and demonstrate public support for wind energy. In 2011 the campaign was renamed Action for Renewables in order to place wind within the wider context of all renewable energy sources and facilitate future work with other energy sources.
- Action for Renewables helps ordinary members of the public demonstrate their support for renewable energy http://www.actionforrenewables.org/

Noise

- Please find attached a briefing note from SKM which cites a series of reports on noise and noise-related issues

Electricity prices

- The NI Utility Regulator in June 2013 stated to the ETI Committee that recent rises in consumer bills in NI were caused by the rise in the price of gas http://www.niassembly.gov.uk/Assembly-Business/Official-Report/Committee-Minutes-of-Evidence/Session-2012-2013/June-2013/Electricity-Prices-Briefing-from-the-Utility-Regulator/
- A Committee for Climate Change report showed that UK energy bills doubled between 2004-11 and less than 7% of this rise was caused by low-carbon support, with 85% caused by rising gas prices. http://www.theccc.org.uk/news-stories/low-carbon-policies-provide-insurance-againstrisk-of-high-costs-of-unabated-gas-fired-generation-13-december-2012/
- A Redpoint study for IWEA in 2011 suggests an Ireland-wide decrease in wholesale electricity price by 2020 if our 40% targets are reached. http://www.iwea.com/contentFiles/Documents%20for%20Download/Publications/News%20Items/Impact_of_Wind_on_Electricity_Prices.pdf?uid=1298912434703
- An EirGrid recommendations paper in May 2013 outlines that higher levels of installed wind capacity, combined with enhanced operational capabilities, lead to a reduction in market production costs and, through lower curtailment levels, a reduction in constrained production costs (which determine Dispatch and Balancing Costs). When these two reductions are combined to give the total production cost reduction, the annual net benefit to the all island system is €295m. http://www.eirgrid.com/media/SS_May_2013_TSO_Recommendations_Paper.pdf -

Community acceptance

- We would also like to point to research published in Northern Ireland in 2012, which found that respondents in the location of an operational and proposed wind farm site were generally strongly in favour of energy generation by renewable technologies, including wind power. The majority of respondents from both areas also considered wind turbines to be an effective method of generating electricity.

- The findings state that that the presence of wind turbines had little impact on resident's perception of their neighbourhood as both proposed and operational sites rated their area as 'good' or 'very good'.
- At the operational site respondents within 3km of the wind farm reported, in an average of 85.6% of cases, that they were not affected at all by the wind farm, in relation to the issues of main concern: visual impact, damage to the environment and negative impact on property prices
http://www.cieh-nireland.org/assets/0/72/130/234/264/2c5b43d7-6149-4bb0-a0d7-83609c88bab1.pdf

NIRIG response re correspondence from Windwatch

2013 09 27 3. NIRIG response to Environment Committee regarding correspondence from Windwatch

NIRIG
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27 September 2013

Dear Anna,

The Northern Ireland Renewables Industry Group (NIRIG) is a joint collaboration between the Irish Wind Energy Association and RenewableUK. NIRIG represents the views of the large and small scale renewable electricity industry in Northern Ireland, providing a conduit for knowledge exchange, policy development support and consensus on best practice between all stakeholders.

NIRIG rejects the allegations made in the correspondence forwarded by the Environment Committee on 13th September 2013 from Wind Watch. We suggest that the correspondent may not be aware of a significant body of credible evidence that addresses these issues. Further information on the key areas cited by the group is outlined below.

We would also like to reference the findings[1] made public by the IPCC today. This report states that scientists are 95% certain that humans are the "dominant cause" of global warming since the 1950s. The panel warns that continued emissions of greenhouse gases will cause further warming and changes in all aspects of the climate system and to contain these changes will require "substantial and sustained reductions of greenhouse gas emissions".

Economics of wind energy

The MATRIX Sustainable Energy Horizon Panel report 2013[2] states that approximately 500 companies in NI are active in the sustainable energy supply chain of the wind, bioenergy, marine and integrated building technologies sectors. DECC figures demonstrate that between April 2011 and July 2012 £230m was invested in renewables in NI, with the creation of 887 jobs.[3]

1 http://www.ipcc.ch/report/ar5/wg1/#.UkWukn94R1Z

2 http://www.matrix-ni.org/#/sustainable-energy/4571128041

3 http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored/oredjobs/oredjobs.aspx#

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The wind industry in the UK was estimated to directly employ 12,242 people as of April 2012[4]. The industry also supports employment along the supply chain, such as in construction and transportation. The wind industry in the Republic of Ireland is estimated to directly employ more than 3,000 people as of September 2013.

Research commissioned by Government and industry in 2012 showed that the local economy benefitted by £100,000 for each Megawatt of installed capacity.[5] [6] Whilst the wind industry is responsible for significant investment and jobs[7], its primary purpose is to create energy.

All forms of energy generation receive government support and the support provided to the renewables sector is particularly transparent.

House prices

There is no evidence in the UK or Ireland demonstrating a link between proximity of wind farms and house value. A comprehensive report[8] published in America in September 2013 collected data from 51,276 house sales, closer to wind turbines than previous studies. They compared house values, as measured by sale price, before and after the announcement of a proposed nearby wind farm, and before and after construction: *"Regardless of model specification, we find no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/preconstruction periods."*

It should be noted that the Advertising Standards Authority recently ruled[9] that a claim made by an anti-wind farm group (that proximity to wind farms caused house prices to fall) was misleading and could not be substantiated.

Electricity bills

Again the evidence is clear and a clear advantage of wind power is that it is in particular a hedge against fossil fuel price increases. A Committee for Climate Change report[10] showed that UK energy bills doubled between 2004-2011 and less than 7% of this rise was caused by low-carbon support, with 85% caused by rising gas prices.

A Redpoint study commissioned by IWEA in 2011 suggests an Ireland-wide 11.5% decrease in wholesale electricity price by 2020 if our 40% targets are reached.[11]

An EirGrid recommendations paper in May 2013[12] outlines that higher levels of installed wind capacity, combined with enhanced operational capabilities, lead to a reduction in market production costs and, through lower curtailment levels, a reduction in constrained production costs (which determine Dispatch and Balancing Costs). When these two reductions are combined to give the total production cost reduction, the annual net benefit to the all-island system is €295m.

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4 http://www.renewableuk.com/en/publications/reports.cfm/SOI2012

5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48359/5229-onshore-wind-direct–wider-economic-impacts.pdf

6 http://www.renewableuk.com/en/publications/index.cfm/BiGGAR

7 http://www.renewableuk.com/en/publications/reports.cfm/Working-for-a-Green-Britain-Volume-2

8 http://emp.lbl.gov/publications/spatial-hedonic-analysis-effects-wind-energy-facilities-surrounding-property-values-uni

9 http://www.asa.org.uk/Rulings/Adjudications/2013/7/Stop-Grange-Farm-Wind-Farm/SHP_ADJ_201148.aspx

10 http://www.theccc.org.uk/news-stories/low-carbon-policies-provide-insurance-against-risk-of-high-costs-of-unabatedgas-fired-generation-13-december-2012/

11 http://www.iwea.com/contentFiles/Documents%20for%20Download/Publications/News%20Items/Impact_of_Wind_on_Electricity_Prices.pdf?uid=1298912434703

12 http://www.eirgrid.com/media/SS_May_2013_TSO_Recommendations_Paper.pdf -

Tourism

In 2008, the Scottish Government released The Economic Impacts of Wind Farms on Scottish Tourism[13] which concluded that the effects of wind farms are so small that, provided planning and marketing are carried out effectively, there is no reason why the two are incompatible.

A 2011 Visit Scotland[14] survey showed that for 80% of UK respondents the presence of a wind farm would not affect their decision about where to visit or where to stay on a UK holiday or short break.

An NITB survey[15] in August 2011 concluded that tourists on the whole seem generally positive or neutral to the prospect of wind farm development and less than 5% of domestic (NI) tourists said that they would be discouraged from returning to an area that had wind farms.

Health

Numerous credible peer-reviewed science and various government reports in the U.S., Canada, Australia and the U.K. refute the claim that wind farms cause negative health impacts. Northern Ireland's Public Health Agency advises that in general, provided established guidance and best practice in relation to placement of wind turbines and mitigation measures is undertaken, there is minimal to no risk to the health of the population associated with such facilities. A fuller briefing note is attached.

Community benefit schemes

Community benefit schemes are not material planning considerations. They are voluntary schemes set up by developers in recognition of local communities' commitment to accommodating onshore wind farms and are a commitment by developers to ensure that a proportion of the benefits delivered by these projects are realised within the communities that live near them.

The wind industry is a leader in the development of such protocols and NIRIG members have committed to and are delivering tens of thousands of pounds to support a range of community initiatives including energy efficient measures in community halls, schools and clubs such as solar lighting, insulation and double glazing, environmental projects, traffic calming measures near schools, childcare, tourism, classes, sports and youth groups.

Birds

A 2002 study demonstrated that for every 10,000 bird deaths, less than one is caused by a wind turbine. The American Bird Conservancy[16] notes that wind turbines kill just 0.088% of the 500 million birds killed each year by pet cats in the US.

A status report[17] compiled for WWF finds a clear and escalating pattern of climate change impacts on bird species around the world, suggesting a trend towards bird extinction from global warming. Wind energy plays an important role in the mitigation of climate change.

13 http://www.scotland.gov.uk/Resource/Doc/214910/0057316.pdf

14 http://www.visitscotland.org/pdf/Revised%20Oct%2012%20%20Insights%20Wind%20Farm%20Topic%20Paper.pdf

15 Windfarms and Off Shore Windfarms August 2011, NITB

16 https://web.duke.edu/nicholas/bio217/ptb4/avian.html

17 http://wwf.panda.org/about_our_earth/aboutcc/problems/impacts/species/cc_and_birds/

Rare earth

EWEA research[18] shows the European wind industry would use 0.81% of world supply of neodymium in 2020, 0.95% of world supply of dysprosium in 2020, and 0.35% of world supply of neodymium in 2030 and 0.41% of world supply of dysprosium in 2030.

Legality of wind farms

On 27 August 2013, an article published in the Independent claimed that the recent ruling of the United Nations in respect of the UK's NREAP calls into question the legal validity of any further planning consent for all future wind farm developments. The NREAP is a wider Government document setting out the UK's strategy for reaching its 2020 renewable energy target and is not a planning document. Therefore, the fact that this has been challenged has no relevance with regard to the legality of planning decisions on existing or future wind farm projects. The ruling only applies to the extent that future NREAPs should be consulted on in line with the requirements of the Convention. There has been no successful challenge made against the content of the existing NREAP itself. The NREAP was compliant with the Convention at the time of publication.

Wind cuts carbon

According to the National Grid, between April 2011 and September 2012 electricity generated by wind farms in the UK reduced the requirement for electricity from other sources by 23,707 GWh (Gigawatt hours), resulting in an estimated 10.9 million tonnes less CO2 being emitted.[19]

It has been argued that because wind is variable, more carbon is emitted overall as the grid must rely on carbon-intensive coal and gas to cover any shortfall when the output from wind falls. National Grid found this effect reduced the 10.9m tonnes of carbon saved by wind by just 0.081%, or 8,800 tonnes.

NIRIG is strongly of the opinion that the debate on any policy issue in Northern Ireland must be based on credible peer-reviewed evidence.

I hope that this is useful and we welcome the continued support from the Environment Committee for an appropriate and sustainable energy policy for Northern Ireland.

Yours sincerely,

Meabh Cormacain

NIRIG

18 http://image.exct.net/lib/fe7815707466067d7515/m/1/Rare+Earth+EWEA+response+to+JRC+rare+earth+report+.pdf

19 http://www.scottish.parliament.uk/S4_EconomyEnergyandTourismCommittee/NATIONAL_GRID.pdf
http://www.guardian.co.uk/environment/blog/2012/sep/26/myth-wind-turbines-carbon-emissions

DETI response to written evidence from Omagh and Strabane District Councils

8 October 2013

Sheila Mawhinney
Environment Committee Clerk
Room 416
Parliament Buildings
Ballymiscaw
Stormont
Belfast BT4 3XX

Dear Sheila

Wind Energy – Comments on Written Evidence Provided by Strabane and Omagh District Councils' Joint Working Group on Wind Energy

Thank you for your letter of 28 June asking for this Department's comments on the written evidence submitted to your Committee by the Strabane and Omagh District Councils' Joint Working Group on Wind Energy.

As that Working Group is aware, the Departments of Enterprise, Trade and Investment, Environment and Agriculture and Rural Development have already commissioned a report on communities and renewable energy. The work is now complete and has been published on the DETI website http://www.detini.gov.uk/communities_and_renewable_energy.pdf.

The report covers many of the issues raised by the working group's evidence paper: the need to take into account the recent and pending Department of Energy and Climate Change (DECC) work on communities and energy; community benefit levels in Northern Ireland and need for a community benefits register; the need for best practice guidelines for the way renewable energy developers engage with communities; the potential to explore opportunities for funding community energy projects; and improving the capacity of communities to deal with issues raised by development of renewable energy.

I should emphasise that the recommendations have not been accepted at this stage. The Departments involved in commissioning the report plan, as recommended by the report, to await the outcome of a DECC consultation on Community Energy, expected later in the autumn, and to formulate a draft action plan to implement the recommendations of the report and to consult on this.

It is important to note that the Community and Renewable Energy report does not make a recommendation or requirement for certain levels of community benefit in Northern Ireland as it would be inappropriate for Government to do so. This is because it would then have a mandatory element which could be interpreted as a tax, and the devolution of such powers in Northern Ireland is complex.

The written evidence from the Strabane and Omagh joint working group rightly points out that Renewables UK plans to offer £5k/MW community benefit for onshore wind-farms in England. DETI understands that this will be for new wind-farms entering the planning system from now on, so is unlikely to be felt at a practical level for some years. You will note that the statement from the DECC does not require Renewables UK to do this, no doubt because of concern that it would be inappropriate to do so.

The DETI Minister has now written to Northern Ireland Renewables Industry Group (NIRIG) to ask them to review their current protocol in the light of this development, with a view to matching the Renewables UK commitment for England.

Where the written evidence from the Strabane and Omagh Joint Working Group touches on issues of planning policy, planning guidance, trans-boundary issues, biodiversity, environmental health, noise issues, landscape heritage, Area Plan for West Tyrone, PPS18 and so on, these would be more appropriately addressed by the Department of Environment because that Department is responsible for these areas.

The Environment Committee will be well aware that the Executive's Strategic Energy Framework, established after full public consultation, sets a target to increase the amount of renewable electricity in Northern Ireland. This challenging target is the cornerstone of DETI's strategy to increase the security of Northern Ireland's energy supplies and reduce Northern Ireland's carbon emissions from the electricity sector. The main alternatives to renewable energy are fossil fuel and nuclear power, each of which has its own set of environmental, security of supply issues and other impacts.

Yours sincerely

David McCune

Department of Enterprise, Trade and Investment

Wind Energy Review submission – Mr John Wilson

To: Anna Lo, Chair,
Northern Ireland Assembly Environment Committee.

Personal submission regarding the Committee's review in Wind Energy, Oct/Nov 2013.

30th October 2013.

Dear Ms Lo

The terms of reference of the review include:

> *"To clarify the degree to which the commitment to renewable energy is met by wind energy, and to investigate how other forms of renewable energy are being promoted."*

I would wish to make the following observations/comments that I believe are relevant to the specific term of reference quoted above.

Firstly, regarding the use of wind power.

In spite of a number of social and environmental concerns that are quite widely held and some genuine technical limitations, wind power does represent an essential ingredient of any strategic energy plan for Northern Ireland, both in terms of carbon commitments and security of supply. However, it appears to me that there are both practical and social aspects that seem to be largely ignored. As is often the case, there is an irony here, namely, that addressing these properly – far from negating the potential benefits of wind – would actually enhance them.

To be specific;

1/ Wind power (generated in medium-to-large scale schemes) should be integrated into the broader generation system in such a way as allows the power to be captured/stored for controlled/scheduled use in the grid rather than simply used (or not used, as may be the case) when it is generated.

2/ Locations of large turbines should be consistent with broad principles of maintaining the visual amenity of rural and other valued sites.

Re '1':

Wind power directed specifically towards 'pumped storage systems' allows the power to be managed in such a way as to smooth out supply/demand problems. For example, off-peak wind power can be used to pump water up to holding reservoirs for controlled release through hydroelectric turbines at peak times. The water is captured after it exits the turbines at the bottom of the penstock and then pumped back up again. Although not a wind-powered scheme as such, the Dinorwig scheme in north Wales demonstrates what could be achieved in capturing energy that would otherwise be wasted.

It is appropriate to acknowledge that this sort of system can be expensive to construct and in-effect front-loads a significant cost in to the scheme. However, over time the cost per kWh (kilowatt hour) drops dramatically.

It appears that the wind energy sector is unenthusiastic about this type of system because of two main issues;

- The cost (and who bears it)

- The (potential) delay to developing wind farms if planning consents for these are conditional upon the pumped storage infrastructure being in place.

Whilst it would be unfair to simply dismiss these concerns, they are not convincing when set in the context of long-term strategic energy plans. As regards the specifics, existing surplus reservoir stock combined with the potential to utilise existing impounding reservoirs – as well as creating new capacity - has the potential both to significantly reduce costs and shorten timelines.

By way of example, Knockbrecken (aka 'Knockbracken') reservoir on the Saintfield Road and Ballymiscaw reservoirs on the Church Road in Holywood are surplus to NI Water requirements and along with nearby land could be converted to pumped storage hydro at relatively modest cost. The output of these facilities would be low, however, the aggregation of a number of similar small schemes across NI could be significant and an impounding reservoir like Spelga could also (potentially) be utilised without compromising its water supply function. The development of new sites (given that these do not have to be either located in especially scenic areas nor huge in scale) should also be do-able cost-effectively and without significant public disquiet.

Integration of the off-peak wind power into these systems is not technically complex as once their power enters the grid it can be easily utilised almost anywhere. A caveat however, is that we almost certainly need to structure any created 'genco' in such a way as to maximise efficiency. [It should be noted that any excess generation – not only wind – can be utilised in this type of scheme.]

As most of the contracting for these systems can be sourced locally, it is also legitimate to regard the construction of these types of schemes as being infrastructure projects that will support and/or create employment across both the civil and electrical engineering sector, with the concomitant multiplier effect in the local economy.

Re '2':

One of the most frequently raised issues regarding wind power is the position of large turbines as regards their impact on the landscape. There are also concerns regarding noise and impact on wildlife. Often objections are dismissed as 'nimbyism' and what appears to be a UK government-led 'rushto-wind' doesn't do much to re-assure those likely to be most impacted that their concerns will be objectively and fairly considered. The reality is that at one end of the continuum, we have smaller schemes that probably do not require any more that a modest amount of care in deciding exact locations and are generally not considered overly impactful on the visual amenity. At the other end, we have proposed schemes like that for the Tunes Plateau off Portstewart that would have massive impact and cannot be mitigated in any way as regards the loss of visual amenity.

The pragmatic approach would, however, appear to be one practiced commonly on the European mainland: position the bulk of turbines in industrial and commercial areas where residential populations are low or nonexistent and where supporting infrastructure means lower installation costs. The wind energy sector dislikes this approach because it is unlikely that these locations will have the wind profile of coastal and hilltop sites and are therefore going to generate less power, turbine for turbine. However, taken in the round, the ability to erect large turbines with little or no planning 'grief' and close proximity to both local consumers and the regional grid can go some way to offset the lower generating efficiency. More importantly in political and social terms, as a strategy it is likely to enjoy widespread support.

> *"….how other forms of renewable energy are being promoted."*

As a bald statement, it appears to me that no other form of renewable energy is being aggressively promoted, per se. To the casual observer in Northern Ireland, there probably does not appear to be any other type of renewable energy generation possible – certainly not at scale. There are occasional media pieces on the SeaGen project in Strangford and even less frequently articles on other tidal schemes or biomass, but in-effect the public are left uninformed regarding the potential of these and the other range of options we have. The wind power lobby has certainly dominated the public discourse on this subject (for good or for bad).

Whilst it is understandable that local politicians want a 'quick hit' on the issues of carbon reduction and security of supply, they do appear to have needlessly limited their vision to a combination of 'clean' fracked gas and wind power. Only very recently have other ideas been mooted – for example sub-surface tidal stream generation in between Ballycastle and Rathlin – and this lack of both an awareness of alternatives or a more visionary approach is very worrying.

In no particular order, the alternatives to wind include;

- Tidal stream (e.g. the Ballycastle/Rathlin scenario)
- Wave
- Micro generation (e.g. pv/micro hydro/run-of-river systems)
- Biomass (including combined heat and power systems)

Please allow me to elaborate on the above.

Tidal stream.

The potential for further development of Strangford Lough is clear. These types of schemes work with tidal movements that are well established and predictable and hence the energy generated is more easily integrated into the grid. It is also prolific in that only around slack tide times does the system stop generating. It does present engineering challenges, but not of a significant scale – as the existing scheme demonstrates. The Seagen pilot has proven so successful for its owners that the company is developing a larger scheme in Scotland: why not in NI?

The currents between Ballycastle and Rathlin are estimated to contain a huge amount of untapped energy. The engineering challenges are significantly greater than in the Strangford scheme, but are by no means beyond existing knowledge and skills. Although this would probably be the most expensive and therefore very heavily front-loaded project we might undertake, it nonethe-less has the potential to produce a massive amount of energy that will drop dramatically in kWh costs over it's lifetime. That lifetime could reasonably be anticipated to be in hundred year-plus terms, which is well beyond the life expectancy of a CCGT power station. This sort of system really does have the potential to provide ultra low cost power well into the future. It also represents a unique opportunity for NI to demonstrate both its design engineering and installation engineering skills in what would be a globally unique system, if implemented at the large scale that is possible in this location.

Wave.

Every so often local and national media carry stories on some new type of wave energy generation system. It is virtually unknown within Northern Ireland (or elsewhere for that matter) however, that the first and longest running wave generation plant was designed by Queens University Belfast and is located in the Isle of Islay in Scotland! It's hard to believe that we have completely forgotten about this scheme and the fact that this technology offers a significant potential contribution to clean generation.

The Islay 'limpet' type of system can be disguised to minimise its visual intrusiveness and is relatively low cost. Although not viable in huge numbers around our coast, there are certainly many potential sites and although their individual power output is modest, aggregated, these could make a real contribution to the total generated by renewable means.

QUB have also recently developed their ‘Oyster’ scheme and surely we should be encouraging this innovation by actively installing these types of systems where possible?

Micro generation.

Historically, a very common analysis of the potential of micro generation appeared to be predicated on the notion that only grid-connected systems of scale could be considered genuinely viable. This all pervasive culture (big is good – small is bad) has stifled micro generation for far too long. It is less of an issue nowadays but still, I believe, dampens enthusiasm at government level for these types of generation. It is essential that a much broader assessment of the value-added proposition that micro generation can bring be brought to bear. As has already been mentioned, the aggregation of a number of types/sources may deliver significant total generation. There is also the very real commercial gain from the manufacture and installation of these sorts of systems. There are both technical and commercial issues, but these are resolvable.

Photovoltaic/PV.

Government encouragement to domestic users regarding the installation of PVs does appear to have had a considerable effect both in terms of total uptake/generation and the creation of an increasingly competitive supplier base. This should be encouraged further. There are however, some issues around this that would enhance the long term potential.

Firstly, I believe there is confusion about the grant system that is/has been available. Advertisements placed by suppliers regularly infer a cut-off point and while this undoubtedly motivates some potential customers, it acts as a very real disincentive to others who may fear committing financially and then failing to get the grant support that they had factored into their decision. The grants available should continue and there should be much more government publicity/information about the type and duration of any such schemes. People are naturally a little reticent about the supplier’s claims about grants, but they should be reassured by clear and easily accessed information from government. The ‘discos’ should also be encouraged even more than at present to support this market. Given that PVs generation cycles (i.e. during daytime) match more closely to demand than wind, the potential to reduce our imported energy needs may be greater.

Secondly, micro generation by domestic users could be significantly increased by amendments to the Building Regulations that required new properties to have standardised power inputting systems (socket/inverter) installed at build. These would allow for easier, safer and cheaper retrospective installation of, for example, PVs or small wind turbines. This sort of ‘enabling’ legislation would increase new-build house costs by less than 1% and encourage uptake of renewable micro generation systems.

Micro hydro/run-of-river systems.

A report compiled some years ago by a senior QUB academic concluded that there was no significant potential for hydro in Northern Ireland. Advances both in the technologies around micro generation and the integration of smallscale locally generated power into the grid have, I would contend, changed the situation. In the first instance, micro hydro and run-of-river systems are principally designed for local power consumption: for example, a farmer generating power that he/she uses immediately and reduces their total energy bill rather than meeting or exceeding their total requirements. Selling in to the grid is less of a concern.

By way of an imaginary scenario however, the real contribution of this type of system to the overall energy situation may be more obvious: if 5,000 systems reduced the consumption of power from the grid by even 1% this represents a real reduction in carbon production as well as assisting in reducing the total cost of bought-in wholesale energy.

As with the points raised re tidal stream, our universities and FE/technical colleges have huge potential as R&D partners working alongside innovative local engineering companies who are capable of delivering new, efficient and low-cost solutions.

Biomass.

For a number of years the potential of biomass has been championed by at least one well-known local farmer – John Gilliland in Derry/Londonderry. Alas, despite the huge potential of this type of generation, there has not been any significant project to date. The concept suffered a PR disaster more recently when a scheme on a private housing development in Lisburn was shut down. Sadly this has wrongly created a very negative perception of biomass and local politicians appear to be unaware of the real potential, especially in mid-scale combined heat and power ('CHP') plants. Given the sheer extent of agriculturally marginal and set-aside land in Northern Ireland, the potential of biomass in the form of short rotation willow is enormous. The technology is well established and it can generate a significant amount of power in a way that is in-effect completely independent on either weather conditions or imported fuel issues.

Large-scale biomass generation also has the capacity to create employment through the husbandry, transportation and burning of the willow. There is also the potential for farmers to gain a modest but real income from land that would otherwise be unproductive.

There has been some dispute about the environmental aspects of burning biomass and certainly it is appropriate to acknowledge that there is disagreement around this. However, overall it remains a cleaner and more sustainable option that burning any type of fossil fuel. By utilising CHP-type schemes the efficiency of the energy take out from the fuel is enhanced and carried out in regional power plants biomass could significantly contribute to the stability of our energy supply.

[Short rotation willow biomass is not to be confused with the burning of scrap timber and timber-based materials. Although these do offer potential, they are very different in terms of both their potential contribution to energy selfsufficiency and the environmental impact of their combustion.]

Conclusion.

There are significant issues around renewables. These are not all about the technical achievability of the various technologies/systems. Pricing is a key ingredient. For many years now, non fossil fuel obligation-type pricing systems compelled the discos to buy renewable energy at a premium price. That, together with a carbon reduction obligation, undoubtedly did create a market through the shortened time line for return on investment by those supply companies that 'took the plunge'. Alas it cannot be considered an open-ended arrangement and we should be careful about the impact of distorting the market/pricing system through that mechanism.

Although continuing to provide up-front grant assistance for micro generation systems is viable and advantageous in the short term, premium pricing of the electricity itself creates a false sense of viability that should be gradually weaned out of the system. The last twenty – thirty years of somewhat hesitant travel in the direction of increased renewables has perhaps been 'pitched' too much towards the notion of large (generating) companies making good returns on the back of subsidies. I believe we have long since reached the position where we need to be very proactive in getting our local community to aspire to independence of supply and the price stability that this could and should bring. Not only would this give domestic users the best long term result, but commercially and industrially it could be significant if NI can market itself as a lower energy cost region. Although we are unlikely to ever be as industrialised as we were in the past, it is certainly possible to conceive of a scenario where lighter industrial manufacturers would see NI as a great potential location because of both security of supply and price.

Northern Ireland needs reliable, competitive and clean energy. I am personally convinced that this is best achieved through a diverse range of renewable generating technologies that also encompass a range of scales from the gigawatt tidal stream to the domestic micro system. As a community we need to be willing to invest a significant amount of resource – financial and human – in order that we can deliver this long-term aim of cheap and sustainable power. Our political leaders need to be honest about the need for this 'long game' approach, as there is no short cut.

I have no doubt that if you were to share the opinions I have expressed here with 'industry insiders' many would dismiss them as 'pie in the sky' dreamy optimism. They are not – they are real world solutions that require modest sacrifices now for huge benefits tomorrow. This sort of approach requires a genuine vision from our leaders: I hope you can rise to this challenge and encourage others to do the same.

Thank you for your time.

Wind Energy Review submission – Mr Ralph Erskine

Wind Turbines and Noise

Ralph Erskine

Paper for the Committee for the Environment's Review into Wind Energy

The Committee is charged with assessing 'the adequacy of PPS18 and related supplementary guidance in regulating proposals for wind turbines, in particular with regard to issues of noise and separation distances. This paper addresses some noise issues.

Planning Policy Statement 18-weaknesses
Para 1.3.46 of the *Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy* recommends that 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97 – hereafter 'ETSU-97') should be used in assessing noise from wind energy developments.

Para 1.3.46 states that ETSU-97 'presents the findings of a cross-interest Noise Working Group', which is very misleading. It would appear that acousticians and employees of wind farm companies formed half of the Group's 14 members, but that it did not include any medical experts.[1] Although it discusses sleep and sleep disturbance, in the absence of any medical experts in the Group's membership, which seriously weakens its recommendations.

Para 1.3.49 refers to a DTI study 'The measurement of low frequency noise at three UK Wind Farms, W/45/00656/00/00' which found that 'internal noise levels were deemed insufficient to *wake up* residents at the three sites investigated' (emphasis added). That is an accurate description of the finding in the report (Hayes McKenzie Partnership 2006), but it completely fails to understand the nature of sleep, and to recognise that noise interferes with sleep in different ways, and that in particular awakenings are remembered only if they are longer than 20 or 30 seconds (see p. 8). Relying only on recalled awakenings therefore falsifies results. Did DoE consult any medical experts before referring to this report in Para 1.3.49? That seems to be very unlikely.

Flaws in ETSU-97
ETSU-97 was written by a Noise Working Group of developers, noise consultants, environmental health officers and others set up in 1995 by the Department of Trade and Industry through ETSU (the Energy Technology Support Unit).

ETSU-97 is supposed to describe a framework for measuring wind farm noise and to give indicative noise levels calculated to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development. It succeeds in facilitating wind farm development, but signally fails to protect neighbours.

ETSU-97 is widely recognised to be flawed. It dates from 1996, and generally relates to turbines with a maximum 30m hub height, whereas nowadays their hub height is generally around 80m. ETSU-97 is now supplemented by *A good practice guide to the application of ETSU-97 for the assessment and rating of wind turbine noise*, which was published by the Institute of Acoustics in May 2013. However, that guide has in turn been found wanting by various commentators (see p 3)

[1] It may have included one or more environmental health officers, but if so none cites a medical qualification.

1

ETSU-97 recommends a limit of 5dB above background noise. If the background noise is 40dB, the limit is therefore 45dB. However, in quiet areas, the night-time limit is 43dB(A), which is higher than the daytime limit of 35-40 dB(A). ETSU-97's higher night-time limit of 43dB(A) defies logic. Its justification was that that most people are indoors at night when the noise indoors is said to be attenuated by an assumed 10dB(A) through an open window. However, there is no technical justification for this claimed level of attenuation - the actual attenuation through an open window is probably barely perceptible (i.e. around 3dB). The attenuation afforded by a closed window can be highly variable depending on the type of glazing system and frequency of the noise. No window, whether open or closed is effective at attenuating low frequency noise such as occurs with aerodynamic modulation.

In fact, the 3rd Draft version of the Hayes McKenzie Partnership report 'The Measurement of Low Frequency Noise at Three UK Wind Farms' recommended a reduction in the night-time allowed noise level to 38dB LA90 (40dB LAeq), plus an additional reduction of 5dB if a high level of aerodynamic modulation was present. The draft report also included the statement, "A difficulty in returning to sleep will result in tiredness the next day and all the associated descriptions of ill health which might be associated with a lack of sleep", but was deleted at the behest of a civil servant (Cox et al. 2012 p 54).

ETSU-97's major flaws include the use of averaged noise levels over too long a time period and ignoring the transient 'thumping' noise of aerodynamic modulation which causes awakenings and arousals. It also ignores the fact that low frequency noise is audible over greater distances than higher frequency noise. It is one of the very few known guidance documents in any country to permit a higher night sound level than during the day, completely contrary to noise pollution legislation. It does not meet the World Health Organization recommendation that an Lnight,outside level of 40 dB should be the night noise guideline to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly (World Health Organization Europe 2009 p vii)

ETSU-97 only measures-

a) wind speeds up to 12 metres per second, ignoring faster wind speeds which cause turbines to generate more noise;

b) wind at a height of 10 m, although modern wind turbines are often 125 m high (to the top tip).

It is not clear whether in Northern Ireland the application of ETSU-97 is subordinate to the 'precautionary principle' set out in PPS 23 (England). If not, it should be. Under PPS 23 the precautionary principle should be invoked when-

a) there is good reason to believe that harmful effects may occur to human, animal or plant health, or to the environment; or

b) the level of scientific uncertainty about the consequences or likelihood of the risk is such that best available scientific advice cannot assess the risk with sufficient confidence to inform decision-making.

Review of ETSU-97

The Institute of Acoustics (IoA) therefore reviewed ETSU-97 at the request of the Department of Energy and Climate Change (DECC), and published *A good practice guide to the application of ETSU-97 for the assessment and rating of wind turbine noise* in May 2013. Most unfortunately, the review fails at the first hurdle for a scientific paper.

Contrary to the IoA's professional Code of Conduct, the primary data relied on in the report is not publicly available, making it impossible to verify the validity of the recommended guidelines. It therefore fails a critical test for a scientific paper. A MAS Study sets out detailed criticisms of a paper on which the review is substantially based (Stigwood 2011).

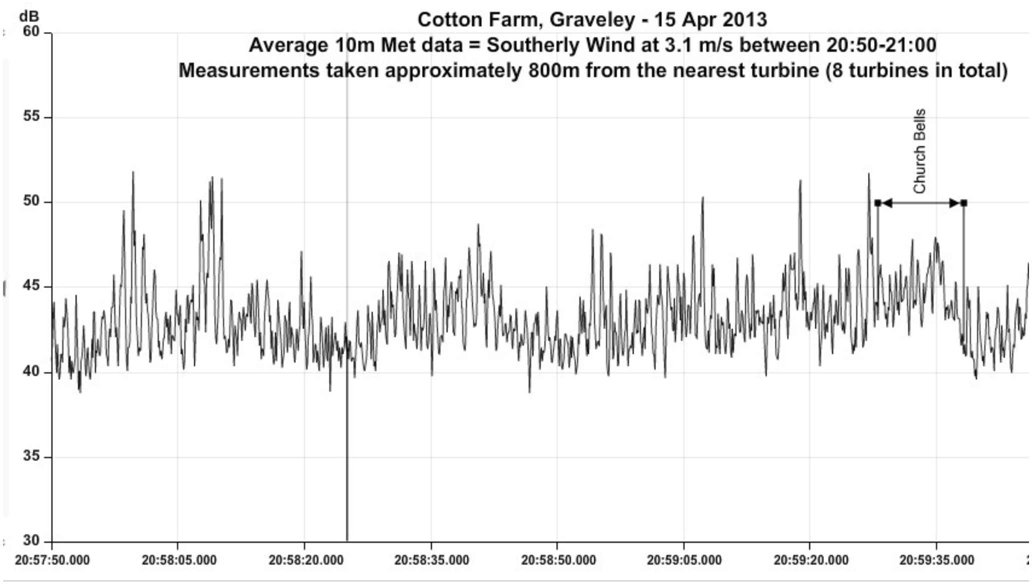
The published Guide is also open to serious question for the following reasons-

The review accepted the sound levels in ETSU-97 without question, on the basis that they 'are a matter for Government' (Guide para 1.2.1), even though those levels have been the subject of much criticism, and do not conform to the World Health Organization recommendation that an Lnight,outside level of 40 dB should be the target to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly

None of the members of the review team appears to be a medical expert.

The review was not independent because its terms of reference were in effect dictated by DECC.

Aerodynamic modulation (AM) (also referred to as amplitude modulation)
Aerodynamic modulation results in the thumping, 'whoomph, whoomph,' sound that is especially associated with tall rotors, stable weather conditions, and night-time. The result is a perceivable fluctuation in the sound level, often about once per second. The graph below (courtesy of MAS Environmental) illustrates this for Cotton Farm in England. Note the constant wide variations (about 10 dB) in the noise level, and that the level is often above 45 dB.



Modern rotors can be 80 to 100m in diameter, with a tip height of 125m, sweeping through a huge vertical arc. In wind gradients, with wind speed and wind direction varying with height, the angles of the blades are constantly changing on a repetitive basis. The lift forces on the blades fluctuate throughout the cycle. The changes in lift forces are associated with changes of circulation around the blades, which cause unsteady vortex shedding from

3

the trailing edge. These effects can cause the thumping, pile-driving low-frequency noise reported from modern turbines, together with the higher frequency amplitude modulation associated with the trailing edge vortices.

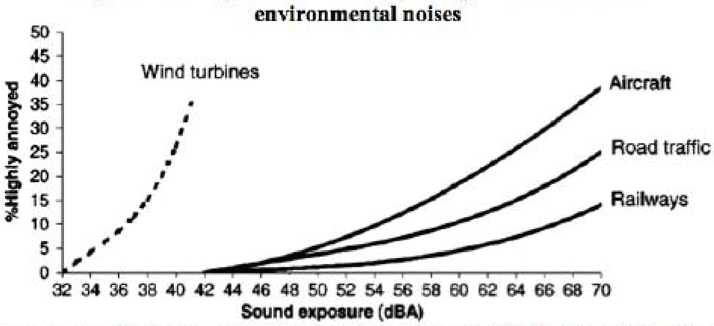
In the 1980s, engineers at the US National Aeronautics and Space Administration, probably the foremost aeroacoustic research organization in the world, identified how atmospheric turbulence resulted in unsteady blade loadings, increasing sound levels. (Grosveld et al. 1982) and showed that wind gradient generates substantially higher noise levels (Hubbard et al. 1989). They also measured the low-frequency threshold of hearing for persons subjected to impulsive wind-turbine noise, and showed this could be almost 20dB lower (i.e. more sensitive) than the conventionally accepted noise threshold for less obtrusive sounds (Shepherd et al. 1982).

Aerodynamic modulation is generated at higher levels during the downward motion of the blade (i.e. the three o'clock position). This results in a rise in level of approximately once per second for a typical three-bladed turbine. This periodic rise in level is also referred to as amplitude modulation, and as described above for a typical wind turbine, the modulation frequency is 1 Hz (once per second). The origin of this amplitude modulation is not fully understood, but is now thought to be related to the difference in wind speed between the top and bottom of the rotation of a blade due to wind gradient, directivity of the aerodynamic noise (Oerlemans and Schepers 2009) and synchronous noise pulses from different wind turbines (Colby et al. 2009, p 3-5).

The level of aerodynamic wind turbine noise depends on the angle of attack: the angle between the blade and the incoming air. Increasing atmospheric stability also creates greater changes in the angle of attack over each rotation, resulting in stronger turbine sound fluctuations. In a very stable atmosphere wind velocity is more constant. With a modern turbine rotating at high speed, the fluctuation in turbine sound level increases to approximately 5 dB. At distance, the fluctuations from two or more turbines may increase the fluctuation level further at the observer's position up to approximately 9 dB (Van den Berg 2006 p 142).

Wind gradients can increase sound levels at night by up to 15dB. Pedersen (2004) found that wind-turbine noise is very much more annoying and intrusive than the criteria set by conventional dB(A) considerations. Wind farms trigger equivalent levels of annoyance at much lower noise levels than noise from aircraft, roads or railways – see the Figure below. Annoyance rises rapidly for wind-turbine noise levels above 35dB(A)-38dB(A). Turbine noise is much more audible at night when ambient noise decreases, which explains why complaints of nocturnal noise and disturbed sleep are common.

Figure 6: Annoyance associated with exposure to different environmental noises



This chart is copied from the 2009 report by the Minnesota Department of Health, entitled *Public Health Impacts of Wind Turbines*. It was originally published in Pederson and Waye, Perception and annoyance due to wind turbine noise—a dose-response relationship. J. Acous. Soc. Am. 116:3460. 2004.

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A large variation of wind speed across the rotor area increases the modulation of the turbine noise, and the normal "swish–swish" sound turns into a more annoying, "thumping," impulsive sound. The effect is more prominent with turbines with large rotors, where there is a substantial difference in wind speed between the top and bottom of the rotor. This is usually not reflected in noise measurements, which are mainly carried out in the daytime (Møller et al. 2012 p 20).

In a stable atmosphere, fluctuations in modern wind turbine sound are readily noticed. Although it is not clear how this relates to annoyance, 'the sound can be likened to the rhythmic beat of music: pleasant when the music is appreciated, but distinctly intrusive when the music is unwanted' (Van den Berg 2006 p 82)

Fluctuations with peak levels of 3-9 dB above a constant level may affect sleep quality adversely. The Dutch Health Council found that 'at a given *Lnight* [see glossary] value, the most unfavourable situation in terms of a particular direct biological effect of night-time noise is not, as might be supposed, one characterised by a few loud noise events per night. Rather, the worst scenario involves a number of noise events all of which are roughly 5 dB(A) above the threshold for the effect in question' (Health Council of the Netherlands 2004 p 17).

Even the American Wind Energy Association and the Canadian Wind Energy Association, both of which represent wind farm developers, accepts that it is generally the fluctuating sound component that provokes most complaints about wind turbine sound. The fluctuating aerodynamic sound in the 500 to 1,000 Hz range occurs from the wind turbine blades disturbing the air, modulated as the blades rotate which changes the sound dispersion characteristics. This fluctuating sound is harder to become accustomed to than sound that does not fluctuate (Colby et al. 2009 para. 4.1)

Large turbines (hub heights 50-100 m) are more likely than smaller turbines (hub height 30 m) to cause excessive aerodynamic modulation, an increase of low frequency noise and greater disturbance inside buildings. Internal noise can modulate over 15-20dB, probably due to different wind speeds and atmospheric conditions at these heights (Stigwood 2009).

Sound emission measurements are usually done in daytime. Until van den Berg carried out his research in 2004 it was difficult to imagine the sound would be very different at night-time, so almost no one did. At first even van den Berg could not imagine how people could hear wind turbines 2 km away when at 300 to 400 m distance the (calculated) immission level was, for a given wind velocity, already equal to the ambient background sound level. The explanation proved to be quite simple: like most other experts he had not listened in a relevant period - an atmospherically stable night (van den Berg 2006 p 20).

Regulators and decision makers need to experience the effects of aerodynamic modulation to fully understand wind farm noise impact and the limited relevance of average decibel controls in relation to the psycho-acoustical effects. As a substitute to living and experiencing wind farm noise impact at an affected dwelling, the Listening Room Experience (available from MAS Environmental Ltd, Cambridge, UK www.masenv.co.uk) provides a reasonable way of experiencing and understanding the impact.

Some of the comparisons commonly used to describe likely wind farm noise levels warrant close scrutiny. To reassure neighbours, wind companies often explain that a 40-50dB noise is similar to that made by a refrigerator, or light traffic on a road 50 feet to 100 feet away. But who wants to sleep next to his or her refrigerator? If you live in the country, would you readily adapt to steady light traffic on a road only 50 feet away? Add in the fact that turbine noise is often much more variable, pulsing, etc., than a refrigerator, and you begin to sense why simple dB levels are not all that helpful (Acoustic Ecology Institute 2010 p 6).

Low-frequency noise

The term ‘low frequency sound’ can easily be misunderstood: acousticians relate it to frequencies below 100 to 200 Hz, which cannot easily be ‘heard’ by the human ear (but see below).

At the Committee’s meeting on 12 September, Ms G. Hitchins referred to the 2006 DTI report by the Hayes McKenzie Partnership on low frequency noise at three UK wind farms, adding that the noise found was ‘well below the guidelines that are permitted by’ DEFRA. However, she did not say whether Hayes McKenzie have any physiological expertise. If they do not, and did not consult any medical expert, as appears to be the position, their conclusions are unreliable, since noise can disturb sleep badly without waking the sleeper (see p 8).

One study confirms that large wind turbines can impact health adversely due to acoustic pressure pulsations unrelated to the audible frequency spectrum, by affecting the vestibular system especially at low ambient sound levels. It emphasises the need for epidemiological research by medical health professionals and acousticians concerned with health, and the importance of including a margin of safety sufficient to prevent inaudible low-frequency wind turbine noise from being detected by the human vestibular system (Ambrose and Rand 2009).

Low-frequency sound is particularly annoying when it occurs alone or with low levels of sound at higher frequencies. This results in it usually being more annoying indoors than outdoors, since the high frequencies are more attenuated by house sound insulation than the low frequencies. Also it is often more annoying in the evening and at night, when it is otherwise quiet. Prolonged exposure to audible low-frequency sound may cause fatigue, headache, impaired concentration, sleep disturbance and physiological stress as indicated by increased levels of saliva cortisol (Møller et al. 2012 p 3).

Predictions and models

van den Berg found that the discrepancy between measured and predicted immission levels near a wind park at Rhede in Germany was very large: sound levels were up to 15 dB higher than expected at 400m from the wind park. At 1500m actual sound levels were 18 dB higher than expected (van den Berg 2006 p 18), which is a huge increase, since dB levels are logarithmic.

The problem of predicting noise propagation over large distances outdoors is that the air through which the sound travels is constantly fluctuating. Noise can only be modelled accurately if the state of the atmosphere through which the sound waves propagate is known, which border on the impossible. The temperature, humidity, wind velocity and pressure at every metre of the sound path are changing second by second and bear no relationship with each other. In practice this requires knowing the state of the atmosphere at all points in space through which each sound wave propagates. Even if the precise meteorological state is known on the site at a given location and time, the chances are slight that an identical state will exist 1,000 m away and almost 3 seconds later, which is the time it takes for sound to travel this distance (Dickinson 2010; Bass et al. 1998 para. 2.1).

Computer prediction of sound is too often inaccurate. Predicting air movements, which carry sound, can be compared to weather forecasting. Weather forecasts are often wrong even though they use super-computers costing £30 million or more. Acousticians do not have access to such computers, and their computer programs cannot take all the variables into account. For values at distances of more than a few hundred metres the accuracy of computer programs leaves much to be desired.

There is an unavoidable variation in noise emission between turbines, even of the same model. The probability that a given delivered turbine emits more noise than an average turbine – or for that matter, any randomly chosen measured turbine – of the same model, is in principle 50%. For planning purposes, the noise emission should take this into account. Experience from a Danish project in 2011 with eight Vestas V90-3.0 MW turbines has shown that the measured sound power levels exceed the anticipated levels from the Environmental Impact Assessment – see the Figure (courtesy Møller et al) below (Møller et al. 2012 pp 9, 16).

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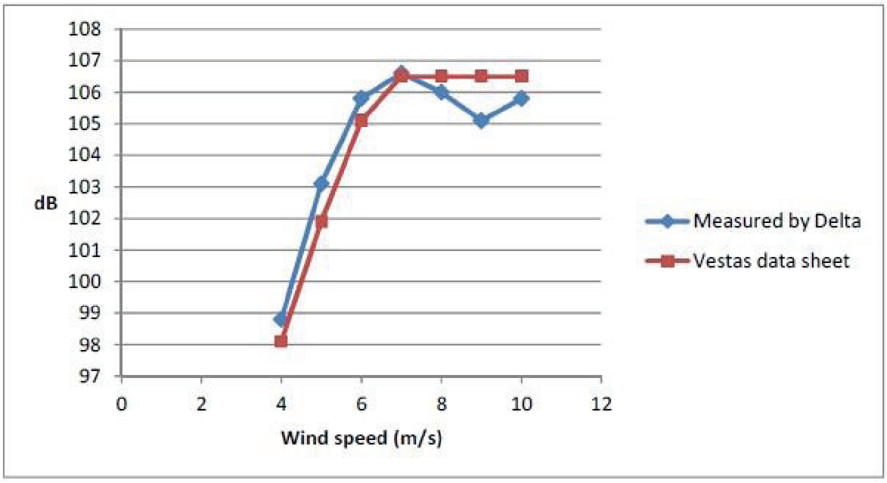

Figure 5. Apparent sound power level L_{WA} as a function of wind speed as measured by Delta[8] and as given in data sheet by Vestas[9].

In practice, wind farm developers often-

a) fail to use suitable microphone wind screens which include secondary wind screens. Measured background noise values are therefore higher than the true values.
b) fail adequately to consider the effects of wind shear during
c) fail correctly to apply or test the standard turbine noise prediction calculation model resulting in under prediction of turbine noise levels.
d) fail to allow for measurement tolerances and assessment uncertainties
e) fail to address adequately amplitude modulation. The Salford report into modulation is flawed and outdated since turbine heights have increased significantly since 2007. Many cases were missed (van den Berg 2009) and at least seventy UK wind farms have since been identified where aerodynamic modulation is the cause of complaints (Stigwood et al. 2013).

7

Sleep

Sleep is not a continuum but a cycle and people commonly wake between cycles although they may not be aware of it. moving from wakefulness into sleep and vice versa is not an instantaneous event but a process. When one moves from wakefulness into sleep, the transfer of information from short-term memory to long-term memory stops and is the last to be restored on awakening. An awakening is remembered only if it is longer than about 20 or 30 seconds. As a result, if one relies on recalled awakenings as the outcome measure of an effect, say of noise, one will underestimate the effect because of the failure to recall all of the brief awakenings.

Some noises do not cause an actual awakening but an arousal, which is a brief increase in the frequency and decrease in the amplitude of the brain waves or electroencephalogram. Arousal is moving from a deeper level of sleep to a lighter level of sleep and usually lasts a few seconds. Arousals are not recalled, but if enough arousals occur, they have the same effect as a reduction of total sleep time (Hanning 2009 para. 2.2).

Recommendations

ETSU-97 should be made subject to a precautionary principle such as is set out in PPS 23 (England)

ETSU-97 should be reviewed by an independent working group of experts without any financial interest in wind farm development. The group should be multi-disciplinary, including audiologists and other medical professionals.

The Committee should seek the opinion of the Chief Medical Officer on health issues connected with noise from wind farms, together with that of Professor Alun Evans, Centre for Public Health, Queen's University of Belfast, Institute of Clinical Science B, Belfast, who is an epidemiologist with an international reputation.

Background noise surveys should be repeated in existing wind farms where complaints have been made about noise levels. The surveys should be in controlled conditions using suitable wind screens

In low noise environments where background noise is less than 30 dB(A), the daytime level of the wind turbine noise should be limited to a level within the range of 35-40 dB(A), as in the Republic of Ireland (Wind Energy Development Guidelines, Department of the Environment, Heritage and Local Government, Ireland, p 30).

An applicant for planning permission for a wind farm should, as in Ontario, be required to hold a minimum of two community consultation meetings to discuss the project and its potential local impact.

Environmental statements submitted by wind farm developers should be in searchable pdf format – not just an 'image' pdf (which cannot be searched).

The Committee should experience the effects of aerodynamic modulation in order to have a better appreciation of the impact of wind turbine noise. The Listening Room Experience provided by MAS Environmental Ltd, Cambridge, would appear to be a good way of experiencing and understanding this. Visiting a wind farm is unlikely to be sufficient, since the worst noise is generally heard at night, and in stable weather conditions.

4 November 2013

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Glossary

A-weighting	a filter that represents the frequency response of the human ear
Amplitude Modulation	a sound is modulated in amplitude when its level exhibits periodic fluctuations.
Attenuation	the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.
dB	abbreviation for decibel
dB(A)	abbreviation for the decibel level of a sound that has been A-weighted
Decibel	the unit normally employed to measure the magnitude of sound
Frequency	the number of acoustic pressure fluctuations per second occurring about the atmospheric mean pressure (related to the 'pitch' of a sound)
	the unit normally employed to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
Hertz (Hz)	the unit normally employed to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
Hours	ETSU-R-97 defines the night-time hours as 23.00 to 07.00 every day.
LAeq	the abbreviation of the A-weighted equivalent continuous sound pressure level
LA10	a noise level exceeded for 10% of the time during a measurement period, often used for the measurement of road traffic noise
LA90	a noise level exceeded for 90% of the time during a measurement period, often used for the measurement of background noise
Lnight	Refers to the EU definition in Directive 2002/49/EC: equivalent outdoor sound pressure level associated with a particular type of noise source during night-time (at least 8 hours), calculated over a period of a year
Noise	sound that evokes a feeling of displeasure in the environment in which it is heard, and is therefore unwanted by the receiver
Noise emission	the noise emitted by a source of sound
Noise immission	the noise to which a receiver is exposed
Receiver	a person or property exposed to the noise being considered
Wind gradient	the increase of wind speed with height above the ground
Wind shear	wind gradient (q.v.)

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Wind Turbines and Noise

About the author

Ralph Erskine is a retired barrister. Although he has no qualification in acoustics or a relevant discipline, he is an experienced researcher and author on scientific subjects, with many published articles in refereed journals.

Wind Energy Review submission – Prof Geraint Ellis

Northern Ireland Assembly
Environment Committee
7th November 2013

BRIEFING ON WIND ENERGY PLANNING ISSUES
Prof. Geraint Ellis, Queen's University, Belfast.

This briefing note has been produced to accompany Geraint Ellis' presentation to the NI Assembly Environment Committee on 7th November 2013, as part of its "mini-enquiry" on a number of aspects of wind energy development in Northern Ireland. The paper offers only a short outline on the issues that will be discussed at the Committee and is intentionally brief to provide a summary of the key issues.

1. Planning for renewable energy projects

- *Defining aims and objectives;*
  Renewable energy is being expanded for a number of sound reasons, such as addressing climate change and increasing energy security. Figs 1 and 2 in the Appendix indicate the very rapid increase in renewable generating capacity in Northern Ireland, indicating a ten-fold increase between 2003 and 2011. Figure 2 shows how this has come also most entirely from onshore wind development, offering a drastic change to the Northern Ireland landscape. Therefore, it would appear that the planning system has been successful in fulfilling the aims of PPS18 to "facilitate the siting of renewable energy generating facilities … in order to achieve NI's renewable energy targets". Indeed, compared to policy in neighbouring jurisdictions, PPS18 is highly permissive and while it has encouraged rapid growth of renewables, it is worth considering how effective it has been in balancing this with other aspects of the public interest, such as encouraging local economic development, protecting long-term renewable assets or facilitating social acceptance of wind energy.

- *Integration with other policies;*
  It has not always been clear how the NI renewable energy targets are coordinated with other government policies, such as those for planning, which needs to take into account a wide range of issues such as landscape protection, community development, tourism, etc. Indeed, it is unclear whether there has been an evaluation of the spatial implications of meeting renewable targets, or an assessment of what would be an acceptable level of "saturation" of the NI landscape. Furthermore, has there been any consideration of whether planning issues other than grid development could act as a limiting factor in expanding NI's renewable energy base? Was there ever a consideration of the planning implications of adjusting the financial support for different types of renewables? There is substantial potential for creating substantial synergies between different areas of policy (e.g. development on Forestry land) while more explicit links between government strategies can play an important role in helping to justify planning decisions.

- *Planning for other types of renewables*;
  As noted in Fig. 2, NI has been very effective in stimulating wind energy development and it has used its powers over financing mechanisms to encourage certain types of renewables, such as single turbines and anaerobic digesters, so that the growth of these outstrips other parts of the UK. The other main types of renewable technologies that are likely to offer challenges to the planning system in the next 5-10 years will be increased expansion of large Anaerobic digesters, large scale solar plants and offshore renewables. While a new regulatory framework for marine areas is now emerging, the policy context for the other technologies is not immediately clear.

- *Performance of neighbouring jurisdictions;*
  Figures 3-5 compares 2011 figures for renewable capacity in Northern Ireland compared to neighbouring jurisdictions, based on a recent study for the ESRC[1]. This serves a number of purposes; it raises questions of how we evaluate success in planning and energy policy and it focusses on what makes a robust renewable energy policy. This study highlighted a number of factors that make Scotland the current leader in renewables in the UK, and highlighted that NI has a more liberal planning system than anywhere else in the UK. It also highlights the different approach taken in Wales for the strategic planning of wind energy (see Fig 6), which offers a number of interesting lessons for planning large scale wind developments.

[1] http://www.cardiff.ac.uk/cplan/research/delivering-renewable-energy

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2. *Dealing with noise, landscape and other impacts*

- *The use and definition of setback distances;*
  The most common planning instrument for mitigating the impacts of wind turbines on individual properties is the specification of set-back distances; i.e. the minimal distance that turbines will be permitted from the nearest property (most commonly an occupied house). There is no compulsory setback distance in the UK, but some guidance is provided based on a set distance (e.g. 500m), or as a function of turbine height. Internationally, there appears to be a lack of consensus on an appropriate setback distance, nor the main purpose for such controls. There have been a number of unsuccessful attempts in England and Ireland to establish distances up to 2km by private members bills. Stringent setback distances have been introduced in Victoria, Australia[2], which appear to have largely prevented further wind energy developments. Set back distances are a rather crude instrument for controlling the impacts of turbines and would face particular problems in NI for achieving renewable targets given previous policy on one off housing in the countryside.

- *Impact on land values;*
  Many neighbours to proposed turbines are concerned about the impact on local land values. There does not appear to be any solid evidence on the actual impact on house prices, with studies reporting both negative and negligible impacts in different contexts and these may be specific to local housing markets. There does not appear to have been any studies conducted in an NI context. However, one must also consider that many types of development have a positive or negative impact on neighbouring land values, which are generally not compensated or taxed and it is unclear why wind energy developments should be made a special case in this respect.

- *Minimising visual intrusion;*
  Visual intrusion and a sense of the changing character of places drives many concerns over wind turbines. This is an inevitable consequence of the deployment of wind energy and the planning system is the only arena in which such effects can be evaluated and balanced with other impacts. While wind farms have avoided AONB and other sensitive landscapes, there does not seem to be a strategic approach to minimising the overall zones of visual intrusion of turbines on the NI landscape. This contrasts to the approach followed in Wales (Fig 6); indeed the support given to small single turbines is likely to maximise the visual intrusion per MW generated.

- *Noise issues:*
  Noise is a common source of complaint from those living near wind turbines and this can be a function of a range of factors, including turbine design and siting, atmospheric effects and individual sensitivity to noise. These factors also lead to difficulties in measuring turbine noise and identifying an "acceptable" noise limit. The most commonly quoted noise standard is ETSU-R-97, which specified 5dB(A) above background noise and absolute maximum of 35-40dB(A) for daytime and 43dB(A) for night time. While this could be controlled using set back distances, this does not easily take into account different model types, siting etc. An interesting initiative in Denmark has been to reduce the noise limits to 20dB(A) (from 40) in an attempt to place pressure on manufacturers to introduce quieter turbine models.

3. *Community engagement and sharing the benefits of wind energy development*

- *Participation and its links to 'acceptance'*;
  Communities often complain that they have not been adequately consulted about wind energy proposals in their local area and such factors often exacerbate levels of objection to planning applications. Studies have shown that there is a "good process effect" linked to openness and transparency. Practice does vary between developers, although NIRIG has adopted a protocol for community engagement in 2013. Wind energy proposals are not differentiated from other developments for the process of participation.

- *The role of intermediaries;*
  A number of countries have attempted to increase trust and good practice in wind energy developments by encouraging or establishing intermediaries to be involved in the development process. These may become involved in negotiations between the community and the consenting authority (e.g. Community Energy Scotland),

[2] http://www.theguardian.com/environment/southern-crossroads/2013/may/29/1

between the developers and the community (e.g. developer funded community liaison officers), or provide good practice advice for all those involved, such as the Danish Wind Turbine Secretariat.

- *Community benefit schemes;*
  Many wind energy developers offer benefits to those living in proximity to a proposed wind farm, although such initiatives cannot be formally taken into account when considering a planning application. Such schemes take a variety of forms and are at different levels of numeration – for example NIRIG announced its intention to offer a £1000 per MW in early 2013, while £5000 per MW is often called for in Scotland, where there is now an open register of the benefits offered by each scheme. Some County Councils in the Republic of Ireland are proposing to secure community benefits through planning gain[3]. Developer-led schemes come in a variety of forms, including payments into community funds, while RES have recently launched a Discounted Electricity Scheme[4]. Community benefits schemes face a number of problems of administration and boundary effects. Community benefits schemes do offer a range of positive outcomes for local communities, although the impact on acceptance is far from clear. There are questions why wind developers should be expected to provide benefits, while other forms of development are not.

- *Community energy and co-ownership;*
  Increased community ownership of renewable schemes has been shown to be effective in enhancing local community benefits and maximizing the acceptance of wind energy schemes. There is a very low level of community involvement in energy in Northern Ireland and compared to other jurisdictions, there has been little government intervention in this area. In Denmark, where there have been historically high levels of acceptance, wind energy has traditionally been led by local cooperatives and in 2008 Denmark passed a new law requiring up to 20% ownership of any scheme to be offered to local communities.

4. Key issues and potential future developments

The Northern Ireland energy system will continue to evolve over the coming decades in response to technological change and a variety of economic and environmental challenges. The direction of change will be intrinsically linked to social issues, which could provide the ultimate limiting factor for some developments, such as onshore wind. The planning system will have to continue to anticipate and regulate such developments and for it to successfully do this, it is suggested that some key questions may be:

- How effective is planning for renewable linked to energy policy and other government strategies?
- Has PPS18 been effective in securing government goals for the planning of renewables? How has this policy been evaluated and monitored and what are the implications for the adoption of the Single Strategic Planning Policy Statement?
- How will the planning system respond to large scale AD and solar plants?
- What is the government's view on "repowering" of previously developed sites?
- Will local authorities need specific support when dealing with renewable proposals when they take on planning responsibilities in 2015?
- What actions would increase community trust in the planning process – would intermediaries improve the current situation and if so, how would they be funded?
- How best can community energy be encouraged through the planning system and is there a role for a co-ownership strategy?
- How can NI best learn from the experience of other countries in the planning of renewables?

Prof. Geraint Ellis,
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4th November 2013

[3] For example: http://www.mayococo.ie/en/Planning/DevelopmentPlansLocalAreaPlansandStrategies/PolicyDocuments/
[4] http://www.res-leds.com/

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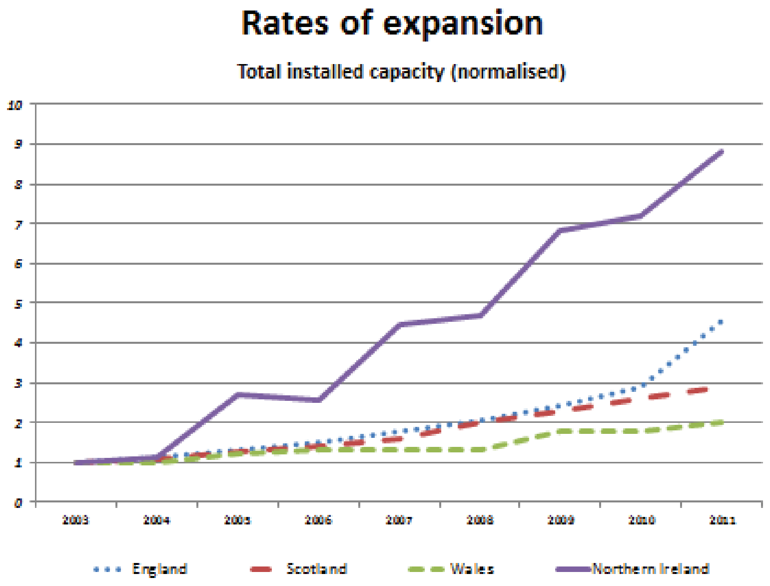
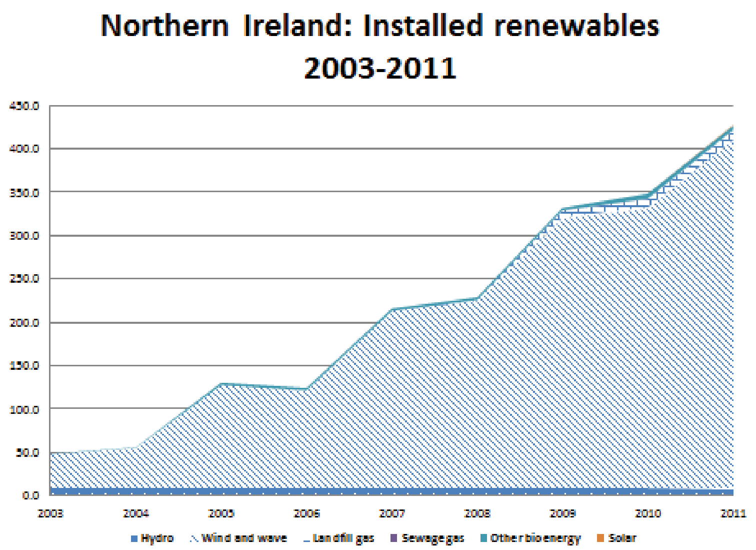
APPENDIX

Figure 1



Source: DECC Energy Trends

Figure 2



Source: RESTATS

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Figure 3

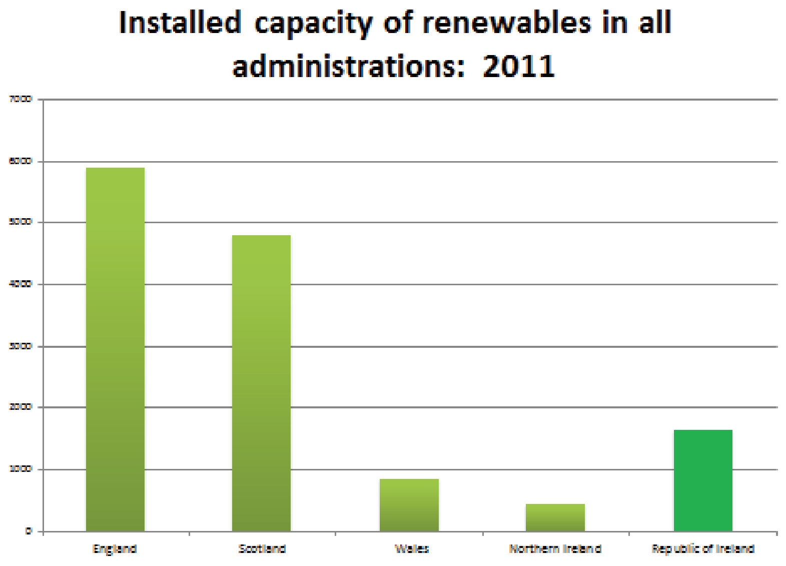

Figure 4

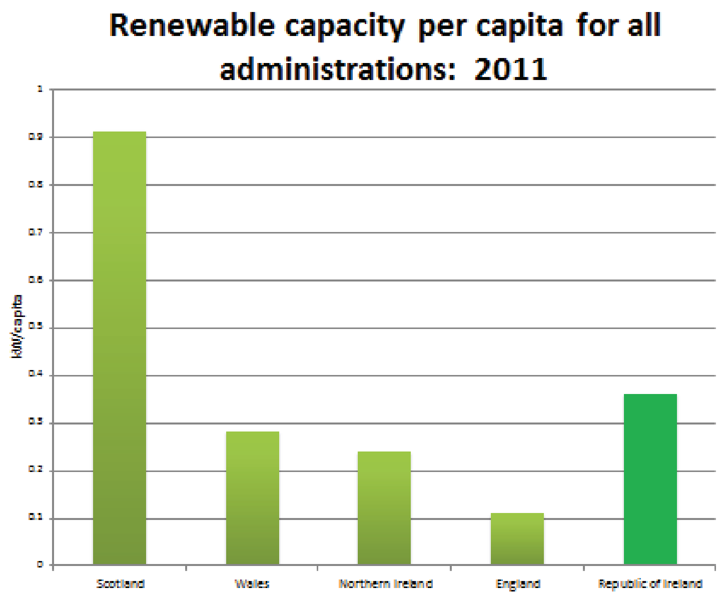

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Figure 5

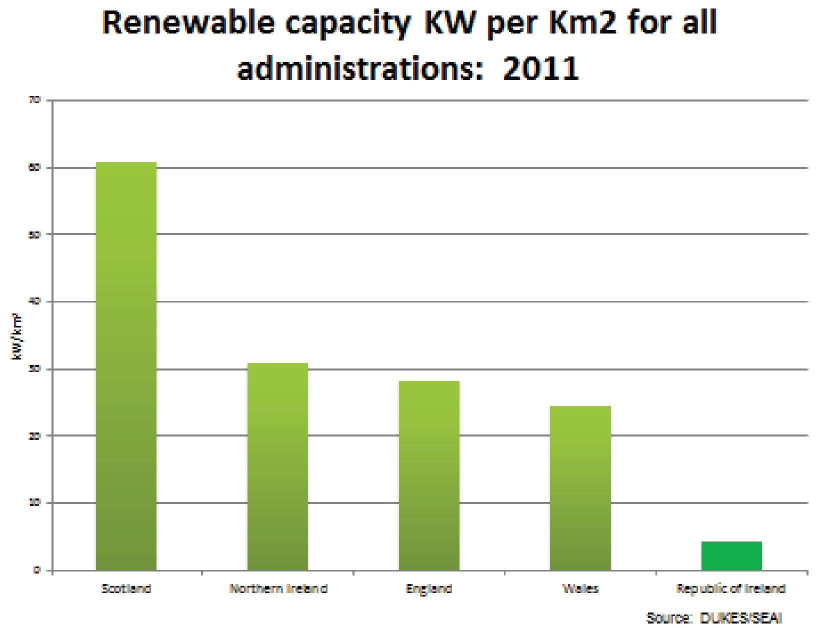
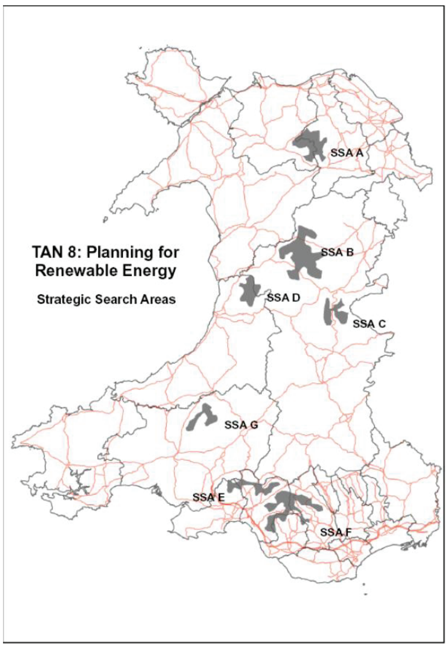
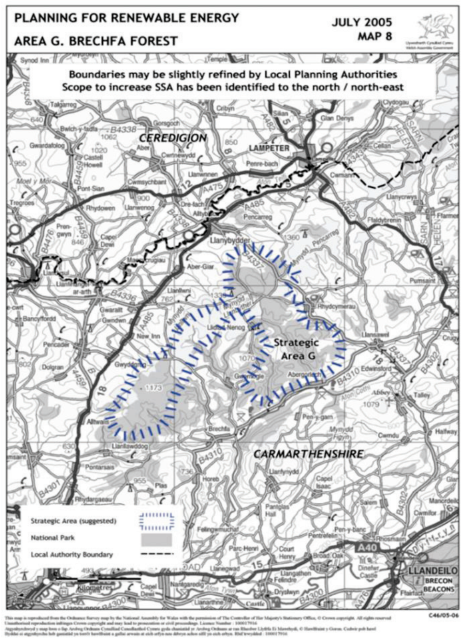


Figure 6





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Wind energy review submission – SSE Renewables

SSE Renewables
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Chairperson Ms. Anna Lo MLA MBE
NI Assembly Environment Committee
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November 7th 2013

Ref: Wind Energy Review

Dear Chairperson Lo,

SSE Renewables (SSER) wishes to make the enclosed submission for consideration as part of the current Wind Energy Review by The Northern Ireland Assembly Committee for the Environment, with a focus on the environmental and planning aspects of wind energy development.

SSER welcomes your Committee's long standing interest in wind energy and your acknowledgement of the need to reduce Northern Ireland's dependence on fossil fuels and to meet the European Union's 2020 renewable energy targets.

In the enclosed submission, SSER sets out its view in relation to the three areas under review - planning policy with regard to wind turbines; the extent to which wind energy meets our renewable energy commitment and levels of engagement with local communities. We are available, at your discretion, to address any questions or further information you may require.

About SSE Renewables

SSER is part of SSE plc, the leading generator and developer of thermal and renewable energy in Great Britain and Ireland, and is Northern Ireland's largest renewable energy developer. The green energy generated at wind farms developed by SSE Renewables helps power Airtricity, Northern Ireland's fastest growing energy provider. To date, the company has invested almost £1 billion in the development of Irish renewables.

SSER has delivered five wind farms in Northern Ireland to date, including the operational 27MW Slieve Kirk Wind Farm outside Derry-Londonderry which powers around 22,000 homes. The company is also nearing completion of the nearby 46MW Glenconway wind farm which will help power an additional 37,000 homes in the region. When completed, the Derry-Londonderry Slieve Kirk Wind Park will be Northern Ireland's largest renewable energy generation site.

SSE Renewables is a trading name of
SSE Renewables (Ireland) Limited Airtricity House, Ravenscourt Office Park, Sandyford, Dublin 18, Ireland.
Tel: +353-1-6556 400 **Fax:** +353-1-6556 444 **Web:** www.sserenewables.com

The Registered Office of SSE Renewables (Ireland) Limited is One Spencer Dock, North Wall Quay, Dublin 1, Ireland.
Registered in Ireland No. 331742. SSE Renewables (Ireland) Limited is part of the Scottish and Southern Energy Group

Directors: Fraser McGregor Alexander (British), Paul Cooley, Caoimhe Giblin, Pamela Walsh, Stephen Wheeler.

SSE has invested £400million into the future of energy in Northern Ireland to date and has a significant pipeline of new renewable energy developments. This investment is in line with the company's commitment towards serving customers, employing people and providing a sustainable, secure and competitive supply of energy to power our rapidly growing energy supply business, Airtricity, which now has over 300,000 customers.

SSER welcomes the continued strong policy support for increased renewable penetration in the portfolio mix in Northern Ireland. SSER fully supports Northern Ireland's Strategic Energy Framework 2010 which outlines the need to balance the energy mix in order to improve security of supply, reduce exposure to the volatility of world energy prices and reduce reliance on fossil fuels that contribute to climate change. It also supports the Strategic Energy Framework target of 40% of Northern Ireland electricity to be provided from renewable energy sources by 2020.

SSER supports proper planning and sustainable development and recognises that development of wind energy projects must afford protection to residential amenity and must be delivered in partnership with local communities. SSER also recognises the need to ensure 'best practice' planning and permitting procedures and, importantly, coherence between environmental and renewable energy objectives in order to ensure the delivery of Northern Ireland's targets.

The renewables industry is playing a critical role in achieving Northern Ireland's legally binding 2020 targets for renewable energy through its continued investment in new onshore and offshore generation capacity. The industry makes a very real and sustained contribution to the country's economy, offsetting expensive imports of fossil fuels, providing direct and indirect employment as well as net financial contributions to local communities, services and economies.

In the following sections, SSER provides its feedback and comments on the key focus areas of your Committees' Wind Energy Review.

1. **SSER Comments on the adequacy of PPS18 and related supplementary guidance in regulating proposals for wind turbines, in particular with regard to issues of noise and separation distances**

In the selection of suitable locations for wind farm development, careful assessment is required and exacting standards should be expected and delivered by the industry. Planning Policy Statement 18 requires that wind energy development demonstrates environmental benefits as well as minimising environmental, human and social impacts through careful consideration of location, scale and design.

SSER follows strict guidelines on wind turbines and noise emissions to ensure the protection of residential amenity. In addition, best practice for a wind farm development indicates a separation distance of 500m between turbines and houses to ensure compliance with noise limits.

<u>Wind Farms and Separation Distance</u>

Northern Ireland has a long history of rural housing and ribbon development; as a result most of the country is populated with low density housing. Policy RE1 of PPS 18 Renewable Energy includes a suggested separation of 10 times the rotor diameter to an occupied property, with a minimum separation distance not less than 500 metres.

The implementation of *rigid minimum separation distances from all dwellings and built up areas* would prove detrimental to the potential for wind energy development in Northern Ireland and contradicts the Government's supportive policy position in relation to wind energy. It would also seriously hinder Northern Ireland in meeting its legally binding EU targets for renewable generation.

In the selection of suitable locations for wind farm development, SSE Renewables carries out a detailed feasibility assessment for each potential site. This is followed by an iterative EIA process and cross collaboration of environmental specialists and design engineers, which results in an evolving design to avoid sensitivities as they arise through detailed surveying and investigation.

A research paper entitled *“Wind Turbines: Planning and Separation Distances”* was recently submitted to the NI Assembly (NIAR 767-13)[1]. The paper was prepared in response to a request from the Environment Committee and it looks at the issue of wind turbines across the UK and Europe. The paper outlines that:

- A minimum separation distance of 500m has been adopted in Wales and the Republic of Ireland
- In Scotland, a separation of 2km between areas of search and the edge of cities, towns and villages if recommended to guide developments. However, policy states that individual developments should take into account specific local circumstances and geography.
- No specific separation distance has been put in place in England. Several local councils have sought to impose minimum separation distances. It is important to note, however, that Secretary of State for Communities and Local Government, Mr. Eric Pickle, recently outlined that buffer zones backed by residents, were not the measure of whether a wind farm development was acceptable and instructed local councils not to impose minimum separation distances. Earlier this year, the High Court ruled against Milton Keynes Council, which had tried to impose a limit of three quarters of a mile between turbines and homes.
- In Germany, the separation distance for turbines is 300m from an individual property and 500m from residential areas.
- A separation distance of 4 times the total height of the turbine is recommended in Denmark.[2]

Any proposed increase in separation distances needs to consider the large number of residential dwellings in the Northern Ireland countryside. An exercise carried out in the Republic of Ireland by the All Ireland Research Observatory at NUI Maynooth demonstrated that an increase in the mandatory separation distance would have a significant impact on the potential for wind energy development in Ireland.[3]

The study found that an increase in the separation distance greatly reduced the land available for wind development. Approximately 23.75% of total land area remained using a 500m setback, and this decreased to 9.4% and 3% when the separation distances were increased to 1km and 2km, respectively.

A similar exercise was carried out for Northern Ireland and this information was presented to the NI Assembly as part of the research paper prepared by the Research and Information Service.[1] However, the results of this exercise are not included in the paper.

SSE Renewables has carried out its own assessment based on 2008 pointer data. However, this exercise did not include a detailed analysis of the pointer data (e.g. approved planning or status of residential properties) and therefore should be considered indicative.

The results of our indicative assessment are presented below. It demonstrates that wind energy development is not possible across a significant portion of Northern Ireland, even when considering a setback distance of 500 metres from residential properties. Increasing this distance will create

1 Cave, Suzie. 2013. Wind Turbines: Planning and Separation Distances. Research and Information Service, Research paper NIAR 767-13.

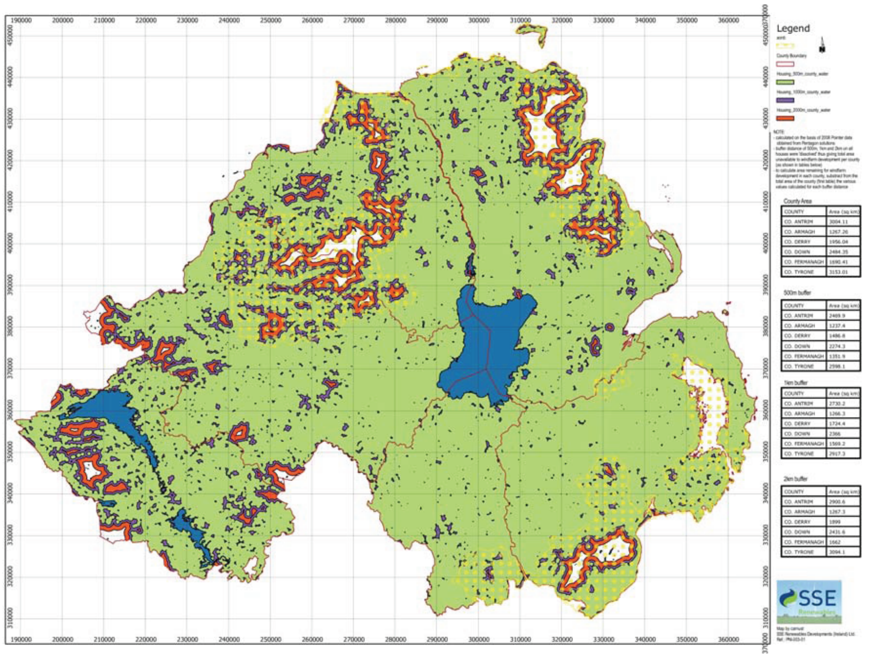
2 Haugan, K. M. B. 2011. International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences: Setbacks, Noise, Shadow Flicker and Other Concerns. Minnesota Department of Commerce, Energy Facility Permitting.

3 AIRO Mapping of asking questions of the new Wind Turbines Bill, found at http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0.

additional, unnecessary constraints and will severely limit Northern Ireland's ability to meet set government targets. This may unnecessarily rule out locations where wind energy would be entirely acceptable from an environmental and human health perspective.

The indicative analysis we conducted is broken down by county, with large waterbodies (e.g. Lough Neagh and Lough Erne) removed from the total area. It also considered the areas designated as Areas of Outstanding Natural Beauty. SSE Renewables assessment found the following:

County	Total Area (Ha)	Percentage of County Remaining by Separation Distance			Percentage of Co. Remaining (excluding AONB) by Separation Distance		
		500m	1000m	2000m	500m	1000m	2000m
Co. Antrim	3,004.1	17.8%	9.1%	3.4%	5.3%	0.4%	0%
Co. Armagh	1,267.3	2.4%	0.1%	0.0%	1.6%	0.0%	0.1%
Co. Derry	1,956.0	24.0%	11.8%	2.9%	11.1%	2.9%	0.2%
Co. Down	2,484.4	8.5%	4.8%	2.1%	0.2%	0%	0%
Co. Fermanagh	1,690.4	20.0%	7.2%	1.7%	20.0%	7.2%	1.7%
Co. Tyrone	3,153.0	17.6%	7.5%	1.9%	11.2%	4.4%	1.3%



It should be noted that the analysis conducted by AIRO at NUI Maynooth and SSE Renewables does not take into account the other key constraints which are used when developing a wind farm site.

Key constraints include the wind resource, suitable site availability, landscape sensitivities, sensitive ecology (e.g. habitats and species), watercourse buffers, avoidance of archaeological features and buffers for aviation and telecommunications interests. When these environmental constraints are applied, the total land area remaining will be significantly reduced. Therefore it should be noted that the area outlined above is an optimistic analysis when all constraints are considered.

SSER believes that the current PPS 18 guidelines are working well and applications should continue to be assessed on a case-by-case basis ensuring wind farms are not unduly prohibited by unnecessary and burdensome mandatory separation distances. It is clearly shown that the current guidelines provide adequate residential protection given the relatively few issues raised to date under these guidelines.

Wind Farms and Noise

In the selection of suitable locations for wind farm development, careful assessment is required and exacting standards should be expected and delivered by the industry. Existing planning legislation requires that wind energy development demonstrates environmental benefits as well as minimising environmental and social impacts through careful consideration of location, scale and design. SSER follows strict guidelines on wind turbines and noise emissions to ensure the protection of residential amenity. In addition, current best practice for a wind farm development in Northern Ireland indicates a minimum separation distance of 500 metres, but ideally 10 rotor diameters between turbines and houses to ensure compliance with noise limits.

ETSU-R-97[4]

The process for noise assessment is based on the '*The Assessment and Rating of Noise from Wind Farms'* produced by the Working Group on Wind Farm Noise for the UK based Energy Technology Support Unit (ETSU)-R-97 in 1996. SSER supports the continued use and further development of these guidelines. It should also be noted that ETSU limits are based on ratings levels derived from BS 4142, assessing the introduction of a new noise source relative to existing noise levels, therefore these are determined irrespective of distance.

ETSU-R-97 recommends that separate noise limits should apply for daytime and for night-time hours. It sets out an absolute lower daytime limit of between 35dB(A) and 40dB(A), or 5dB above background noise levels depending on which is higher. The value selected within this range should be dependent on the number of residential dwellings in the vicinity of the wind farm, the effect of the noise limits imposed on energy generation, and the duration and level of exposure.

During the night, the guidance is based on an assumption that residents will be sleeping inside their home. Therefore, the protection of external amenity becomes less important and the emphasis should be on preventing sleep disturbance. A fixed limit of 43dB(A) or 5dB above background noise levels, is suggested to protect sleep inside properties during the night.

ETSU-R-97 recommends that both the daytime and night-time limits can be increased to a fixed limit of 45dB(A) where a property has a financial involvement in the project.

Supplemental Guidance to ETSU-R-97

Subsequent to the publication of ETSU-R-97, additional guidance documents have been published and incorporated into best practice for noise monitoring and assessment.

The Institute of Acoustics published an update in 2009, which considered the relevant factors for noise assessment from wind energy projects.[5] The article sets out preferred procedures for the acquisition and analysis of wind data, the prediction of noise from wind turbines at residential receptors and the significance of low-frequency noise. Importantly, the article makes a number of specific recommendations about how wind data should be acquired and the assumptions to be used within noise modelling software in order to correct for errors associated with site-specific wind shear.

In May 2013, the Institute of Acoustics published *"A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise"* (IoA GPG).[6] This guidance document is a

[4] Working Group on Noise from Turbines, 1996. The Assessment and Rating of Noise from Wind Farms. ETSU-R-97.

[5] Bowdler, D. A. Bullmore, B. Davis, M. Hayes, M. Jiggins, G. Leventhall, and A. McKenzie. 2009. Prediction and assessment of wind turbine noise: Agreement about relevant factors for noise assessment from wind energy projects. Acoustics Bulletin 34(2): 35-37.

[6] Institute of Acoustics Working Group. 2013. A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise. Institute of Acoustics, Issue 1, May 2013.

practical guide to good practice in implementing ETSU-R-97, which recognises the experience and research results that have been gained since the publication of ETSU-R-97.

The IoA GPG sets out a procedure for the individual elements that make up the noise assessment process. It is particularly important as it fully defines the correct process for carrying out the background noise surveys, the timing and duration of the surveys, the monitoring equipment to be used, the siting of the monitoring equipment, the requirements for measurement and analysis of wind speed and rainfall data, the synchronisation of the of the data collected, the steps to follow in the analysis of the data and subsequent derivation of the noise limits as well as the reporting requirements following a noise modelling or measurement survey.

SSER believes that ETSU-R-97 together with subsequent guidance allow for sufficient protection of residential amenity and human health.

Noise and the Role of Existing Planning Legislation

Under existing planning legislation, wind farm applicants are required to conduct an Environmental Impact Assessment (EIA). This process is designed to identify and assess the potentially significant environmental, social or economic effects likely to result from a development proposal. The EIA is a well-established part of the planning process and the resulting Environmental Statement (ES) will be given detailed consideration in assessing the individual merits of a wind farm application. SSER strives to achieve the most optimal wind farm layout from an environmental and engineering standpoint through a hierarchy of avoidance, minimisation and mitigation of effects. Where schemes fall below the thresholds required for EIA, the planning application will include information and assessments requested by the planning authority including, where relevant, assessment of noise or other amenity matters.

This statutory assessment, conducted in parallel with detailed local consultation (including the planning authority, local communities, statutory consultees and other stakeholders) at an early stage in the pre-application phase, is designed to ensure that any potential adverse effects are mitigated for each specific application and area.

All results from noise modelling for a wind farm are detailed within the noise chapter of the ES. The turbine tower heights are included in the noise modelling. Therefore, although modern turbines have increased in size over the last ten years, importantly, these increases are reflected in the noise assessments.

All noise modelling for an ES is based on a realistic worst case scenario. No noise attenuation due to wind direction, ground absorption, shielding or screening is accounted for (up to a maximum of 2db) depending on the visibility of the wind turbine from a receptor. A ground absorption value of G=0.5 is recommended in the IoA GPG. The ground factor corresponds to the corresponding level of soft versus hard ground between the source, with G=0.5 being a midpoint between the two extreems. The loudest turbine that may be suitable for a particular site is also modelled.

During the formal assessment of a planning application, each potential planning constraint will then be assessed at a project specific level and the extent of each constraint clearly justified through the EIA process. SSER strongly supports this approach and calls for the planning authorities to make decisions on a case-by-case basis, in line with trusted policy and guidance.

Noise and the Evolution of Wind Farm Technology

The evolution of wind farm technology over the past decade has rendered mechanical noise from turbines almost undetectable with the main sound being the aerodynamic swish of the blades passing the tower. It is possible to stand underneath a turbine and hold a conversation without having to raise your voice. As wind speed rises, the noise of the wind masks the noise emitted by wind turbines.

Turbines are becoming larger, quieter and more efficient at yielding the maximum energy from a given wind speed. Increased competition in the turbine marketplace is a positive development and technology choice has increased significantly in recent years.

Noise from modern wind turbines is essentially broadband in nature**,** in that it contains similar amounts of sound energy in all frequency bands from low to high frequency. As distance from a wind farm site increases the noise level decreases as a result of the spreading out of the sound energy but also due to air absorption, which increases with increasing frequency.

This means that, although the energy across the whole frequency range is reduced, the higher frequencies are reduced more than the lower frequencies. This has the effect that, as distance from the site increases the ratio of low to high frequencies also increases. This effect may be observed with road traffic noise or natural sources such as the sea where higher frequency components are diminished relative to lower frequency components at long distances

Turbine technology is advancing year on year. Modern wind turbines have a Noise Reduction Operation mode (NRO). NRO effectively limits the turbines' maximum rotational speed and power output, to reduce the sound levels produced by the turbines. This is one of the options available to wind farm developers, should a noise concern arise.

A study by Bolin et al. (2011)[7] reviewed the current understanding of low frequency noise (LFN) and potential health effects. The review concluded that LFN (defined as 1-20Hz) from wind turbines was not audible at close range, and that this was even less at the distances where residential properties were located (at distances greater than 300m). It found that the swish sound associated with the turbine blades passing through the air was the main cause of annoyance and that this occurred in the 500 – 1000Hz range. The article concluded that empirical evidence was lacking to support claims that LFN caused significant human health issues.

Wind Farms and Strategic Zones

Concerns have been raised regarding the cumulative effects of wind farms, particularly in Co. Tyrone. SSE Renewables believes that decisions on cumulative impact should be informed by very detailed site specific information provided by Environmental Impact Assessments and planning applications. This better supports a market-led rather than high level strategic approach to onshore renewables.

Potential effects on the environment and other users will be amplified if overly prescriptive mitigation measures are used at a strategic level, rather than allowing developers to propose mitigation as part of the EIA. Cumulative effects on landscape and visual amenity, ecological and bird migration studies are comprehensively addressed by existing Environmental Impact Assessment (EIA) requirements.

Strategic zoning ignores the value of site specific characteristics i.e. a zone may exclude another area where the specific topography makes it ideal for a wind farm.

SSE Renewables has followed a 'cluster' approach to our selection of suitable wind farm sites in West Tyrone and each site has been carefully chosen to minimise any additional cumulative landscape impacts in the area. This has been achieved through careful layout design, which considers how the proposed development integrates with existing adjacent developments in the area. There may be cases where this type of approach results in a development which is environmentally and socially acceptable in an area which could easily be judged to have reached capacity under a strategic zoning approach.

7 Bolin, K., G. Bluhm, G. Erriksson, and M. E. Nilsson. 2011. Infrasound and low frequency noise from wind turbines: exposure and health effects. Environmental Research Letters 6: 035103 (6pp).

The existing planning policy framework in Northern Ireland contains supplementary planning guidance for PPS 18 on the landscape and visual amenity impacts of onshore wind development. A study defining strategic zones for onshore wind farms would be a third layer of guidance on top of PPS 18 and EIA requirements and would likely result in onshore development entering a phase of one-off, scattered wind energy developments – which could have negative environmental and social impacts at a regional level.

It is also important to consider the impact of grid availability, in conjunction with all of the other environmental constraints. Many planning approved wind farm projects across Northern Ireland are unable to progress at present due to an inability to connect to the National Grid. It is likely that the grid issues will not be resolved in the near future due to regulator constraints over funding. On recent projects, SSE Renewables has funded the development of the necessary grid infrastructure in partnership with NIE and SONI. After which the operation of the assets reverts to NIE. This represents a significant cost saving to the tax payer. However, SSE Renewables must bear the cost of this within project budgets and it is only possible to do this where economies of scale justify this additional, significant financial investment.

2. SSER Comments on the degree to which the commitment to renewable energy is met by wind energy, and how other forms of renewable energy are being promoted

Northern Ireland is heavily dependent on imported price volatile, carbon intensive fossil fuels. While fossil fuel prices fluctuate up and down in the short-term the sustained trend is upward driven by scarcity, global demand and political risk. These pressures will increase with the growth of emerging economies including Brazil, Russia, India and China. Dependence on fossil fuels impacts the affordability of energy for consumers and business and undermines fuel supply security and environmental sustainability

There is no simple solution - energy demand from electricity, heat and transport, will be met by a portfolio of energy sources - conventional and renewable - combined with demand and carbon abatement measures (e.g. carbon capture and storage). Renewables will make up a sizeable proportion of this portfolio, which in itself will be made up of a portfolio of technologies, determined by market forces. These will include in the near term onshore and offshore wind, hydro, biomass and in the medium term wave and tidal.

As stated in the Strategic Energy Framework (SEF), the precise mix of technologies deployed depends on specific decisions made by energy companies operating within an effective regulatory framework with strategic interventions from DETI. Imposing an upper threshold on onshore wind development would be a departure from the technology neutral, market led approach that will best ensure the achievement of the 40% renewable electricity target at lowest cost to the consumer.

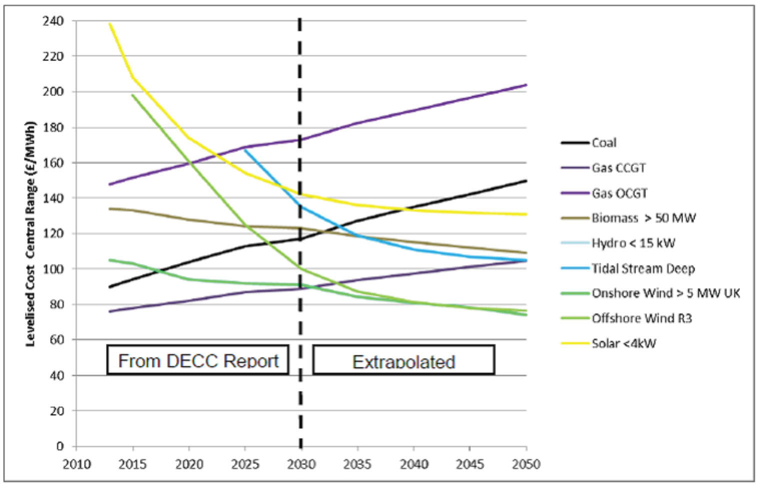
We believe that there should be a focus on deployment rates for onshore renewables rather than a focus on specific technologies. Corrective actions should be proposed, where deployment rates are slower than previously modelled, or deployment conflicts with the overarching goals set within the SEF:

- Building competitive markets;
- Ensuring security of supply;
- Enhancing sustainability; and
- Developing our energy infrastructure

We would also highlight that in the recent paper *Envisioning the Future Considering Energy in Northern Ireland to 2050* commissioned by DETI, it is shown from modelling completed by DECC that onshore wind currently has the lowest levelised cost per MWh of all renewable technologies considered and it is forecast that the levelised cost of onshore wind will be the lowest of all generation technologies by 2050. Northern Ireland's onshore wind resource is thus a huge advantage in decarbonising the economy in the most cost efficient manner.

[http://www.detini.gov.uk/2050_main_report_-_final_version.pdf]

Figure 26 Levelised costs for new generation stations



In addition, it can be seen from DECC's work on ROC banding levels, which is based on the costs and rate of return required to deliver projects, that the costs of onshore wind projects are lower than for other renewable forms of generation. These conclusions are feeding into the ongoing work on Electricity Market Reform Contracts for Difference.

Northern Ireland, like the rest of the UK and Europe, must diversify its fuel mix and harness indigenous decarbonised forms of energy to hedge international supply risks. Fortunately, NI is endowed with an enviable volume of secure, cost competitive, decarbonised energy in the form of wind power. The realisation of this potential will have significant economic benefits for NI through investment and job creation. NI must focus on how this sector can become a leading pillar of economic growth for Northern Ireland.

Our parent company, SSE plc, currently operates the UK's largest dedicated biomass facility, a Combined Heat and Power (CHP) facility and is currently constructing a 108MW multi-fuel (biomass and refuse derived fuel) project at Ferrybridge 'C' Power Station. We believe that biomass has a potential to contribute to the future renewable energy mix in Northern Ireland, but our scoping indicates that the primary constraint on dedicated large scale biomass is the availability of secure long term supply contracts for the biofuels used. Contribution from biomass is therefore likely to be limited to cogeneration at smaller industrial CHP plants – a review of local biomass production studies would help give an overall idea of potential production in Northern Ireland, and could confirm the potential contribution of biomass to the 40% target.

Although comparatively immature compared to other established renewable technologies such as on and offshore wind, marine renewables are gradually reaching maturity. Over the last decade an intensive period of R&D has seen a number of technology concepts emerge, such as Aquamarine Power's Oyster® device, that have the potential to harness significant wave resources.

The primary constraints for deployment of renewables in Northern Ireland today are planning timelines and grid development. Actions to ensure planning decisions and major grid investment projects proceed within stable and defined timeframes would boost deployment rates for all onshore renewables, and would contribute to the well-balanced, secure and sustainable energy generation portfolio that will best serve Northern Ireland.

3. SSER Comments on the extent of engagement by wind energy providers with local communities, and how this engagement may best be promoted

SSER acknowledges the growing need for social understanding and acceptance of renewable energy and related infrastructure projects.

Notwithstanding the significant contribution the industry is currently making to the local and national economy, SSE acknowledges the importance of community consultation, engagement and benefit in the delivery of renewable energy and related infrastructure projects. The protection of local communities and the delivery of long lasting benefits to communities is an important way of achieving public acceptability for such projects.

SSE believes excellence in community engagement is critical towards the success of each of its wind farms, not only during development and construction but also through the lifetime of each wind farm's operation. We become an active member of the communities in which we operate over the 25+ year lifetime of our wind farms. We believe in building meaningful relationships with all of the communities in which we operate, establishing real connections that ensure a sustainable and energy-efficient future for all.

The company is the industry's originator and leading promoter of community funding in the Republic of Ireland and Northern Ireland. Since 2005, SSE Airtricity has supported over 230 community projects, in more than 130 communities across Northern Ireland, with Community Fund awards totalling over half a million pounds. This growth is set to continue as we increase the number of operational renewable energy projects within our portfolio. Last year, the company contributed over £140,000 in community funding to local projects tackling energy inefficiency and promoting energy sustainability in communities beside its wind farms in Northern Ireland. Projects have included insulation and dry lining in community halls and primary schools to solar panels and energy efficient lighting at sports grounds and in village centres

Last year we hosted an open day at our Slieve Kirk wind farm where more than 1000 members of the public, including many families, visited the wind farm to see it in operation. More recently, in June, Airtricity sponsored the Eco-Schools Global Wind Awards, where 120 pupils from 26 schools right across Northern Ireland attended an awards ceremony in Derry/Londonderry to receive awards, participate in workshops and visit the wind farm.

SSER is a member of the Northern Ireland Renewables Industry Group and was an active participant in the development of its community engagement principles, which set out best practice principles for the industry.

Our company will continue to strive to be the leader and innovator in community engagement and benefit and recognises the importance of early, regular and consistent communication and interaction with local communities. Our team of local Community Liaison Officers will drive our community engagement strategy going forward.

SSER Conclusion

Northern Ireland has a robust planning process which is backed up by PPS18 and related supplementary guidance in regulating proposals for wind turbine. The wind energy industry has called for the timely implementation of the Northern Ireland Planning Bill as it will allow for the expedition of a number of planning reforms contained within the Planning (Northern Ireland) Act 2011. SSER supports, in particular, the inclusion of a statutory duty towards sustainable development and promoting economic development.

Finally, statutory assessment, conducted in parallel with detailed local consultation at an early stage in the pre-application phase of a wind farm, is designed to ensure that potentially significant adverse effects are mitigated. SSER strives to achieve the most optimal wind farm layout from an environmental and engineering standpoint and community consultation and engagement forms a crucial part of this process.

SSE is available to meet with your Committee to discuss this submission in more detail, should more information be required.

Yours sincerely,

Mr. Paul Cooley
General Manager
SSE Renewables

Action Renewables report – Communities & Renewable energy: A Study

ACTION RENEWABLES; CENTRE FOR SUSTAINABLE ENERGY; RICARDO AEA

Communities and Renewable Energy: a Study

A report commissioned by DETI, DoE and DARD; to undertake a study on communities and energy in Northern Ireland. In particular, the relationship between communities and the development of renewable energy, and how communities can engage with developers and participate and/or benefit from renewable energy developments.

Project part financed by the European Regional Development Fund under the European Sustainable Competitiveness Programme for Northern Ireland.

1

1 Introduction

1.1 Brief

Action Renewables, the Centre for Sustainable Energy and Ricardo AEA, came together as a project team and were commissioned by the Department of Enterprise, Trade and Investment (DETI), along with the Departments of the Environment (DOE) and the Department of Agriculture and Rural Development (DARD), to carry out a study on communities and renewable energy in Northern Ireland. In particular, the relationship between communities and the development of renewable energy; and how communities can engage with developers and participate and/or benefit from renewable energy developments. The key output of the assignment is to produce a report to a steering group consisting representatives from DETI, DOE and DARD.

The brief states that the report should make recommendations about:

a) the most advantageous potential forms of energy related community benefit in Northern Ireland;
b) best practice for community benefit in NI and recommendations as to the key issues to be included in any draft Best Practice Guidance document on the community benefits from renewable energy developments in Northern Ireland;
c) best practical steps for communities wishing to benefit from (a) community ownership of energy production or (b) community benefit and include a summary for communication with the general public;
d) the way in which government departments, including the DoE, DETI, DARD and other relevant departments) engage with key stakeholders including local communities on energy issues and developments and at what level this should take place, taking account of the Review of Public Administration).

The brief also states that a draft Best Practice Guidance document, for the relationship between renewable energy and communities in Northern Ireland should be produced.

1.2 Process

The process involved:

- A literature review comprising several key industry and government position papers and selected academic papers (see Section 4.4);
- Semi-structured interviews conducted among a sample of 26 renewable energy developers including commercial and community-led schemes (complete database provided as a separate electronic annex to this report);
- A series of in-depth case studies drawn from the sample for these interviews and other developers/schemes identified during the course of the research (shown at Annex B).The case studies were developed by Ricardo AEA;
- A series of three stakeholder engagement workshops with the government, industry and community sectors, carried out in Belfast and Cookstown in February 2013 (See Annex C);

- One-to-one interviews with officials from DETI, DoE and DARD.
- One-to-one interviews with developers, industry representatives, and community organisations.

The research methodology is based around the development of an analytical framework to collate, characterise and compare community experiences of renewable energy benefits and ownership.

1.3 Team

The study team consisted of:

- Action Renewables who were responsible for leading the team, organising the Stakeholder events, arranging the one to one interviews with government departments and industry representatives and advising on local conditions.
- The Centre for Sustainable Energy (with independent researcher Becky Willis), has particular expertise in community energy models and benefits across the UK. They were responsible for developing the analytical framework, undertaking the literature and developer interviews and for providing policy analysis and recommendations.
- Ricardo-AEA has expertise in renewable energy policy development in the UK. They were responsible for analysing the policy and planning context.

1.4 Structure of the Report

The study is presented in two documents:

1) The Summary Report, with annexes consisting of an outline for Best Practice Guidance, Case Studies, and notes of the Stakeholder meetings.
2) Supporting Documents, which includes a definition of baseline policy and practice, definitions of community models and benefit, and the database of renewable energy projects.

1.5 Limitations

The scope of the study was limited by the fact that it was originally intended to incorporate the DECC interim report on community engagement and communities, within this study, but that report had not been published by the end of April. This study does, however, consider the input that some developers, and Renewables UK, have made to the DECC process.

2 Policy Context in Northern Ireland

2.1 Renewable Energy Policy

The EU has set a target for 20% of all energy consumption[1] in the EU to be provided by renewable sources by 2020. For the UK, the target is 15% of total energy consumption. As part of Northern Ireland's (NI) contribution to the UK target, the NI Executive has set targets for 40% of total electricity consumption and 10% heat consumption to be provided by renewable sources by 2020. NI has exceeded the 12% of renewable electricity generation by 2012 target. At the end of May 2013 NI produced approximately 14.8% of its electricity, and 2% of its heat from renewables. The Programme for Government has set an interim target of 20% renewable electricity consumption by 2015 and NI is on track to meet this. The Republic of Ireland (ROI) also has a 2020 target for 40% of total electricity consumption[2] to be met from renewable sources.

As highlighted in the NI Executive's Strategic Energy Framework[3], there is a general consensus that greater quantities of renewable energy are now important for NI. The current, approximately 90% dependence on imports, to meet NI energy needs, creates uncertainty in terms of security of supply and exposes NI to the volatility of world energy prices. Additionally the NI greenhouse gas emissions reduction action plan states that levels of carbon reduction will vary for different energy mixes[4]. While it is not a completely straight line trajectory between increasing renewable energy and decreasing emissions, increasing renewable energy generation, and reducing the high proportion of fossil fuel based fuels in the NI energy mix, should reduce carbon emissions overall, helping NI become more sustainable economically, environmentally and socially.

Between 2003 and 2011 there was a 225% increase in generation from renewables in the UK, but faster rates of growth of 853% were recorded in Northern Ireland[5]. In part these figures reflect the low starting point in NI, however they still indicate the significant progress that has been made. In the ROI, across this same period renewable installations trebled. The total number of renewable developments in the UK by end 2011, excluding PV[6], was 4,292. Of this 162 (4%) were in NI, 348 (8%) in Wales, 1,494 (35%) in Scotland and 2,288 (53%) in England. A like for like comparison between the jurisdictions is not appropriate without a wider consideration of different factors including population, electricity demand, alternative fuel supplies and the electricity market. However, it is apparent that there remains potential for further renewable developments in NI.

[1] Across electricity, heat and transport
[2] http://www.dcenr.gov.ie/NR/rdonlyres/24C72FEE-7726-4C0A-BB5B-51CC878E7F87/0/RenewableEnergyinIrelandReport2011finalwebJune2012.pdf
[3] http://www.detini.gov.uk/strategic_energy_framework__sef_2010_-3.pdf
[4] http://www.doeni.gov.uk/northern_ireland_action_plan_on_greenhouse_gas_emissions_reductions.pdf
[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65917/6481-renewable-electricity-2011-et-article.pdf
[6] Not all solar PV figures for NI are captured in the DECC Report

6

The favourable Executive support policy for renewable electricity generation has resulted in an operational capacity of over 400MW of onshore wind, with 1GW of capacity currently in planning[7]. In October 2012, three offshore renewable energy sites in NI's coastal waters were awarded development rights from the Crown Estate. Together these could deliver 800MW of electrical capacity of which 600MW comprises one offshore wind project and 200MW is tidal energy[8]. This compares to the 3.5GW of wind capacity that needs to be installed in ROI, to meet its own renewable electricity targets. Wind energy will play a significant role in meeting the NI Executive renewable electricity targets. Onshore wind accounts for most of the installed renewable capacity to date and most of the capacity pending.

The largest wind farm currently operational in NI is the Slieve Rushen wind farm in Fermanagh with a capacity of 54MW, whilst the largest site in the UK currently in operation is 539MW (Whitelee in Scotland). In NI, the average capacity of wind development, greater than 100kW, is 5.3MW. Across the rest of the UK the average size is 13.7MW. Wind farms in NI are generally smaller than the rest of the UK but support levels are the same. Influencing factors on the scale of developments in NI include the scale of the land mass, high scenic quality and cultural associations of NI landscapes. Care must be taken therefore not to make a like for like comparison in the scale of renewable developments in Northern Ireland and other constituent parts of the United Kingdom and the Republic of Ireland.

2.2 Planning Policy and legislation in NI

The Department of the Environment (DOE) is responsible for planning control in NI both in relation to development management and development plan functions.

The DOE has a statutory duty, laid down in the Planning (Northern Ireland) Order 1991 ("the 1991 Order"), to formulate and co-ordinate policy for securing the orderly and consistent development of land and the planning of that development. All planning decisions should be made wholly on planning issues. Agreements under Article 40 of the 1991 Order may be necessary for a renewable energy scheme to be permitted, if there are works required to enable the development, such as infrastructure improvements to provide access to a site.

The Planning Act (2011) sets the legislative framework for a reformed planning system and transfer of the majority of planning powers to local councils. Overall the aim is to create a planning system which is quicker, clearer and more accessible.

One element of this programme of reform is the Planning Bill (2013) which brings forward certain provisions within the Planning Act 2011 to be applied by the Department in advance of the transfer of powers to the new district councils. One of the provisions the Bill is bringing forward is enhanced community involvement. Developers will be required to consult the community before submitting

[7] Taken from DECC's Renewable Energy Planning Database Dec 2012 (https://restats.decc.gov.uk/cms/planning-database) which sources data monthly from the NI Planning Portal

[8] "Successful bidders in Northern Ireland offshore energy leasing rounds" published 10th October 2012 (recovered 29 April 2013) http://www.thecrownestate.co.uk/news-media/news/2012/northern-ireland-offshore-energy-successful-bidders/

major planning applications and demonstrate they have done so appropriately, without this the Department may decline to determine the application.

The integration and application of renewable energy in NI is governed by Planning Policy Statement 18 Renewable Energy (PPS 18). The aim of PPS 18 is to facilitate the siting of renewable energy generating facilities, in appropriate locations, within the built and natural environment.

There is an accepted principle in the planning system, in all parts of the UK, that a decision about a particular planning proposal should be based on planning issues, should not be influenced by additional payments or contributions offered by a developer, which are not directly linked to making the proposal acceptable in planning terms. However, in an amendment to previous statutory provisions, a provision is included that material considerations in the determination of planning applications, includes a reference to consideration of any economic advantages or disadvantages likely to result in granting or refusing planning permission.

Identifying the economic advantages of a proposal as a material consideration could be seen as more evolved in planning policy in NI than the rest of the UK. PPS18 Policy RE1 makes clear that the wider economic benefits of a proposal (in addition to the wider social and environmental benefits of a scheme) are material considerations which must be taken into account. It also directs the decision maker to attach 'significant weight' to these benefits when determining whether planning permission should be granted.

PPS18 identifies a range of additional opportunities resulting from renewable energy developments that will support the Northern Ireland economy:

- direct and indirect employment opportunities during the construction and operational phases;
- revenue to the owners of the land on which they are built;
- employment in the manufacture of components and services;
- opportunities for rural diversification, the alternative agricultural use of land and employment in the production of biomass crops;
- a beneficial route for the utilisation of residues and wastes that might otherwise be difficult or expensive to dispose of; and
- an improved source of electricity in remote locations.

2.3 Other Policies on Community Engagement in Renewable Energy

2.3.1 DECC Community Energy Strategy

Current actions on community engagement and benefits differ across the UK, and between different developers. The Department of Energy and Climate Change (DECC) Onshore Wind – Call for Evidence[9] aims to assemble information on engagement with communities and the different types of benefits from onshore wind farms being provided across the UK and internationally. This will be

[9] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/205423/onshore_wind_call_for_evidence_response.pdf

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used to examine good practice and to provide guidance for developers and communities as to how they can best engage with, and benefit from, the process of developing onshore wind. The results of this study may be adapted in light of the findings of the DECC Call for Evidence.

In addition, the UK government announced in 2012 that it would review 'community energy', defined in a broad way to include any community involvement in energy generation or saving. DECC is investigating this issue and a Community Energy Strategy will be produced by Autumn 2013, with a UK wide consultation period over Spring/Summer. While energy is largely devolved to NI, DETI have been engaged with DECC on this matter and will be able to benefit from this work as appropriate.

2.3.2 Rural Communities Renewable Energy Fund

A £15m renewable energy fund for rural communities will be launched by the UK Department for Environment, Food and Rural Affairs (DEFRA) in June 2013. This will offer funding to community groups in rural areas (England) for feasibility studies and planning applications for renewable energy projects. A range of heat technologies, including biomass, anaerobic digestion, ground and air source heat pumps will be eligible. A key objective of the fund is that local technologies deliver benefits for local communities where the installation is sited[10].

2.3.3 Crown Estate Coastal Communities Fund

One of the ways that communities will benefit from offshore projects is through the Coastal Communities Fund, managed in partnership with the Big Lottery Fund. The Coastal Communities Fund is equal to 50% of the revenue generated by the Crown Estate's marine assets. It has been estimated the fund could be worth £23.7 million in 2012 to 2013[11]. Coastal communities in the UK are invited to apply for funding for projects that will "support the economic development of UK coastal communities by promoting sustainable economic growth & jobs"[12].

2.3.4 Scottish Government Policy on Renewables

The Scottish Government has a target to use renewable sources to generate the equivalent of 100% of Scotland's gross annual electricity consumption and 11% of Scotland's heat demand by 2020. Within this the Scottish Government has a target of 500MW of community and locally-owned renewable energy projects by 2020.

The Highland and Islands Council introduced a policy in 2011 aimed at ensuring the Council could secure local community benefit from the use of local resources in renewable energy developments[13]. The Council will seek to negotiate concordats with developers in the Highlands. These concordats will ensure that developers operate within the Council's policy and that developers negotiate directly with the Council on behalf of communities to secure the greatest level of benefit possible.

[10] https://www.gov.uk/community-energy
[11] https://www.gov.uk/government/policies/supporting-economic-development-projects-in-coastal-and-seaside-areas--4
[12] https://www.gov.uk/government/policies/supporting-economic-development-projects-in-coastal-and-seaside-areas--4/supporting-pages/the-coastal-communities-fund
[13] http://www.highland.gov.uk/NR/rdonlyres/3F804E15-AB75-4FE4-84A2-E5D142A7C7C4/0/CBPolicyfinal.pdf

Dumfries and Galloway Wind Energy Development Interim Planning Policy[14] provides a framework to encourage community benefit as a result of investment in wind energy. Argyll and Bute Council have a similar framework[15] dictating the conditions where there may be a requirement for developers to establish a community benefit fund. The frameworks outline how the community benefit fund would be redistributed (50:50 between region and community for Dumfries and Galloway and 40:60 for Argyll Bute) and how the funds could be utilised.

In Scotland, several schemes and initiatives exist for supporting community involvement with renewables. These include:

- The Community and Renewable Energy Scheme (CARES), in Scotland. With a budget of £7.75 million, CARES provides eligible community groups with free technical advice and financial support (during feasibility and planning) for renewable energy projects.
- The Renewable Energy Investment Fund, also in Scotland, which provides funding, of £103 million[16], to projects that will increase community ownership of renewables, accelerate marine renewable energy and/ or provide district heating networks.
- SP=EED[17] (Scottish Planning equals Effective Engagement and Delivery) is a benchmarking tool for community engagement in planning, prepared by Planning Aid for Scotland[18] which aims to help anybody (communities, local authorities, developers) involved in community engagement to make it as meaningful and worthwhile as possible.

2.3.5 Republic of Ireland

In the Republic of Ireland the DOE, Heritage and Local Government has published guidelines to offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission[19]. The guidelines are also intended to ensure a consistency of approach throughout the country in the identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments.

At a local council level in the Republic of Ireland, approaches to policies on renewable energy/wind power and the involvement of local councils vary considerably, and there is often limited mention of community involvement and benefits. Few Councils explicitly focus on the potential benefits of wind farm developments to local communities, for example. Below are several examples of local council guidelines on wind power and local community benefits:

County Clare

In County Clare's Development Plan 2011-2017: Wind Energy Strategy paper, the council sets out as part of its broader guidelines and strategy for wind farm development that it will seek to promote

[14] http://www.dumgal.gov.uk/CHttpHandler.ashx?id=7343&p=0
[15] http://www.argyll-bute.gov.uk/sites/default/files/planning-and-environment/community%20windfarm%20benefits.pdf
[16] Funded from NFFO contracts.
[17] http://www.planningaidscotland.org.uk/page/87/SP-EED.htm
[18] http://www.planningaidscotland.org.uk/
[19] These guidelines can be accessed at: http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1633,en.pdf

community involvement and require community benefit where possible in Wind farm developments.[20]

County Galway
In County Galway's Wind Energy Strategy 2011-2016 strategy paper, considerable attention is paid to the need for local community benefits and consultation in the development of local wind farms. In particular it is made clear that great flexibility regarding planning regulations will be considered where the wind farm is a community-led project or will have direct benefits for the local community[21].

Kildare County Council
County Kildare defers to the guidelines provided by DOE, Heritage and Local Government regarding wind power, though does not explicitly consider local community involvement[22].

Laois County Council
Laois County Council has stipulated in its development plans that it will seek to promote community involvement and require community benefit where possible in proposed wind farm developments[23].

2.4 Conclusions

Onshore wind is likely to contribute most to the short term renewable electricity targets. It is generally considered that the renewable electricity targets for NI are challenging[24] and the commissioning of a large proportion of the wind farms under development will have a part to play in meeting those targets. There is no presumption that pre-application community consultation will lead to more large scale development proposals, but where such consultation takes place, there is a greater chance of a better quality application coming into the system and therefore improving processing times.

The Planning Act 2011 and the new Planning Bill 2013 are intended to facilitate enhanced community involvement. The inclusion of economic advantages, or disadvantages, as a material consideration in the planning process should encourage renewable energy developers to recognise the value of identifying the benefits that accrue from the development. Much of the planning function will be transferred to Local Councils, in 2015.

Changes in the planning process are not primarily to support the delivery of community benefits. They will, however, provide opportunities for increased engagement between communities,

[20] http://www.clarecoco.ie/planning/publications/clare-county-development-plan-2011-2017-volume-5-clare-wind-energy-strategy-9109.pdf
[21] http://www.galway.ie/en/Services/Planning/DevelopmentPlans/CountyGalwayWindEnergyStrategy2011-2016/Copy%20of%201%20Final%20WES%20TEXT%201%20as%20adopted%2026092011.docx.pdf
[22] http://kildare.ie/CountyCouncil/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2011-2017/Chapter-8.pdf
[23] http://www.laois.ie/media/Media,6702,en.pdf
[24] http://www.detini.gov.uk/ni_offshore_renewable_energy_strategic_action_plan_2012-2020__march_2012_.pdf

developers and councils. With planning functions moved to councils and the DoE bringing forward a consolidation of its suite of Planning Policy Statements into a new simpler, shorter single Strategic Planning Policy Statement, each council is likely to develop its own bespoke policy on wind energy development through their development plans.

3 Definitions and principles

3.1 Community engagement in renewable energy

Effective stakeholder engagement has long been recognised as an important tool for ensuring successful project development and delivery in other energy-related industries. In the case of oil and gas exploration for example, the potential risks of failing to manage relationships with local communities have been a key driver for the development of highly sophisticated approaches to stakeholder engagement as part of broader corporate social responsibility strategies[25].

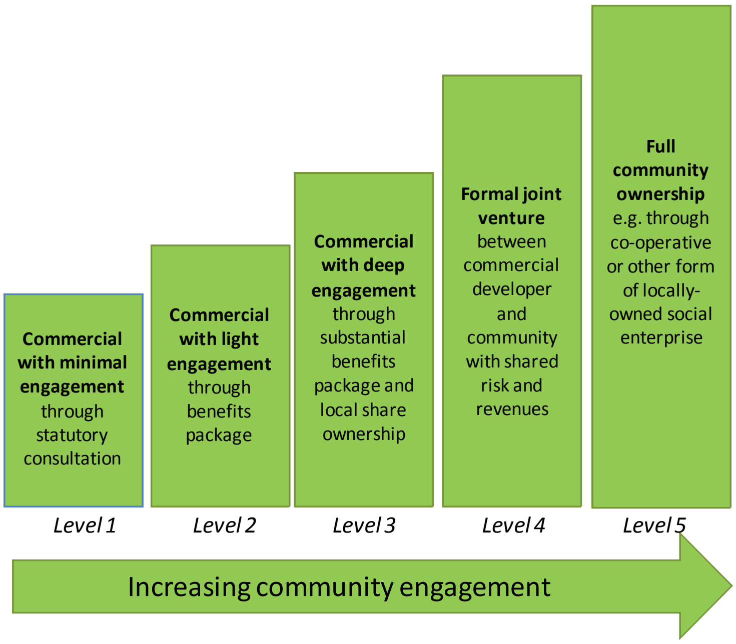
In this context, the nature and extent of the local community[26] depends on the development in question, its location and potential impacts. These would be very different for a small anaerobic digestion plant sited next to an existing dairy farm as it would for a large wind farm on a green-field site overlooking a small town or village. However they are defined in specific circumstances, local communities are key stakeholders in renewable energy developments for a number of reasons. Greater public support for renewable energy is widely seen as a key factor in achieving the rate of deployment required to meet national targets[27]. At the local level, as recognised in the UK Renewable Energy Road Map, projects are “more likely to succeed if they have [...] the consent of local communities. This means giving communities both a say and a stake in appropriately-sited renewable energy projects like wind farms”[28]. Improved public awareness of climate change and a greater diversity and security of the UK’s energy mix are among a range of other drivers identified for engaging communities in renewable energy[29]. At the same time, the potential benefits that may be derived from a renewable energy development (see section 3.2) are seen increasingly as a driver for communities to engage, either through dialogue with a commercial developer or the development of community-led energy enterprise.

In practice, just as there exists a spectrum of public participation in all types of development ranging from informing and consulting through involvement and collaboration to empowerment[30], it is possible to identify several different levels of community engagement in renewable energy developments (see Figure 1). For developer-led schemes, this engagement can take a variety of

[25] For example a voluntary global standard developed by Accountability: AA1000 Stakeholder Engagement Standard (AA1000SES), available for download at www.accountability.org/standards/aa1000ses/index.html
[26] For the purposes of this study, community has been defined in terms of locality, i.e. focusing on the location of any given renewable energy development and the people living nearby. The appropriate geographical scope of the community for the purposes of engagement and/or benefit is considered in more detail in Chapter 4.
[27] See for example: Onshore Wind – Call for Evidence. Part A: Community Engagement and Benefits (DECC, 2012), p9
[28] UK Renewable Energy Road Map (DECC, 2011)
[29] See for example Co-operatives UK and the Co-operative Group, *Manifesto for a community energy revolution*, December 2012
[30] For example, the Spectrum of Public Participation developed by the International Association for Public Participation (IAP2), available at www.iap2.org/associations/4748/files/spectrum.pdf

forms at different stages of the development process, for example during site identification; before and after submission of a planning application; and post-consent (during construction, operation and decommissioning)[31].

Figure 1 Levels of engagement in renewable energy development



- **Level 1** consists of public consultation on specific development proposals as may be required by the planning process. This typically takes the form of a call for representations to the planning authority from close neighbours and other statutory consultees in response to a planning proposal (or in the preparation of an Environmental Impact Assessment, if required), and may be enhanced by various more pro-active engagement techniques, such as public events, local media activity, project websites etc.

- **Level 2**, arguably the dominant model in the mainstream renewable energy sector, includes statutory consultation undertaken as part of the consenting process (as for Level 1) supplemented by cooperation between the developer and a representative body from the community to establish and administer a benefits fund, dispersing an agreed sum (usually based on £ per MW installed) to support local community-based projects.

- **Level 3** involves a higher level of community engagement both in the pre-application stages (for example through the developer enabling local residents or groups to contribute to the design of measures to mitigate any environmental impacts) and in the design and delivery of a tailored package of community benefits (for example including a local electricity tariff

[31] For example: The Protocol for Public Engagement with Proposed Wind Energy Developments in England. A report for the Renewables Advisory Board and DTI (CSE, 2007)

alongside a community fund). This level may also comprise some form of shared ownership, for example through a local share issue, typically once the scheme is operational.

- **Level 4**, a model most common in Scotland, involves a formal joint venture between a legally constituted community group and a commercial developer to share the risks and revenues of a renewable energy scheme throughout its entire lifecycle[32].

- **Level 5** involves full community ownership, often through the co-operative model (e.g. an Industrial and Provident Society) and is becoming more common for small-scale schemes such as roof-top solar PV installations. Despite considerable barriers at a larger scale (e.g. to securing development risk capital), a number of co-operatively owned onshore wind schemes of 5MW and above exist in the UK, and more are in the development pipeline (see Chapter 4).

The level of engagement at each stage will depend on the approach taken by the developer within the framework set by national and local planning policy and any relevant industry guidelines. Evidence from other European countries suggests that positive community engagement in specific developments is more likely to occur where there is wider public acceptance of, and support for, renewable energy and that this in turn can be generated by long-term policy support, for example through the planning regime or fiscal incentives. A previous study by CSE[33] for example found that in countries where renewable energy was built into regional and local planning strategies, decisions around individual projects tended to be less controversial, levels of community ownership were higher and local benefits were greater.

3.2 Community benefit from renewable energy

The term 'community benefit' generally refers to the range of monetary and non-monetary benefits that might accrue as a result of the presence of renewable energy development specifically to its neighbouring communities. As suggested in the previous section, these benefits can take many forms. Previous studies have defined the scope of community benefits in a number of ways, depending on whether the focus has been on the broader socio-economic benefits arising from a development or the specific mechanisms established by the developers for generating additional benefit to local people[34].

In general terms, community benefits from renewable energy developments can be categorised under four main headings[35]:

[32] The evidence from other parts of the UK suggests that outright community ownership (represented in Figure 3 as the most advanced form of engagement) is likely to be an option only if the entire development process is driven by a local community-based organisation.
[33] Community benefits from wind power. A study of UK practice and comparison with leading European countries – Report to the Renewables Advisory board and the DTI. (CSE, 2005)
[34] Either way, discussions on community benefit tend not to include the positive contribution renewable energy developments may make towards national / global policy objectives, e.g. on climate change, energy security or economic competitiveness.
[35] Adapted from: Delivering Community Benefits from Wind Energy Development: A Toolkit. A Report for the Renewables Advisory Board and DTI. (CSE, 2007)

(i) **Community funds**: a trust fund receiving a lump sum and/or regular payments from the developer/operator and awarding grants to support local community or environmental projects;
(ii) **Benefits in kind** funded by the developer/operator and including local infrastructure or other amenity improvements; direct support for local education or community projects; and reduced energy tariffs for local homes and businesses;
(iii) **Local ownership** of the development (or part of it) by local people or community-based organisations, through local share being offered for sale or gifted by the developer, joint venture or majority ownership by a community-based enterprise;
(iv) **Local supply chain**, for example through contracting to local firms and other employment and training opportunities during project design, construction and operation.

Critically, the actual value of any community benefit will depend on how it is perceived locally and this will vary both within and between communities. For example, any income generated for or payments made to a local landowner, homeowner, small business or shareholder may not be seen as a benefit shared by the whole community. Equally, every community will have different priorities in terms of how it might seek to benefit from a renewable energy development: this is a matter between the developer and the community itself. As a result, the definition of appropriate community benefit models is often seen as a key theme for engagement with local communities.

3.3 The relationship between community engagement and benefit

As noted above, community engagement and benefit from renewable energy developments are frequently inter-connected. In broad terms, as suggested by Figure 1, it might be expected that the level of benefit derived by a community from a renewable energy development with a given capacity would be proportional to the intensity of its engagement, whether working with a commercial developer or leading a scheme in its own right.

The relationship extends to the less tangible non-monetary benefits that may accrue to a community as a result of the engagement process. If managed effectively this might increase local capacity for engaging with the planning system and other local government functions; improve 'energy literacy'; strengthen cohesion and build a greater sense of self-determination. Furthermore it might be expected that many of the in-kind and supply chain benefits provided by a commercial development would be increased (subject to scale) by a scheme under community ownership with potentially closer ties to other local businesses, educational institutions and civil society organisations.

Nonetheless, it should be recognised that all forms of community engagement come at a cost and so may have an adverse impact on the business case for any renewable energy development. The benefits to developers of local support for a particular scheme (e.g. helping to reduce planning risk by minimising local objections) need to be balanced against the costs of the required engagement strategy, including local consultation activities, the design and delivery of a community benefit fund and the offer of any shared ownership options. For community-led schemes (i.e. those with the highest level of community engagement), the cost of finance and relatively low return on investment compared with large-scale commercial schemes can constitute even more significant barriers to delivery[36].

4 Analysis of current practice

4.1 Introduction

This chapter reviews current practice in community engagement in renewable energy developments, the provision of community benefits and the various options for community ownership. It draws on the findings of the following five key research tasks conducted during the course of the study:

1. A literature review comprising several key industry and government position papers and selected academic papers (see Section 4.4);
2. Semi-structured interviews conducted among a sample of 26 renewable energy developers including commercial and community-led schemes (complete database provided as a separate electronic annex to this report);
3. A series of in-depth case studies drawn from the sample for these interviews and other developers/schemes identified during the course of the research (shown at Annex B)
4. A series of three stakeholder engagement workshops with government, industry and community sectors carried out in Belfast and Cookstown in February 2013 ; and
5. Further one-to-one interviews with officials from DoE and DARD.

Based on the evidence from this review, this chapter draws conclusions on best practice in community engagement and benefit for consideration as part of future guidance for the renewable energy industry, government and communities.

4.2 Community engagement in renewable energy developments

4.2.1 Drivers of community engagement

The style and type of community engagement is influenced by 5 main factors:

1. **The style of engagement will be driven by its purpose.** If the developer is seeking simply to fulfil statutory obligations by raising awareness of the development so that the local community has an opportunity to make objections, then this will entail a different set of engagement activities to a situation where the developer wishes to work in partnership with the host community to develop a scheme that brings substantial joint benefits.

2. **Technology type and the scale of the development.** The deployment of different technologies at different scales will have qualitatively and quantitatively different impacts on host communities. Consequently the level of engagement both required and elicited by each combination of technology of a particular scale type falls on a continuum. At one extreme, large onshore wind farms may have multiple impacts on the environment, on local

[36] Harnmeijer et al (2012): A Report on Community Renewable Energy in Scotland. SCENE Connect Report, May 2012.

infrastructure and on visual amenity. Somewhere in the middle, farm-based anaerobic digestion or installation of biomass boilers may have far fewer impacts on amenity but may nonetheless lead to concerns over other potential impacts – e.g. vehicle movements caused by larger farm based AD plant taking organic waste from other farms or local air quality. At the other extreme, a domestic-scale roof mounted photovoltaic array may not be visible, require planning permission or create any other impact on the local community. Developments like this may entail almost no community engagement.

3. **Different developers have developed their own procedures, protocols and engagement strategies for community engagement** - even for fulfilling basic statutory consultation requirements. These will reflect corporate thinking on the value and role of community engagement. In addition, various industry and governmental bodies have developed guidance and protocols for community engagement which is followed to greater or lesser extents.

4. **The proposed ownership model for the development.** Co-operatively owned developments will have somewhat different objectives in realising a renewable energy project than commercial developers. For example benefits such as social cohesion, opportunities for training and skills will likely be of greater significance for a collectively owned development than for a developer owned project. This will be reflected in the style of engagement with the local community.

5. **Local governance arrangements**. Developers will work with various tiers of local government in distinctive ways. The details of local governance will vary between local authorities. For example in England and Wales, "community councils" where they are renamed parish councils are statutory consultees. However there are other "community" or "neighbourhood" councils in some parts of England which are convened by the local authority and have decision-making powers but are not statutory consultees.

4.2.2 Current processes for achieving different levels of engagement

Engagement activity is typically carried out in a defined sequence. The following sequence is drawn from consultation with on-shore wind developers in the UK but may generally apply to other renewable energy developments which have an impact on local communities and localities.

1. **Where is the site and how does it physically impact the local area?**
   The developer identifies a site and visits the area, documenting topography and layout of buildings in the immediate vicinity of the development area.

2. **Who is most impacted and in what way?**
   The developer will zone the impacts of the proposed development, typically into 2 zones: 1. those closest to the development and most impacted by it and 2. those impacted to a lesser extent and falling in a zone surrounding the main impact zone. Developers may then compile a database of contact details for owners of property in the zones for subsequent mail outs etc. This stage requires the developer to define the local community.

3. **How is the local community impacted?**
   In this stage the developer initiates dialogue with the local council to determine key local stakeholder groups, local planning issues, local development plans and other areas of concern. At this stage the developer may also begin to consider the environmental, social, political and economic impacts of the proposed development.

4. **Development of an engagement strategy**
   The developer will begin to plan their engagement strategy drawing on knowledge gathered in the previous stages. The strategy may include a mix of awareness raising activities, face to face contact, events and public meetings, development of websites and publicity material and creation of a liaison group comprising key local stakeholders and usually representatives of any locally elected bodies (e.g. in England, parish councils or in Northern Ireland, district councils). At this stage the developer may also consider the development of a benefits package (potentially including a range of shared ownership options).

5. **Implementation of engagement strategy**
   The engagement strategy is rolled out using a range of activities tailored to local circumstances.

6. **Gathering, analysing and assessment of data on community opinion**
   As part of the engagement process the developer will gather the views of the community via questionnaires and through qualitative means such as face to face contact with local residents and other stakeholders. This will be analysed and opportunities to meet any community concerns will be considered.

7. **Incorporation of changes to development plans**
   Any changes reflecting public opinion are incorporated into plans and these are then represented to the local community. This can become a continuous process.

8. **Submission of planning application**
   The developer submits their planning application which will include detail of their consultation processes and the outcome of any formal measurement of local community support.

9. **Ongoing engagement of the community during construction**
   There will be ongoing engagement activity during the construction phase not least through the secondary economic activity created by the development - for example the use of local contractors to construct aspects of the development.

10. **Ongoing engagement via ownership models and community benefit**
   Once the scheme is constructed and generating energy there will be ongoing community engagement through the establishment and management of various community benefit schemes (in the case of wind energy). Where the community has some form of ownership over the development there will also be ongoing engagement either directly through

representation on decision-making bodies or indirectly though receiving financial benefits through the ownership arrangements. There may also be ongoing engagement via creation of local employment opportunities, supply chains and in the use and management of in kind benefits.

At each of the stages identified above there are opportunities for best practice. In the following sections we consider the opportunities for best practice identified during the research at the initial scoping, consultation and pre-planning stages. Best practices for ongoing engagement via ownership models, community benefit and secondary local economic, social and environmental benefits are considered in subsequent sections of the report.

4.3 Scoping stages of the engagement strategy

Scoping stages are the activities set-out in stages 1-3 in paragraph 4.2.2 . The research indicates that the extent of engagement is mainly dependent on the technology type to be deployed and the ownership model. Even at scoping stage, it was a commonly held view by interviewees and other stakeholders that onshore wind farms require extensive engagement. Similarly, community-led wind developments also require extensive engagement to gauge community support and, where appropriate, interest in local investment. By contrast, public engagement at this stage is less likely to be required for other small scale developments, such as community-scale solar or hydro-electric developments or privately owned farm based AD plants which give rise to fewer potential impacts on the local community.

4.3.1 Start early

The importance of starting early with engagement activities was highlighted by a number of respondents and in the industry's protocol for community engagement (Northern Ireland Renewables Industry Group, 2013). Our respondents widely held the view that efforts to lodge planning applications with the minimum periods allowed for community consultation were not only contrary to the spirit of planning law but could also be counterproductive as the local community would invariably learn of the developers plans and perceive such an approach with suspicion. It is understood that there is no minimum consultation period required in NI at present but that this will change as a result of the implementation of the Planning Act (NI) 2011 (section 27). This approach may create greater opposition to the development whereas residents and other stakeholders may respond differently if provided with early opportunities to share and discuss their concerns. For example, one community developer for an urban hydroelectric scheme in GB spoke of their regret at not conducting meaningful community consultation before going to planning. As a result of this they felt they had created "quite a big" opposition group.

4.3.2 Defining the community

When scoping and designing the engagement strategy a key task and starting point for the developer is the definition of "the community" or "communities" affected by the scheme. Community can be thought of as two distinct types: community of <u>benefit</u> and community of <u>impact</u>. The community of benefit is the community able to access benefits of the development directly (such as through eligibility to buy shares or bid to a community benefit fund) or indirectly via

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benefitting from economic and environmental effects of the development (e.g. local job creation or supply chain opportunities)[37].

The community of impact refers to those who are directly impacted by the development e.g. they have an impact on e.g. their visual amenity. Other impacts that could be considered in determining community of impact could be transport routes, noise and air pollution. Sometimes the two types of community are one and the same, although often they are different. For example, in projects sited in sparsely populated areas the community of benefit is likely to be much more geographically spread than the community of impact.

Once established, these definitions of community enable developers (working with the communities and other stakeholders) to plan their engagement strategy for example: to identify who should benefit from community benefits, who should be given first option on shares, who should be invited to public exhibitions etc. However, identifying the relevant communities can be challenging because they are determined by a combination of geography and topography, political boundaries, socio-economic characteristics and local agendas – for example, areas requiring regeneration or economic stimulus according to local planning. For the purposes of the developer, community definitions may also need to be flexible. For example the boundary determining community of benefit may shift in response to local needs and as a result of negotiations, as happened in one of the schemes in the database:

> "Originally, "[the local town to the site]" wanted all the [benefit] money to go to them which the developer wasn't happy about. Eventually the local authority negotiated a 10km boundary for community benefits" Wind energy developer S

All definitions of the boundaries of a community begin with an assessment of its geographical proximity to the scheme site (CSE et al, 2007) but this will then be modified based on the other factors outlined above. The site visit phase is the opportunity to determine what those factors should be – for example if it is clear from the site visit that the local topography means that despite a group of buildings being close to the site, visual amenity from those buildings is not impacted in any way then the developer may choose not to include these buildings in the zone of most impact. When the community benefits package is under consideration definitions of community may be amended further to ensure entitlements to those most in need. Our research found the following approaches to the definition of community:

1. For a large Anaerobic Digestion scheme based at a dairy farm the impacted community was simply defined as the "neighbouring" town. Much AD in Northern Ireland is farm based and so unless the plant is fairly large scale, taking organic matter from neighbouring farms and thereby creating vehicle movements, there should be little impact on local communities. Consequently community benefit is rarely awarded for AD systems. The dairy farm described above was an exception to this rule.

[37] These definitions of community may differ from the definitions used for planning purposes under the NI planning act. This defines community as follows: "Community is taken in its widest sense and will include the public, businesses, voluntary groups and any person who has an interest in the Departmental planning functions".

2. A concentric ring system has been prescribed by some local authorities in GB, including the Highland Council in Scotland, as the basis for community definition. However, because there is no straightforward relationship between impact and proximity, this method has known deficiencies. Local topography and political and socio-economic dimensions also need to be considered. The concentric rings method it is no longer used by the Highlands Council.

3. A mixed method adopted by a large wind developer with those most impacted on the basis of proximity and topography designated "zone 1", the "micro-consultation" zone and the wider community around one 1, impacted to a lesser extent, zone 2. Political considerations are influential in deciding the boundaries of zone 2:

   > "We would draw a line around the micro-zone and could draw a line around the wider zone of impact. We then purchase the address information for everyone in those zones and use that information to contact people. That is what we use to invite people to the consultation events. For the wider zones we also look at political boundaries but we do try and base it on common sense." On shore wind energy developer I

4. Zoning by proximity as a basis for allocation of shares. For example, the board of Drumlin Wind Energy Co-op zoned the area around the wind farm as the Priority 1 area. Anywhere else became Priority 2. Residents of the Priority 1 area were offered first option to buy shares in the co-op (potentially up to 100%)[38]. The need be flexible about zoning on the basis of proximity/impact for share issue purposes is exemplified by the Kilbraur wind farm in Sutherland, Scotland. This is a sparsely populated region where it would have been impossible to raise sufficient share capital from those immediately impacted by the wind farm so the priority 1 area was defined as the whole of Sutherland, reflecting that Sutherland residents may be impacted in other ways than impacts to visual amenity. Priority 2 was anywhere else.

5. Zoning by proximity/impact and political boundaries as a basis for allocation of shares. Totnes Renewable Energy Coop took as slightly different approach for their share offer in a stake in a windfarm. The zone of most impact was defined and the boundaries of the 15 bordering parish councils identified. Only residents of the central zone and bordering parish councils were permitted to buy shares.

We can conclude that there is no one method for defining community of benefit or community of impact. Appropriate definitions of community of impact will be largely based on proximity but driven by the technology to be deployed and the local context such as topography. Likewise definitions of community of benefit and the procedures for arriving at a definition will be determined by local circumstances and the needs of respective stakeholders.

4.3.3 Do your homework – understanding the local agenda and planning issues

Early consultation with locally elected bodies, such as local council members or other community-based groups and organisations such as the Rural Support Network is considered essential. Using this first point of contact allows the developer to quickly build up their understanding of the local community in a number of key areas:

[38] As it transpired there was not much local interest in the share offer and consequently the majority of shares were sold to zone 2 – including 70% to investors based in England

1. Whether community development plans have already been drawn up with which the development could align when designing any community benefit package.
2. Identification of local stakeholders and their respective needs and agendas. For example, where are the schools, churches, community groups, local employers and political representatives? Which of these groups will be affected and how?
3. Identification of specific features of the proposed site. Information gathered from community representatives can also be used to set the agenda for the Environmental Impact Assessment (EIA). For example, one respondent remarked that early consultation had informed them of the presence of a significant archaeological site of which they had not been previously aware. This was then included for consideration in the EIA.

In the Northern Ireland context the developer should work with district council officers and the network of community support organisations, the Rural Support Network, partially funded by DARD, and with a remit to coordinate local response to planning.

4.3.4 Site visits and meeting those most impacted

Site visits that allow detailed recording of the orientation and aspect of affected buildings and homes were seen as very useful in revising plans to meet local concerns. This can be done at a very fine level of detail. For example, consideration of the aspect of windows or conservatory in a particular property looking onto the proposed site, the position of individual hedges or trees or other features of the landscape that could conceivably impact how the development is seen. It is paying attention to this level of fine detail that can be the difference between an affected resident being supportive of the development or not. This level of engagement with those most impacted may have cost implications but is considered worthwhile.

At this stage, it is also good practice to have face to face contact with residents and buildings owners in the most affected area closest to the development (zone 1). One respondent spoke of the need to have personal contact with those most affected regardless of whether they supported the scheme or not. This allowed a relationship of trust to be established so that information from the developer would be viewed as credible.

> “In my experience it’s really about personal relationships that make the difference. It’s all about trust - questions like "can we back up the information that we are providing them". So we invest our energy in parish council meetings and smaller scale stuff rather than trying to reach everyone more superficially via having a glossy website etc. I've realigned my budgets so that it’s more about the small scale stuff” Wind energy developer I

Face to face contact with those most affected will also allow the developer to listen to individual concerns at an early stage and begin to address them in the project design, where possible, thereby heading off issues that may arise later in the process.

4.3.5 Listening to the wider community

In addition to the information gathering from a) those most affected and b) representatives of the community such as local councillors there is also a place for listening to the wider community in the scoping phases. This precedes a formal consultation exercise and serves a number of purposes. It will:

1. Establish a sense of the wider community's issues and concerns.
2. Ensure that the formal community groups already initially consulted are indeed representative of the local community's agenda.
3. Help identify the most appropriate channels of communication for the wider community – for example local newspapers, websites, public meetings, social media (e.g. Facebook) pages, workshops etc.
4. Create awareness of the scheme and, where appropriate, offer an initial sounding of the feasibility of key aspects of the engagement strategy for example a local share issue.

A number of techniques have been suggested for this including door-knocking and organising workshops and focus groups. These have been described as "time consuming" but "very worthwhile" (RenewableUK, 2013).

4.3.6 Other recommendations for engagement activity at scoping stages

The research gives rise to a number of further recommendations for best practice for engagement at the scoping stages. These include:

1. Maintaining a presence within the host community so that local people know who the main contact is and can speak direct to developers. This is clearly less of an issue where the community itself is the developer. However, even where the developer is an organisation embedded within the local community it is necessary to ensure its presence is known. A community based developer described spending thousands of hours of volunteer time, door knocking and recruiting "local leaders" who could speak about the project.
2. Establishing free and open channels for communication to present information but also to allow dialogue. These include websites, social media platforms, free phone contact numbers, meetings and cards with free postage.

4.4 Development and implementation of engagement strategy

Drawing on the information gathering and scoping phases outlined above in the scoping phase, stages 4-7 involve the design and implementation of the engagement strategy otherwise known as the pre-planning application stage. The development of the strategy will be influenced by the purpose of the engagement – for example as a means of fulfilling statutory obligations or for other purposes such as raising investment capital via a share issue. Nearly all of the respondents in our survey gave indications of good practice which allowed them to go further than minimum statutory obligations. These are discussed further below.

4.4.1 The range of engagement activity

A wide range of engagement activity was identified by our respondents and is listed elsewhere in the various engagement toolkits. Some clear indications for best practice are provided. In general, face to face and group meetings were often considered the most effective means of creating engagement. However it was generally recognised that renewable energy developers are not necessarily community engagement experts. Indeed, one large wind energy developer (developer R) contracted all of the community engagement activity for a particular scheme to a 3rd party - a charity that specialised in the field – and felt this arrangement had worked very well. The most commonly employed direct engagement activities with indications of good practice are listed below.

4.4.1.1 Face to face and group meetings

- Meetings with members of parliament, councillors and officers at various levels of local and national government.
- Public exhibitions. All those identified in the zones of impact should be contacted at their mailing address and invited to public exhibitions. There are many examples of how these public exhibitions can be managed effectively. These include:
    - Having 3rd party "experts" on hand, circulating and able to answer questions
    - Employing software which visualises the scheme in 3D from different vantage points and, for wind developments, allows repositioning of turbines in response to audience requests so that different configurations can be tested for impacts on visual amenity in real time from actual mapped locations (such as an audience members home).
    - Holding the exhibitions and public meetings at times to suit different lifestyles – i.e. during the evenings and weekends as well as during weekdays
- Guided visits to operational renewable energy schemes and to the project site - "Seeing is believing".
- House visits to those in the zone of primary impact.
- For wind energy developments, noise workshop hosted by acoustics consultants to allow the public to understand the noise monitoring process and to hear recordings of wind farm noise.
- Build your own solar panel workshops.
- Height marker event. Some wind developers have piloted the use of kites and helium balloons to give an indication of the size of the proposed wind turbines at the site.
- Presentations to interested local groups.
- Participation in local community events such as fairs.
- Creation of liaison groups.
- Supply chain events to engage with local service providers.

4.4.1.2 Online, telephone, post and other media

- Provision of dedicated project website with online consultation tools, use of social media pages or blogging sites.
- Dedicated email address, free-phone number and freepost address giving opportunities for local people to express views on the project
- Frequently Asked Questions sheets to inform community of answers to general and local issues. Project newsletters.
- Press statements to local media including newspapers, radio, TV, community magazines and websites

4.4.2 Considerations in designing an effective engagement strategy

4.4.2.1 Use of guidance in the engagement design

Most interviewees in our survey did not base the design or implementation of their community engagement strategies on any published guidance. Responses were typically that they used their own experience and, for small community owned schemes, that they "made it up as they went along". Others used external consultants or the services of a third party. Two of the larger developers described using their own in-house protocols. External guidance that was mentioned was material produced by the Scottish Government, including the National Standards for Community Engagement (not specific to energy projects)[39]. One large developer also mentioned particularly consulting guidance for cross-community engagement in Northern Ireland. Other relevant guidance on engagement that has been produced but was not used or mentioned by our respondents is:

- the National Consumer Council's guidance produced under the INVOLVE programme[40] which describes 9 principles for effective and "deliberative" engagement;
- Royal Town Planning Institute's Good Practice Guidance to Public Engagement in Development Schemes[41] produced by its Planning Aid programme;
- The Scottish government's SP:EED tool[42] which also derives from the RTPI's Planning Aid programme.

We were also told that although guidance was useful on a general level, ultimately each project needs to be considered separately depending on local circumstances.

4.4.2.2 Information flow between the developer and the most affected community

All developers described how the community living closest to and most directly impacted by the scheme will be contacted on a face to face basis. This may initially be via door knocking. Developers all placed great value on this personalised approach giving residents an opportunity to have an overview of the plan and ask questions. This personalised approach was considered the best means of creating a relationship of trust between developer and affected community members meaning that evidence and information (e.g. the results of the EIA) was more likely to be perceived as credible.

4.4.2.3 Information flow between the developer and the wider community

Groups identified in the scoping stage such as local schools, church groups and other community groups are contacted with information about the proposed scheme and details of the consultation process. In addition, those identified as impacted by the development but not as directly as those in "zone 1", the zone of maximum impact are also contacted.

4.4.2.4 Role of the council in early engagement

The council can have many useful roles in the early engagement process. Respondents to our survey indicated that a perception of local council involvement in the early stages had helped to "legitimise" the project and help build cross-community support. Other developers spoke of minimal or no council involvement either with early engagement or at later stages. Other community renewable scheme developers (in GB) suggested that the local council had not been helpful.

[39] National Standards for Community Engagement: www.scdc.org.uk/what/national-standards/
[40] NCC guidance: http://www.involve.org.uk/wp-content/uploads/2011/03/Deliberative-public-engagement-nine-principles.pdf
[41] RTPI guidance:http://www.rtpi.org.uk/media/6245/Good-Practice-Guide-to-Public-Engagement-in-Development-Scheme-High-Res.pdf
[42] SP:EED is available at:
www.planningaidscotland.org.uk/images/SP=EED%20Practical%20Guide%20to%20Engagement%20in%20Planning.pdf

Our data suggests that lack of local authority involvement in these parts of the engagement process is partly due to lack of resources and/or expertise in the relevant areas. Best practice guidance for councils in Northern Ireland in these respects would therefore be useful. At present, in NI, planning decisions are taken centrally whilst the council's role is that of statutory consultee. Therefore issues of probity that arise in GB if and when local authorities are involved in negotiation of community benefits do not arise. However, following the enactment of the Planning Act (NI) 2011 in 2015, the majority of planning powers will be transferred to councils in NI. Therefore, to the extent that council officers and politicians may have a role in negotiating community benefit or in aligning community benefits with local development plans, there will be need for careful treatment of community benefits as projects make their way through the planning process - as has been the experience in GB.

It is possible that councils will not have a role in negotiating community benefits with developers in which case there is less of a need to ensure appropriate procedures are adhered to to ensure probity post 2015. However, given council duties to promote local economic activity and their strategic overview of the needs and capacities of their area there is a potentially useful role for the council in this respect. The potential role of the council in community benefit negotiation post 2015 and the relationship between this and the planning process is considered further below.

4.4.2.5 Working with political representatives

The local government reform outlined in section 2.2 will encourage all stakeholders to work more closely together. This will include councillors and planning officers. However, in its response to DECC's Call for Evidence on Community Engagement and Benefits, RenewableUK describe how meaningful engagement with local elected representatives is sometimes difficult, because some representatives mistakenly believe that it is not appropriate in terms of their code of conduct. There is a perception that engaging in the consultation exercise could be considered as supporting a proposal which they may object to in principle. The unwillingness to engage affects the level of knowledge councillors have when deciding planning applications.

The situation at present in NI is somewhat different in that planning decisions are taken centrally rather than at council level however the reform of the planning system under the Planning Act (NI) 2011 will see planning decisions transferred to councils. Confidence in the planning process could be compromised when officers involved in negotiations around community benefit packages prior to planning approval, are also involved in assessing the planning application. In these circumstances it is important to manage community benefit through the planning process appropriately to ensure probity. This issue is considered further below.

4.4.2.6 Engagement and the Planning Act (NI) 2011 and Local Government (Reorganisation) Bill

Key pieces of legislation affecting planning processes and local community engagement with development are currently in preparation. These are the legislation required to implement the Northern Ireland Planning Act (2011) and the Local Government (Reorganisation) Bill, due to be put before the Northern Ireland Executive in early 2013. Consequently, the legal frameworks for community engagement and involvement with planning processes and supporting guidance are yet to be finalised. Until such time as the legislation is in place, planning processes for renewable energy developments will be guided by DoE's Planning Policy Statement 18, "Renewable Energy" (2009) and it's associated Best Practice Guidance.

Both documents remain largely silent on best practice for community engagement, generally confining themselves to discussion of impacts, opportunities for their mitigation and procedural matters such as when an Environmental Impact Assessment should be undertaken. However, additional guidance on engagement may be needed as a result of the Planning Acts requirements for enhanced community consultation and involvement. In this respect, Sections 27 and 28 of the Planning Act set out the outline requirements for community consultation in relation to developments whilst the "at a glance" guide to the Act[43] states that reforms to the planning system will deliver "enhanced community involvement in development plan preparation, applications and appeals".

Local government reform is aligned with the Planning Act, envisioning as part of the reorganisation a greater role for "community planning" which will "provide a framework within which councils, departments, statutory bodies and other relevant agencies and sectors can work together to develop and implement a shared vision for promoting the well-being of their area based on effective engagement with the community"[44]. These changes to the NI planning system highlight the need for generic guidance on effective community engagement that could provide a framework for processes more specific to renewable energy developments.

4.4.2.7 Aligning with community or council development plans

Development of local development plans at council level is a requirement of section 8 of the Northern Ireland Planning Act (2011)[45]. These plans must describe a) the council's objectives in relation to the development and use of land in the district and b) the council's strategic objectives for implementation of those policies. The 2011 Act also requires a statement of community involvement to be in place before commencing a development plan for the district and that the development plan is to be prepared in accordance with the statement of community involvement. DoE anticipate that these very general requirements will be transposed into the working up of local development plans.

If the local community has a development plan, either of its own creation or produced in partnership with the council (as will be expected as a result of the Planning Act (2011)) then it is good practice to align the establishment and management of the renewable energy scheme with the plan. Community Energy Scotland consider community development planning "invaluable if not essential" in order to extract the maximum benefit from a large scale, revenue generating, renewable energy project (Community Energy Scotland Ltd, 2011).

In addition to the obvious strategic benefit of linking funding and other economic activity with the plan's objectives, good community development plans serve an engagement purpose. They are a

[43] Available at: www.nilga.org/getattachment/29d6a6b5-e562-457e-8e80-96a1ee9534e0/-At-a-Glance--Guide-to-the-Planning-Act-(NI)-2011.aspx
[44] From the DoE website, summarising the objectives of local government reform in respect of planning: www.doeni.gov.uk/index/local_government/local_government_reform.htm
[45] www.legislation.gov.uk/nia/2011/25/contents

useful tool for interacting with the community because they provide a framework for delivering community aspirations and evidence to funders and community members alike that the community itself has shaped the plan. They also provide a means of measuring progress against agreed objectives. The value of linking community benefit funding with the local plan has further advantages in helping to ensure that the disbursement of funds is seen as fair and serving common goals. As one wind developer put it:

> "It's very good to have a strong strategy so people can't fall out about money, which can be a big issue after a few years when it starts to build up and different people want to do different things with it" Wind energy developer S

Linking community benefit funds to a plan developed by the community also allows the developer to distance themselves from how the money is spent. We found a perception amongst the developers in our sample that being too prescriptive in how funds are spent risks creating tensions within the community and perhaps creating further objections to the scheme. A number of developers said that they would prefer the money not to be spent on unethical or anti-wind farm development activities, for example:

> "We often ask if there is parish plan available. We might read that and use it in our design our community benefit package. Also the requirements of the fund should not be too prescriptive. So we will work with local trustees - give them the say of what the money is spent on, although we would like to ensure that it is not used for anything unethical". Wind energy developer I

Therefore, from a developer's perspective, where a community plan is not already in existence it is advisable to encourage the creation of one, perhaps as part of the work of establishing a community benefit fund with good governance and terms of reference and particularly where the community benefit fund will be large. Our evidence suggests a number of challenges to community planning and in aligning renewable energy schemes with those plans. These are described below.

4.4.2.8 Challenges to community consultation: lack of interest

It can be difficult to get people to attend meetings, respond to questionnaires etc. A number of our respondents mentioned that public meetings in particular were sometimes very poorly attended. There are a number of means of addressing this including being sensitive to working patterns when organising timings, aligning information days with existing community events and identifying opinion-formers within the local community who are willing and able to galvanise interest in the scheme. Encouraging local people to attend meetings and to become engaged in the project can be extremely resource intensive. One community PV scheme organiser described how the large number of man hours involved can lead to "burnout" amongst local volunteers. Further evidence is needed, but this may present a case for government support for community level schemes.

4.4.2.9 The vocal minority and the silent majority

A number of our respondents mentioned that those most likely to express an opinion about a scheme or attend a public meeting were often opposed to it. This tendency is thought to be inherent in the design of our planning procedures whereby initial proposals are made by developers, announced to the public and then defended against public criticism. This "decide-announce-defend" model of decision making actively solicits criticism rather than support (Bell, Gray, & Haggett, 2005). This has led some to describe the planning process in general and the process of seeking planning consent for windfarms in particular as one of "democratic deficit" (Bell et al., 2005). This means that although a majority of people in the local community may support a wind energy development, the minority who are opposed may win the argument because they are more active and vocal in expressing their opinion.

It is likely that another aspect of the vocal minority effect is linked to a feature of our social psychology: many people use a mental shortcut to estimate how common something is[46]. Essentially, people make an assumption that the more examples of a phenomenon that "come to mind" then the greater the sense that something is common or typical (Tversky & Kahneman, 1973). Paradoxically, this is the case even where the examples are memorable precisely because they are rare or unusual. This effect is important because people are powerfully influenced by social norms i.e. the perception of the numbers of others holding particular opinions or behaving in certain ways. The more common we perceive an opinion or behaviour to be, the more we are disposed to adopt the same opinion or behaviour i.e.people have a tendency to follow suit. Therefore, creating memorable examples will create a sense that an opinion is commonly held i.e. it will encourage the sense of a norm for that example. So, the more vocal and memorable the objectors to a wind farm are the more they will create a sense that there are many others like them which will, via the effects of social norming, have the effect of making previously undecided individuals more disposed to adopt similar views. Of course the effect can work both ways: supporters of the scheme can use the same mechanism although the evidence suggests that supporters often remain silent. This provides a strong case for developers to engage with supporters as well as objectors and to find ways of making this support both visible and memorable to others in the community.

4.4.2.10 Establishing a liaison group

A number of wind developers talked about establishing a liaison group as a key component of their engagement strategies. The purpose of the liaison group is to facilitate information transfer between the developer and local communities via the community's representatives. Therefore liaison group membership typically comprises members of local community groups, council officials, other local stakeholders and representation from the developers. Liaison groups will occasionally invite "experts" to address them. One developer stated that it was better to use local officials who had a community interest rather than those who were responsible assessing the planning application. This acts as a further safeguard to ensure that that planning consent is only considered based on "material" considerations. Another developer mentioned that they always made a point of including representation from groups who object to the scheme wherever possible. This militates against the liaison group having a structural bias in the developer's favour. However, a third large wind energy developer described how it was difficult to get objectors onto the liaison group, "the people that put themselves forward tend to be pro the scheme" so "genuine objectors (tend to) get their communications through the liaison group" rather than first hand as a result of direct participation in it.

4.4.2.11 Engagement and social justice

The potential of opponents to block wind power developments (or indeed argue in favour of them) is likely to be greater if they fit a particular educational and socio-economic profile. The professional and better educated socio-demographic groups, perhaps with least to gain from a windfarm because they are already financially secure and do not need its economic benefits (Bell et al., 2005) are usually more skilled than others in galvanising political opinion.

[46] Called the "availability heuristic". See (Tversky & Kahneman, 1973)

This raises issues of social justice: is it fair that communities which have less "social capital" are less able to influence the planning process (Cowell et al, 2012)? And that those that have more, perhaps a minority, are more effectively able to obstruct development which could benefit the majority? In the interests of fairness this presents an argument for local communities to be supported in expressing their views, be they for or against the development.

4.4.2.12 Understanding the reasons for objection and the host community profile

A number of authors have done useful research to identify different classes of objector to renewable energy schemes. For example, "vocal minorities", "principled objectors" and "NIMBY's"(Bell et al., 2005) or "Environmental objectors, NIMBY's and Opportunists" (Rebel Group Advisory, Cowi, & ISIS, 2011). Other work has found significant differences in attitudes to ownership of community wind farms and beliefs about profit distribution amongst different socio-economic and demographic groups: for example in the context of a former Welsh mining community, Devine-Wright (2005) found that older men were more supportive of local ownership, whilst those not in work were more supportive of profit distribution than those in work. These effects were observed in the context of a highly disadvantaged Welsh mining community, which had witnessed the collapse of the mining industry and the attendant social and economic disintegration. The authors conclude that these local historical factors could partially explain the demographic differences found – unlike the younger men, the older men had worked in the collapsed mining industry and were therefore more distrustful of private ownership of energy businesses and conversely more supportive of widespread communal ownership of an energy development (Devine-Wright, 2005). The study suggests that local communities are unlikely to be homogenous in terms of their orientation towards a renewable energy development. Rather, local communities are composed of a patchwork of groups, often with different priorities and agendas which may or may not dispose them to be supportive (and engage with) a local renewable energy development. This further suggests that it is important to understand the structure of the host community when developing an engagement strategy so that all voices can be heard, concerns identified and understood and objections addressed wherever possible.

4.4.2.13 Analysis of the engagement and consultation responses

The engagement process will create a mass of information and data. This should be carefully recorded, documented, analysed and considered. This will require creation of information systems such as databases to store and organise data and methodologies for analysis of it. One developer mentioned how they had learned the importance of this through experience:

> "Yes. What they failed to do then but now do is document things adequately, mainly because at the time they didn't realise that what they were doing was particularly different, even though it was quite groundbreaking in terms of size and the sensitive nature of community engagement. These days everything is logged, responses are all logged and consultations, changes to the project. None of this is required by legislation, but it really helps" Wind energy developer I

Use of robust analysis and a documented process will be invaluable in addressing local community concerns, presenting evidence to planning and in learning from each successive development.

4.4.2.14 Using consultation responses

If the purpose of the engagement process is to align the scheme with the local community's interests and to modify it where necessary to meet their concerns, then this stage of analysis of consultation responses is very important. Respondents gave examples of where small pieces of information gathered during consultation had been very useful in heading off potentially significant issues. For example, at the site of large wind farm based on a Scottish island, the developer was informed of the need to avoid using the ferry for transporting materials at certain peak times because there was only limited space and this could result in locals not being able to get to their workplaces in good time – something that would certainly have impacted on community support for the scheme. At the other end of the scale, in another very large scheme, the developer evidently responded to the concerns of a local town that "wanted nothing to do with it" by removing around one third of the proposed turbines. This had the effect of creating a sense that the community's wishes were heard and therefore establishing some trust between the parties. This eventually resulted in the full complement of turbines being constructed:

> "Other towns were extremely cautious about them going in and dumping another project on their laps, they wanted nothing to do with it - so [the developer] ended up deleting this part of the project (about a third) which really helped them to build a lot of trust with the community. After they got the first 2/3 built they went back to speak to them - and the final third is now going ahead with whole-hearted community support. And when that gets built they'll have the funding to start working on the community plans that they presented" Wind energy developer S

Some authors highlight that trust in the motives and agenda of the developer and the sense that the local community has an influence in decisions around the development may be as important as actual ownership in creating local community acceptance of a scheme. As Wolsink suggests, local opposition is often based on distrust, negative reactions to the actors (developers, authorities and energy companies) trying to build turbines and the way the projects are planned and managed and not to wind turbines themselves (Wolsink, 2000). Using consultation responses in the design of the scheme is one means of building trust.

4.4.3 Ongoing engagement post planning application

4.4.3.1 Feedback

When developers have changed plans following consideration of consultation responses, it is very important that this is fed back to the local community as evidence that that their opinion is important. This will build trust between the parties and increase the effectiveness of the engagement process.

4.4.3.2 Engagement through construction phases

The most disruptive aspect of the scheme will occur during construction. It is important that the communication channels between developer and host community remain open during this and subsequent operational phases so that local concerns can be addressed as they arise.

4.5 Community benefit from renewable energy developments

Chapter 2 has described the range of community benefit types. Here we consider how the various types of community benefit have been established, managed and received by the host communities in our database and in the wider literature. This allows us to draw conclusions about success factors, pitfalls and challenges.

4.5.1 The origins of community benefit

The lack of a direct financial benefit of the proposed renewable energy development to the host community is regularly cited as a factor contributing to planning conflicts (Munday, Bristow, & Cowell, 2011). Conversely where communities can experience direct financial benefits as a result of the siting of the development then opposition is likely to be much less.

In the absence of any other specific arrangements, direct financial benefits are generally available when the community owns or co-owns or otherwise has a financial stake in the development. Community co-ownership is a common model in Germany and Denmark[47] and it is this ownership model that is thought to have resulted in a rapid growth in the wind energy sector in these countries (Munday et al., 2011, Wolsink, 2010). A further contributory factor cited as important in the proliferation of on-shore wind in these countries is that taxation from the scheme is retained locally and that wherever possible local suppliers are used in the sourcing of components, design, construction, maintenance and ongoing management of the scheme. All of the above serve to give local communities a strong financial interest in the scheme (CSE et al., 2007). In Northern Ireland, as in the rest of the UK, only around half of the business rates, currently charged at around £4000/MW are returned to the local council of origin.

In the UK, revenue support for wind energy has relied on using market mechanisms. This has raised barriers to entry for smaller firms and cooperatively or community owned projects because large organisations have greater access to finance and can absorb the very high up front costs incurred before the turbine blades start turning and revenue is generated. Consequently, larger firms have come to dominate the market with little opportunity for community ownership. The advent of Feed In Tariffs (FiTs) in GB has changed the picture somewhat as, while significant upfront costs are still incurred before revenue in generated, the guaranteed index-linked income over the lifetime of the project can be more easily capitalised and used to secure loans. We could expect that loans on favourable terms would also become more easily available in NI should FiTs be introduced.

For schemes that have obvious impacts on the local area and where there is little apparent direct financial benefit to the local community, as would result from a) co-ownership of the scheme b) as a result of the creation of local economic activity using local suppliers or c) greater tax revenue to be recycled locally, it is not surprising to see host communities asking, "what's in it for me?" and "what's in it for my community?" Certainly, it appears that an appeal to "environmental citizenship", i.e. to the idea that the proposed development is "good for the planet" has been shown to be an insufficient motive for scheme acceptance even where turbines are located in industrial areas (Evans, Parks, & Theobald, 2011) and are therefore less obviously detrimental to the natural environment through impacting visual amenity.

Where a sense of financial disenfranchisement is compounded by disengagement from the decision-making processes the conditions for the creation of local opposition to the scheme are in place. It is this local opposition that the European Wind Energy Association describe as "the most prominent barrier for implementation" (EWEA, 2009).

[47] In Denmark and Germany about 86% and 50% of wind energy generation is locally owned respectively (Harnmeijer et al., 2012) .

The UK wind industry's response to this has been the provision of community benefit packages (Cowell, Bristow, & Munday, 2011), but these are not without their problems too – not least that they are all too often perceived as an inducement to principled objectors to silence opposition – a framing of the benefit package that sits very uneasily with the corporate culture of wind developers who understandably prefer to see themselves as acting out of good neighbourliness or sharing the rewards of the development with the local community rather than paying compensation or buying planning consent (Cass et al, 2010).

4.5.2 The meanings of community benefit

Cass et al (2010) describe three motivations for developers to provide community benefit:

1. Being a good neighbour. The developer is acting out of a sense of corporate social responsibility.
2. Sharing rewards. The wind is a common resource which should be shared with the host community
3. Paying compensation. This motivation is the most difficult for the developer to integrate with their corporate culture as it entails an acceptance that the development has adversely impacted the host community.

Cass et al (2010) suggest that developers want to protect the purity of their motives, avoiding the framing of the development as a negative impact on the host community and the associated framing of community benefit as either compensation or as a means of buying off opposition. It also seems the presence of a community benefit does not confer a sense of community ownership over the development:

> Q. To what extent has any direct financial benefits to the community generated a sense of community 'ownership' of the scheme?
> A. They [the host community] see it as a pay-off more than anything for having the windfarm there. There are probably better ways to give them ownership - this would have to be very much around making them feel involved in the process, or some kind of equity (bonds/shares and owning a turbine) as part of a scheme.
> Wind energy developer E.

This perspective suggests that developers may be better advised to avoid the language of Corporate Social Responsibility[48] attempting to frame community benefit as "sharing the benefits" rather than as compensation because this may be perceived as disingenuous. Better to be open and transparent, acknowledging that the development may have impacts on the host community e.g. on visual amenity and therefore that community benefits are needed to compensate for those losses. This framing of community benefit as compensation is explicit in some local authority documentation. For example, the Highlands Council takes a robust approach in its policies on renewable energy development stating that where developers are using the resources of the host community the

[48] Defined by the World Business Council in Making Good Business Sense (2009) as: "Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large" See www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=83&nosearchcontextkey=true

communities should be *compensated* with community benefit funding for the "disruption and inconvenience associated with renewable energy development work"[49].

Here it is critical to distinguish between community benefits for the purposes of compensating the host community for "disruption and inconvenience associated with renewable energy development work" and the activity required to mitigate the planning impacts of the development required by planning agreements under the terms of section 40 of the Planning (Northern Ireland) Order 1991. It may be quite challenging to draw this distinction for additional in-kind benefits such as creation of wildlife reserves etc.

Cass et al (2010) also comment that communities want "contractual" certainty for their community benefit so that they are not dependent on the largesse of the developer acting out of a sense of corporate social responsibility. This again argues for a more formal, open approach to community benefit provision that is somehow included in the development process but remains immaterial to planning. A register of community benefit such as adopted by the Scottish government and a protocol such as that already developed by NIRIG or a Concordat[50] as developed by the Highland Council would help formalise community benefit in this way.

4.5.3 Community benefit in the planning process

As a planning policy guidance document, PPS 18 contains no discussion of community benefit funds which remain outside of the planning system. Other community "benefits" are mentioned however. These include: a) those works that are required to mitigate any adverse impacts of the development under Article 40 of The Planning (Northern Ireland) Order 1991 and b) secondary benefits, such as local jobs, resulting from the scheme. Policy RE 1 in PPS 18 states:

> "The wider environmental, economic and social benefits of all proposals for renewable energy projects are material considerations that will be given significant weight in determining whether planning permission should be granted"
> PPS 18 pg 9.

Therefore the intent of this policy is to include, as material considerations, such "wider" economic benefits as employment opportunities, revenue to owners of land on which the development is built, employment in the manufacture of components and services etc [51] rather than the more direct benefits often provided as part of the wider engagement process such as community benefit funds, ownership options or in-kind benefits to the local community.

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[49] Full text from the Highlands Council Concordat with developers is as follows: "The Highland Council wishes to ensure that local communities benefit directly from the use of their local resources and are compensated for the disruption and inconvenience associated with renewable energy development work. Development that has an impact on the environment and resources should be acceptable not only in land use planning terms, but should also have clear and direct benefits for those who live and work in the area. It is the Council's policy to seek funding and/or in-kind contributions from developers towards local community initiatives in respect of development, such as renewable energy schemes, which have a long term impact on the environment".

[50] The concordat is available here: www.highland.gov.uk/NR/rdonlyres/7472777D-999A-4D41-B6DC-50A42AB0648C/0/CBCONCORDATfinal.pdf

[51] The full list is given in paragraph 1.3, page 2 of PPS18.

In guidance for the UK's renewables advisory board (CSE et al, 2007) and by the renewables industry (RenewablesUK, 2013) it is clearly recommended that community benefit funds are explicitly excluded from consideration in the planning process. The Planning Act (2011) also makes no mention of these kinds of benefit for the same reason: to exclude them from consideration in the planning process.

The local planning authority has a duty to safeguard the impartiality of the planning process. Therefore by excluding community benefit packages it is thought that: a) there can be no question of planning consent apparently being bought or unduly influenced by the offer of generous financial packages to the local community or b) bidding wars between developers of who can offer the most generous community benefits package to gain planning consent can be avoided. RenewableUK also point out that where these benefits to be formally included as material to planning there would be significant knock on effects not only to other types of renewable development that do not currently have to pay community benefit (it is only the wind industry that has established this protocol) but also potentially to all applications for development. This would entail a complete overhaul of the planning laws so that benefits could be regulated and managed.

However, despite these laudable aims to distance community benefits from the planning process, the research suggests some scepticism that community benefits do not influence the planning process to some extent, despite not being treated formally as a material consideration. There is also the suggestion that even where they may not have an influence, there is a perception that they may which needs to be managed. For example, one developer mentioned that the existence of community benefit funding was publicised and discussed with the public in the earliest stages of the engagement process for a wind farm and that for wind energy developments they are now expected. Therefore, it seems likely that planning officials will be aware that community benefits packages will be associated with wind energy schemes although they may be unaware of the detail.

Therefore despite clear instructions on which factors are material to planning it seems that uncertainties remain over the degree to which community benefit funds may nonetheless have an influence on planning decisions. Note we do not speculate here on whether benefit funds have actually had an influence on planning decisions but highlight that in the minds of some developers in the evidence base and, as reported in the literature, amongst both developers and local councillors (e.g. Cass et al., 2010) , there is a perception that this may be the case or that others my perceive this as being the case. One wind developer in the evidence base described how this led to "debate", over when to introduce the figures for the level of benefit on offer to the host community:

> Q: To what extent do you feel the provision of direct financial benefit to the community has been important to allowing the scheme to go ahead?
> A. I'm not sure how much weight that would have had in the [planning] decision, it's never really made very clear. There's always a bit of a debate about when you make it clear what the benefit will be so it doesn't look like bribery, as obviously this can't be considered in the planning process. Wind energy developer E.

These tensions in the timing of introduction of community benefit are also described by Cass et al., (2010) who finds that community benefit introduced prior to planning consent is often construed as "bribery" (Cass et al., 2010) whilst when it is introduced post planning consent it may be construed as "compensation" for damages. Developers are not comfortable with either of these framings of community benefit, preferring, instead, to think of themselves as acting out of good neighbourliness or "sharing the rewards" (See 4.5.2).

In this rather complex context there are two main options to ensure probity. Either a) discussion of any community benefit should take place *post* planning consent or b) a "parallel" negotiation process can be adopted whereby discussions of community benefits are separated from the planning process, but run in parallel with different officers and councillors involved. Option a) is not considered best practice for a number of reasons:

1. All parties are aware that community benefit will be paid in any case for wind developments. Introducing discussion of it post planning consent could create a false sense of impartiality that may be exploited by objectors.

2. Community benefit packages can provide very significant economic investment and in-kind improvements to a local community. It is important that they are aligned with local community needs and therefore discussed at the earliest opportunity.

3. There are opportunities to integrate additional in-kind benefits in the design of the scheme such as layout of access roads and extensions to the electricity grid which are sensitive to local needs and would involve little or no additional cost to the developer, but which would greatly benefit the local community. It is more efficient to include these considerations in the design of the scheme that is submitted for planning approval rather than redesigning the scheme to integrate them post planning consent being granted.

As mentioned, under current arrangements in NI there is, as yet, no need for option b) because planning decisions are taken centrally without local political involvement other than as statutory consultees. However, this situation will change in 2015 with the implementation of the Planning Act (NI) 2011 described above.

Separating benefit negotiation and planning processes means that any council officers and councillors who are involved in discussions about community benefits must not become involved in planning decisions on the proposal. Appropriate officers to lead negotiation on community benefits would include the economic development officer or sustainability manager or councillors outside the planning committee. This proactive and planned approach is recommended in the protocols[52] and is

[52] See the guidance developed by Community Energy Scotland on negotiation available at:
http://www.communityenergyscotland.org.uk/assets/0001/0341/Negotiation_Process.pdf which states:
Community Energy Scotland recommends that you reach the negotiation process after building capacity through the previous modules. This process is independent of the planning process, but we would recommend that all actions are undertaken as soon as possible, and that payment details are ready to be confirmed in advance of planning permission being granted. Your local planning department will be aware that community benefit schemes are not a consideration, and the sooner you can confirm an agreement with the developer, the better.

already adopted by some local authorities (CSE et al., 2007) such as the Highlands Council. Highlands Council state in their Guidance note on Making the Most of Community Benefit funds[53] that:

> "Ideally negotiations should take place in parallel with but separate from the determination of the developer's planning application. The Council's preferred approach is for communities to take the lead in negotiations but where this is not practical or feasible the Council's local Area Manager will facilitate the negotiation process. Support is also available from Highland Opportunity Ltd, which is the Council's arms length local economic development company. The Council is committed to ensuring separation between the planning process and community benefit negotiations. Community Councils also have a responsibility to safeguard the impartiality of the planning process. Any Community Council Member taking part in the negotiation process must forgo involvement in determining the Community Council's response to the planning application". Section 2 Page 1

4.5.4 Design of the community benefit package

We found a number of approaches to the design of the community benefits package. There was broad agreement that the package should meet the needs of the local community however the means by which this should be achieved varied somewhat. Some developers preferred to leave decision-making on how community benefit funds should be spent entirely in the hands of the trustees of the fund. This was thought to be beneficial in that it allowed the community to address its own needs rather than the developer guess or decree what those needs might be. Case study 2: Gwynt y Môr Offshore Wind Farm demonstrates good practice in ensuring the design of the community benefit package involves as many representatives of the local community as possible and that the funds are structured to meet local community needs.

Others were more prescriptive, seeking to ensure that the money was spent in areas identified in local planning or strategy as of central importance to the host community. For example, the coastal area proposed for the off-shore wind farm (Case study 2: Gwynt y Môr) had tourism as its core economic activity. Therefore an off-shore wind farm benefits package was designed around boosting tourism.

Other developers wanted to ensure that the kinds of activity funded by the wind scheme had a connection to the scheme so that the link between the benefit fund and the scheme was readily apparent. This usually meant that the funding should be allocated for sustainable energy projects locally. For example, grants for micro-generation and retrofitting homes with greater levels of insulation.

4.5.5 Negotiation of community benefits

Our respondents (mostly drawn from GB) reported a number of different processes whereby the community benefits package had been negotiated. For commercial led developments, usually the local authority or parish council was involved as a representative of the local community. The involvement of local authorities (or councils) in negotiations was thought to bring a number of benefits including the ability to bring professional resources to the process, ability to readily align community benefits with local planning and development objectives and greater opportunities to

[53] This guidance note available at: www.highland.gov.uk/NR/rdonlyres/A6BE3D1D-8667-4807-9837-A8C867A9CA18/0/makingthemostofCB.pdf

either provide or source match funding for a trust fund. However, a number of disadvantages were also identified. These included the sense that the local authority may be able to inappropriately use community benefit funding to meet its own statutory funding obligations and that the local authority's idea of priorities for community spending may not always tally with those of the local community. By involving the local authority or "council" in the context of NI there is also a risk of "politicising" the management of the fund which could further alienate community groups. DARD's Rural Support Network has a clear role here in providing a framework for credible, trusted community groups to engage with developers and planning authorities in negotiating community benefit.

4.6 Community benefit types: pitfalls, challenges and success factors

As described in Chapter 2, the types of community benefit can be categorised as follows:

1. Community benefit funds
2. In-kind benefits
3. Ownership benefits
4. Secondary economic benefits

We consider how these have been implemented below.

4.6.1 Community benefit funds

Community benefit funds are the most common form of community benefit. The developer pays an amount per MW installed or output per year or a fixed sum per annum (all index linked) into a fund, which is then disbursed into the local community through a variety of mechanisms, principally via a trust fund.

It is not required by law, but has come to be expected in the UK for wind energy developments which have significant impacts on local communities. They are not commonly associated with wind energy developments in continental Europe because regulatory and market arrangements encourage other forms of benefit to flow to more effectively flow to host communities including increasing the local taxation base, generation of jobs, other supply chain opportunities and much greater opportunities for shared ownership (CSE et al., 2007). These circumstances can obviate the need for community benefit funds.

Community benefit funds are not usually associated with non wind renewable energy developments however our database does have one instance of community benefit from a hydro scheme and 2 others of community benefit funds established from cooperatively owned solar PV installations. We now explore various aspects of the implementation of community benefit funds in the UK.

4.6.1.1 Community benefit: the amount that is awarded

Various protocols, toolkits and planning authority guidance notes have been developed to set guiding principles on the amount that should be awarded and the communities to which it should be awarded to. In practice, the amount of benefit, how it should be used and the communities that are eligible to benefit from the fund will be negotiated to match the individual circumstances of the host community, its socio-economic profile and the development itself, taking account of the expected generation capacity, implementation and maintenance costs, grid[54] constraints and profitability.

Fermanagh Trust have recently compared community benefit levels between Northern Ireland and the rest of the UK and find that only 1 of the 14 wind farms located in NI had community benefit of £2000/MW or more. The others were much lower than this – 11 of the 14 were between £500 and £1000 MW. They conclude that on the whole community benefit funds are much lower in Northern Ireland than in Great Britain (Fermanagh Trust, 2012, page 45).

Figure 2 presents figures for annual community benefit in £/MW/annum for a sample of schemes in England, Wales, Scotland and Northern Ireland. A small number of the schemes shown are not yet operational (and are shown with an asterisk) however figures for community benefit for these schemes have been agreed and are reported. Most of the English schemes shown are in this category. Also shown is the size of the scheme in terms of MW installed. Northern Ireland schemes are shown with red bars. Data for this chart is drawn from 3 main sources:

a. the Scottish register of community benefits;
b. a study of community benefit in Wales by RenewableUK Cymru (RenewableUK Cymru, 2012); and,
c. a selection of case studies for Northern Ireland [55] some of which are reported in NIRIG's response to DECC's Call for Evidence on Community Engagement and Benefits (Northern Ireland Renewables Industry Group, 2012)

It is important to note that Figure 2 shows indicative levels of community benefit (£/MW) for wind-farms where information is publicly available: as we have indicated above, the sensitive nature of some community engagement has meant it is not always possible to get information on this issue. It is very important that readers understand that this does not necessarily mean that it is representative of either the size of wind-farms in that jurisdiction, or the level of community benefit in that jurisdiction.

[54] Grid connection costs in Northern Ireland are a significant issue because of the nature of the grid, currently without strong interconnection, with long connection timeframes and significant future constraint and curtailment – these all impact on the ability of the windfarm to get electricity on the grid and therefore make revenue from sale of electricity etc.
[55] It has not been possible to gather a large sample of data for ROI and England.

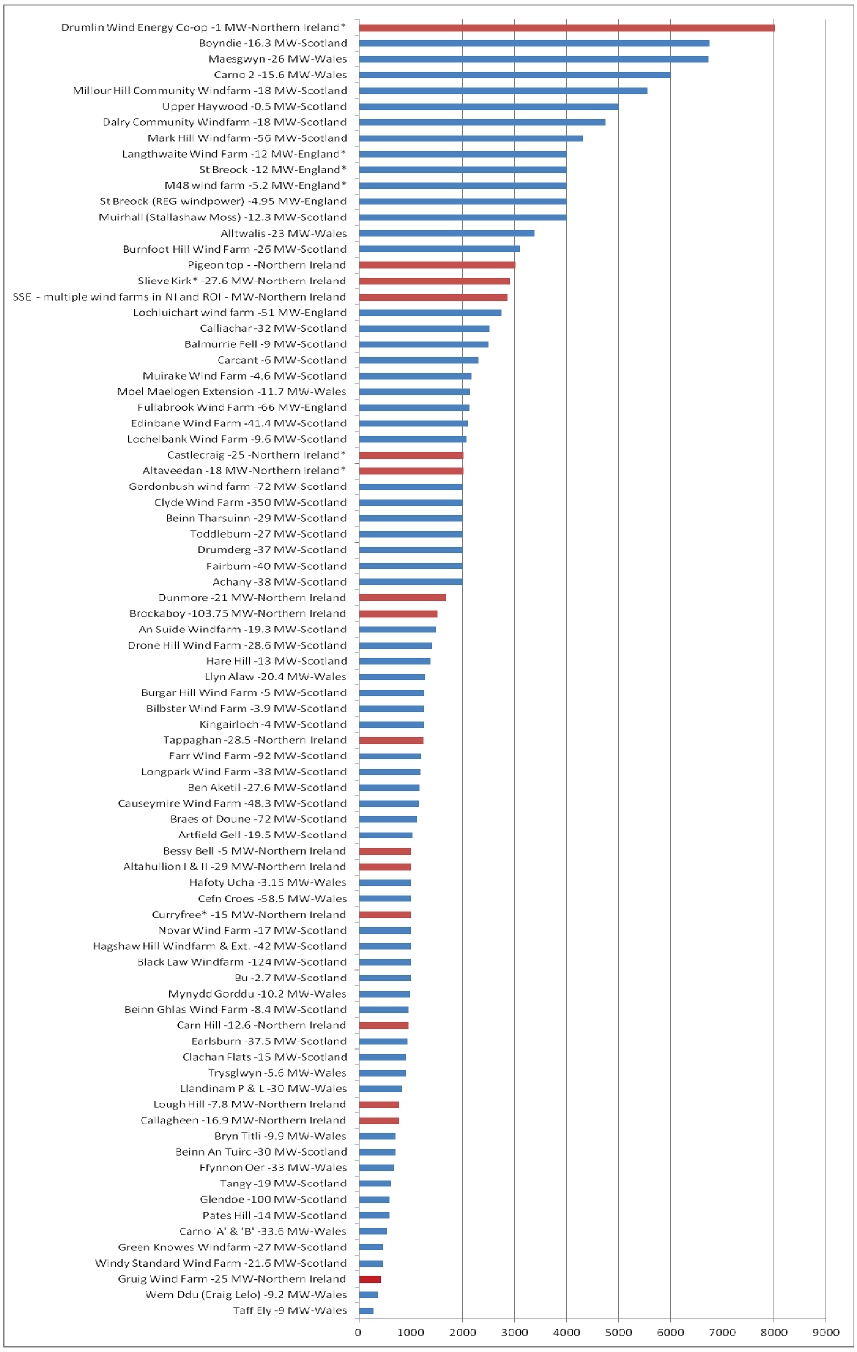

Figure 2: Levels of community benefit (£/MW/annum) for various on-shore wind schemes in Scotland, Wales and Northern Ireland awarded over the last 15 years.

Figure 2 demonstrates a very wide range of benefit awarded from around £400 / MW / annum at one extreme up to £8000 / MW / annum at the other for the Drumlins cooperative scheme in Northern Ireland. This is due to the many factors described above including: ownership model (privately owned through to cooperatively owned), developer's policy, local authority or council policy (see below), the profitability of the site, the project size, the impact of the site, location, grid capacity or restrictions, support mechanisms and levels, the needs of the local community and their skill in negotiating with developers, the other in-kind benefits that are awarded as part of the "package" and the age of installation (awareness of the potential benefits of onshore wind have grown so the level of community benefit has increased in recent years (Fermanagh Trust, 2012).

In this respect, Case study 5: multiple wind farm community benefits from SSE, demonstrate that a single developer may have a different policy on calculating levels of benefit in different regions or countries. In this instance, in NI and ROI, SSE calculates benefits from a percentage of actual revenues from the wind farm as opposed to awarding a fixed sum in GB. Consequently, the amount the funds receive in NI and ROI do vary from year to year depending on the revenue from the farm.

This is attributed to the fact that cost structures and revenues from the wind farms in both NI and ROI are different than in Scotland. For example, wind generation in Ireland cannot physically provide more than 50% of demand. This results in turbines generating for between 3-4% of the year without the electricity being sold, so no revenue is created for this period. This uncertainty over revenue is reflected in the levels of community benefit funding.

These varying factors make a like for like comparison across the regions difficult to construct. Table 1 compares the average community benefit for schemes in Scotland, Northern Ireland and Wales. Again, it is important to understand that these figures do not represent either the average size of wind-farm in those jurisdictions (because the sample is not representative of those windfarms), for instance, in Scotland, the largest onshore windfarm is Whitelee at 539 MW: the figures only represent those wind-farms for which we can get data.

	Average community benefit £/MW/annum of sample	Average size of scheme (MW) of sample	Sample size (No of projects)
Scotland	£1916	37	45[56]
Wales	£1785	20	15[57]
Northern Ireland	£1939 (£1535 if Drumlins is removed from the analysis)	24	16[58]
Total across the whole sample	£1986	31	81

Table 1: Average levels of community benefit in Scotland, Northern Ireland and Wales

Note that the average for Northern Ireland has been calculated including the figure for Drumlins which, at £8000 MW is by some way the largest in the sample. When Drumlins is removed from the analysis the average benefit figure drops to £1535.

Table 1 indicates that Northern Ireland may have lower average community benefit than Scotland and Wales, but it is not possible to say this definitely given the sample sizes and the methodology. At this level it is difficult to establish a relationship between the size of the development and the level of benefit awarded, again because of the nature of the sample being dependent on where we could find data on community benefit; we reiterate that these figures should be treated with extreme caution and no firm conclusions drawn, but they may give a rough indication of general trends.

To more accurately discern whether there are significant regional differences, a more detailed analysis is required to include a larger sample (or perhaps the entire population of wind farms in each region) age and size of the scheme and the presence of associated in kind benefits are considered and controlled for. This is difficult to achieve as official figures around community benefit are not recorded as a statutory requirement.

Although it may appear reasonable to link the level of community benefit to wind levels and size of the site, other issues must also be considered. For example deficiencies in grid capacity and interconnection in NI results in increased curtailment, impacting in turn on profitability and forcing lower revenues, reflected in lower rates of community benefit.

4.6.1.2 Community benefit levels: policy

Minimum figures have been recommended in different jurisdictions and by the various UK industry bodies. The RenewableUK figure is for a minimum of £1000/MW for developments over 5MW, although recent publication of the results of DECC's onshore wind call for evidence indicates that

[56] There are approximately 92 wind-farms in Scotland, of which the largest is Whitlee, near Glasgow, at 539 MW
[57] There are around 28 wind-farms in Wales
[58] There are around 22 wind-farms in Northern Ireland (depending on the definition) with an average installed capacity of 20MW (NIRO accredited stations only).

RenewableUK has now agreed £5,000/MW for England only. The original figure (£1,000/MW) is also reflected in the NIRIG's Community Commitment Protocol. We note that RenewableUK argues that it is not in favour of a standard flat rate for community benefit funds recognising that each development has unique circumstances which should be used to derive the appropriate level of community benefit.

A number of local authorities in Scotland have developed community benefit policies and "concordats" for agreements with developers which also recommend various minimum figures. For example, Highlands Council stipulates £5000/ MW. Argyle and Bute recommend £2000/MW with an "additional £1000/MW based on the actual output of the windfarm"[59]. Dumfries and Galloway also recommend £2000/MW. Fife doesn't provide a minimum figure but indicates the range and refers to the Scottish Government's Community Renewable Energy Toolkit which states, "the scale of community benefit from a windfarm development has been in the region of £2,500 per MW installed capacity per year. However, the economics of wind farm development can vary considerably from site to site and developers of some Fife-based wind projects have agreed to provide between £3,000-4,000per MW"[60].

Developers will also have their own recommended rates and procedures for calculating community benefit. One wind developer in our sample stated that they would provide £5000/MW in Scotland and £2000/MW in England. This reflects the tougher stance of the Scottish local authorities and also the fact that Scottish windfarms are often more profitable because the wind resource is better.
Another developer (SSE) has also recently committed to a policy of £5000/MW for developments in Scotland. Their policy is that £2500 will go to the local community fund and an additional £2500 to a regional development fund.

Developers that are also cooperatives will have a different approach to community benefit funds reflecting their different objectives: for example, the Drumlins co-op in Northern Ireland proposes to provide £8000/MW into a community trust fund. This very high level of community benefit is also enabled by the design of the Drumlins scheme: 4 separate turbines each 250 kW in size and therefore separately able to qualify for the current higher rate of Renewable Obligation Certificates (ROCs).

4.6.1.3 A regular sum or an amount linked to the energy generation

Community benefit funds in our sample were nearly all provided as a fixed sum (index linked) every year rather than as a percentage of the scheme's revenues which would vary year on year depending on how windy it had been. A number of our respondents considered this as good practice as it allows the community to budget accurately and to capitalise loans on favourable terms.

4.6.1.4 Subsidised electricity

Two of the large wind developers in our sample described plans for trialling discounted electricity to homes and businesses near their turbines. Payments are made directly into customer's electricity/gas accounts on an annual basis and should amount to £100-£250 per year. These pilots

[59] www.argyll-bute.gov.uk/sites/default/files/planning-and-environment/community%20windfarm%20benefits.pdf
[60] http://www.communityenergyscotland.org.uk/assets/0000/6697/Fife.pdf

are taking place in Scotland and Wales respectively. The Welsh scheme will be funded by £3000/MW donations from developers. One developer is currently in negotiations with NIE about this also happening in NI.

There is obviously no compulsion to take part in the scheme and any unused funds from those that do not wish to subscribe are returned to a general community benefit fund. Subsidised electricity has an appeal to the developers because there is a direct and salient linkage between their electricity generation activities and the form of the benefit. There is also an opportunity to directly tackle the issue of fuel poverty via this mechanism.

4.6.1.5 The effectiveness of community benefit funds in creating support

We explored how effective community benefit had been in "helping" schemes to go ahead. There was a clear indication that community benefit was influential in some circumstances and much less influential in others. For example, one wind energy developer described how the provision of financial benefits was less influential in "allowing schemes to go ahead" in "better off" areas.

> Q. To what extent do you feel the provision of direct financial benefit to the community has been important to allowing the scheme to go ahead?
> A. "There has been schemes where it has been important - sometime it does and sometimes it doesn't [make a difference]- it does have to do with local demographics. Better off areas have less need of community benefit. The hardest parts to develop are where people have gone to retire - they feel they have bought the house and with it the whole landscape. It's very important that our community benefits are never seen as a bribe. It can help as a balance. If you team your scheme up with things are important locally - local jobs then it is more influential. If people are opposed then the size of pot of money won't make any difference so it would be pointless increasing it from 1 to 2 K / MW or whatever".
>
> Wind energy developer I.

The point made above i.e. that increasing the amount of community benefit will not be effective for some groups is also interesting. This suggests that a mix of different types of benefit, rather than only direct financial benefits, may be more effective in securing local support for a development. It may also suggest that there may be some parts of the local community that will never support the development regardless of the benefits on offer. One developer commented, "it can be influential but it's not enough to swing hardline objectors".

The relative influence of community benefit funds seems particularly closely linked to whether the financial benefits are actually needed by the host community – for instance for the purposes of economic regeneration. This suggests that a mix of different types of benefit or engagement, not only financial benefits, (such as formal involvement in the decision making processes) will be necessary to create support across as broad a spectrum of the host community as possible.

4.6.1.6 The effectiveness of community benefit funds in creating positive change

In terms of the community benefit funds creating changes in the local communities, the response from developers indicated that they had witnessed a great number of positive outcomes from the funds. Where the funds had been targeted at energy related activities such as insulation and microgeneration schemes, some respondents reported synergistic effects – a general level of awareness raising of sustainable energy issues that had led to other energy related projects, establishment of energy cooperatives etc. Case study 3: The Callagheen Community Wind Farm Fund exemplifies a Northern Ireland scheme where community funds are spent on a very broad range of activities, not only related to sustainable energy. Case study 4: RES community funds also serves to demonstrate the very wide range of activities that can be funded via a community benefit fund and highlights the community's wishes for the funds to have flexible criteria for what they may be spent upon. However, there is a danger that by adopting this scattergun approach that synergies will be lost.

4.6.1.7 Community benefit funds and (a sense of) community ownership

Not everyone within a local community will wish to take a share in renewable energy scheme, either community owned or via a straight investment in a commercial development - either because they do not have the funds to invest or because they have no interest in the scheme. In this circumstance developers have a couple of options. Either local shares can be gifted to the local community or a sense of ownership and a financial stake in the project can be generated through creation of a community benefit fund. However our evidence suggests that community benefit funds do not create a sense of community ownership. For example:

> Q. To what extent has any direct financial benefits to the community generated a sense of community 'ownership' of the scheme?
> A. They see it as a pay-off more than anything for having the windfarm there. There are probably better ways to give them ownership - this would have to be very much around making them feel involved in the process, or some kind of equity (bonds/shares and owning a turbine) as part of a scheme.
> Wind energy developer E.

Or

> A. They get a certain amount of money depending on the operational year. The feeling of community ownership as a result of the community benefit I would say is actually very low.
> Wind energy developer I.

Or

> A. Share ownership creates a greater sense of ownership than a community trust fund
> Wind energy developer Ed.

These findings suggest that community benefit funding will have little effect in creating a "sense of ownership". Other community benefit types may be more effective.

4.6.1.8 Capacity of the trust to manage community benefit funds

A number of respondents voiced concerns that those managing community trust funds were not always sufficiently resourced to manage the often large sums of money involved:

> "Their main issue has always been the expectation that the community or people in that community may not have experience of handling large sums of money - the company ethos is very community focussed and community minded - so it does require a significant time investment. [You] can't just throw it into the community and leave. Receiving the money directly may not be the best way, so we are also considering others such as ownership in wind farm, apprenticeships, local tariffs etc on future schemes". Wind energy developer F.

Some respondents felt it was incumbent on the developer to help the trust manage the funds in some instances. This would entail helping put in place good governance and procedures and perhaps resourcing the management of the fund financially. One developer saw this investment as critical to the success of the community benefit scheme:

> "Success is dependent on if the developer is very willing to become part of that community (for 25 years!) - they need to be prepared to help the community handle the funds or at least give them the structure to do it effectively themselves. Also think carefully about the size of the fund". Wind energy developer E.

This same developer had established a paid position, "a secretary with lots of experience" to provide the back office support needed to manage the fund and to help gain the trust charitable status. In addition the directors of the trust had to "prove they had a business mind to be elected".

Various toolkits and guidance notes provide detail on the options for establishing appropriate governance and support to community groups to manage community benefits[61]. Above and beyond the availability of guidance, these findings suggest that in some circumstances, trust fund managers may need to be actively resourced and supported by the developer or perhaps the local council.

4.6.2 In kind benefits

In our sample the range of in-kind benefits encountered were usually centred around 3 main types of activity:

1. Improvements to local community infrastructure, landscape or habitat
2. Social and economic benefits such as sponsorship of local teams, providing opportunities for work experience, internships and even local apprenticeships.
3. Educational – visits to schools, sponsorship of exhibitions and events etc.

These benefits were additional to those required to mitigate the schemes impacts under planning gain agreements and were "always well received".

> "In broad terms they offered to do the restoration [of local habitat damaged by mining] to get support, but what they did was actually way beyond what was needed, and it definitely made them more popular in the eyes of the local community."
> Local authority officer referring to activities of wind energy developer SP

Community benefit being construed as a form of inducement is evidently less of an issue for in-kind benefits:

> "Anything as a developer that is above and beyond, showing the local community that you're willing to go beyond for them, is always received well. We've never had anyone accuse us of trying to bribe them in this sense, but have had this with the direct financial benefit". Wind energy developer E.

This may in part be because infrastructure or landscape activity to mitigate scheme impacts are often required in any case as part of planning gain requirements. Additional works can be integrated with mitigation activities but the line between what is required and what is additional will inevitably often become blurred.

[61] For example, this useful guidance from the Highlands Council: www.highland.gov.uk/NR/rdonlyres/A6BE3D1D-8667-4807-9837-A8C867A9CA18/0/makingthemostofCB.pdf

In-kind infrastructure benefits can also be built into design of the scheme, often at minimal extra cost to the developer. Establishing how this may be achieved is dependent on good consultation and engagement with the host community and its representatives at the earliest stages. For example, one developer described how the gates for access roads to the site (subsequently to be used for more general use) were designed so as to be suitable for disabled people. Another described how they had identified an important local manufacturing business powered by diesel generators and been able to adjust the routing of the electricity transmission system so that the business could run from the grid, saving it significant sums and removing a carbon intensive electricity supply.

We also asked whether the host communities had experienced a greater sense of cohesiveness, empowerment or resilience as a result of the renewable energy schemes as a form of in-kind benefit to the area. Where schemes were cooperatively owned the answer to this was an unequivocal yes. The experience of establishing a community asset, which often had lead in turn to a number of spin off activities had made people think more about doing things for themselves, collectively, rather than waiting for things to happen.

4.6.3 Ownership

Chapter 2 has described the basic characteristics of the various models of ownership. Here we consider the pros and cons of each in respect of their engagement with host communities in some more detail.

4.6.3.1 Commercial developer owned

Ownership by a commercial developer is by far the most common model of ownership in the UK. Figures for Scotland suggest that 97% of on and off shore wind energy is commercially owned (3% is "locally" owned) (Harnmeijer, et al 2012). In terms of engagement the fundamental issue with commercially developed and owned renewable energy schemes are the degree of local opposition that they can generate. The European Wind Energy Association report that 40% of developer led wind energy projects across the EU receive lawsuits against them at the Environmental Impact Assessment stage resulting in serious threats to the project's viability (EWEA, 2010). Negative attitudes to commercially led windfarms are particularly potent in stalling deployment of the technology in countries which do not have *networks of support* for wind and other forms of renewable energy to counter the messaging of the anti-groups. One very important mechanism for creating networked local support is through widespread community ownership of wind energy schemes. This has been identified as a critical reason in explaining different deployment rates of wind energy in EU countries (Toke, Breukers, & Wolsink, 2008).

As described in chapter 2 there are also models of ownership whereby the developer maintains ownership and full management of the scheme but the community has a stake via either direct investment (ownership of shares) or ownership of a right to a percentage of the profits (the royalty instrument mechanism). In this mechanism a cooperative is formed which raises share capital to buy the royalty instrument. Profits are returned to the shareholders in the coop who sometimes set aside a percentage of those profits to fund their own community benefits fund. This latter model was pioneered by one of the wind energy developers in our study in partnership with Energy4All and has proved extremely successful. The developer expressed surprise that the rest of his direct competitors were not doing something similar.

The form of ownership is not the whole story in reducing opposition. Bell et al., (2005) find that it is important to distinguish between the economic and the social and political aspects of ownership. Reduced opposition to community wind farms might be due more to conferring greater local control over the siting process, including local accommodation of the concerns of qualified supporters of wind energy and the personal concerns of objectors than to financial incentives offered by share ownership. They conclude that if it is control rather than money that reduces opposition to wind farms, private developers should not expect to overcome local opposition by selling (or giving) shares in wind farms to local people but they might reduce opposition by involving local people in the planning, development and management of wind farms i.e. by adopting a collaborative approach from the outset.

In summary we can say that the lessons learnt from many wind energy projects show that local involvement and local ownership facilitate dialogue and acceptance[62] and that better engagement with local communities is a critical requirement in reducing opposition and meeting deployment targets. For some governments this understanding has prompted the creation of new regulation around wind energy development: to achieve better engagement via the mechanism of partial community ownership of schemes the Danish Promotion of Renewable Energy Act (2008) imposes an obligation on all new wind energy projects to offer a minimum of 20% ownership to host communities via e.g. cooperatives[63]. We consider community ownership in further detail below.

4.6.3.2 Community owned

The rate of community ownership of wind energy developments varies dramatically across EU countries. Toke et al.,(2008) provide a breakdown of the situation in 2008 in Figure 3.

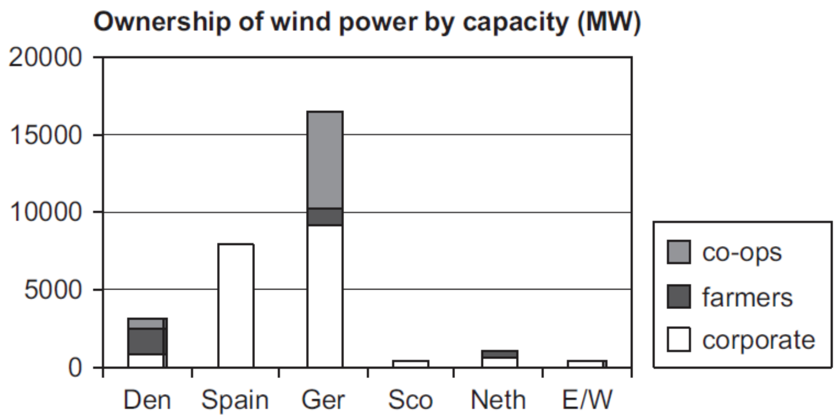

Figure 3: Ownership types of wind power by 6 EU nations. Source: Toke et al., (2008) **pg 1140**

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[62] See recommendations of the Good Practice Wind Guide, Intelligent Energy Project: www.project-gpwind.eu/index.php?option=com_content&view=article&id=35:social-communication&catid=19:optimising-social-acceptance&Itemid=217

[63] The english text of the act is available at : www.ens.dk/en-US/Info/Legislation/Energy_Supply/Documents/Promotion%20of%20Renewable%20Energy%20Act%20-%20extract.pdf

Evidently there are much higher rates of cooperative (local) ownership in Denmark, Netherlands and Germany than in Scotland, Spain and England and Wales. It is thought that local ownership may counteract some of the objections to wind power schemes raised on landscape grounds and that enthusiastic farmers can deploy their local contacts to reduce the scale of planning controversies compared to outside utility or corporate-funded developers.

Toke et al., (2008) suggest that locally inspired and locally owned projects can help improve the prospects of *all* schemes being given planning consent i.e. both commercial and non-commercial - it is plausible to argue that the lack of farmer and co-operative ownership in England/Wales has significantly exacerbated planning controversies whilst in Denmark and Germany various sources attest to the higher rate of planning acceptance for locally owned projects. They conclude that this is at least partly because local ownership creates a network of support at grass roots levels for wind energy which can effectively counteract opposition. In this respect several of our wind energy developers noted that it was an important part of their engagement strategies to get the supporters of schemes to be vocal about their support, not ceding this space to those that were opposed (see 4.4.2.9). Also, that this was not always easy.

So the advantages of some level of community ownership are apparently twofold: on one level it reduces opposition to the scheme in question and at another level it arguably also improves the general planning environment for wind power through creation of grass roots networks of support.

By comparison with the standard commercially owned plus community benefit fund model there is also an economic case for community ownership as a means of injecting significant sums of money into economically disadvantaged areas. With reference to wind development in Wales, Munday et al., (2011) find that amounts placed in community benefit funds are fairly low when compared with the potential returns associated with community owned schemes. An example of the greater financial benefit to the local community of community ownership versus community benefit is shown by the Allt Dearg case study. See Appendix B.

Munday et al also note that community ownership will tend to promote wider social capital and skills by virtue of the activities necessary to engage with host community and to set up and manage a scheme. This opportunity has been recognised by the Welsh Assembly Government which has established a scheme to support social enterprises in installing their own renewable energy generation capacity with funding from the European Regional Development Fund. Other advantages of the community model are that people can get involved for a modest amount of money. Some of the solar renewable developers in our sample offered shares for as little as £20. This addresses some of the regressive characteristics of the Feed In Tariff i.e. that it is paid for everybody via a levy on fuel bills but that it is only relatively well off households that are able to benefit from it through having the means to invest in renewable energy schemes.

Despite the various benefits offered by community ownership, the difficulties of getting a (wholly) community owned project off the ground should not be underestimated (Willis & Willis, 2012). Whereas commercial developers will have paid members of staff to develop the project, organise engagement activity, manage planning etc, community owned schemes must often rely on volunteer time and goodwill. This can create stresses and can result in projects failing or taking much longer to implement. The issue of burnout in community owned schemes was mentioned by a number of our respondents (see 4.4.2.8) and presents a case for government support. Partial ownership, or use of mechanisms to enable local people to have a financial stake in the project offer alternatives to the wholly community owned model. These should create a sense of ownership and consequently a greater acceptance of the scheme amongst the host community.

4.6.3.3 Other aspects of commercial versus community ownership

It is not the purpose of this report to provided detailed analysis of all aspects of various ownership models, including economic aspects. However it is appropriate to reference some further key differences. Community owned developments are usually smaller because community groups are concerned about their risk exposure in taking on large amounts of debt finance. For wind energy this is key to determining the cost per MW as there are multiple fixed costs for wind farm development which means that there are also economies of scale.

Fixed costs include negotiating the planning process, legal fees, hiring a crane to erect the turbines, building roads to access the site, construction of transmission lines to deliver the power and a substation to connect to the grid. In addition, an order for multiple turbines may also receive volume discounts from turbine manufacturers (capital expenditure is by far the largest area of expenditure). Community groups will also usually find that the cost of finance is higher than rates available to commercial developers. These factors tend to mean that where economies of scale are realisable (e.g. because there is sufficient land and a robust enough grid) then larger commercially led projects will have much lower costs per MW. Scene Connect[64] provide initial unit costs of £4609/kW for community led schemes and £2466/kW for joint ventures (Harnmeijer et al., 2012).

In contrast, in analysis for RenewableUK in 2010, Garrad Hassan found that even smaller (2-5 MW) commercial wind developments cost around £1600 / kW. There are also some economic forces that act in favour of community owned developments. For example, local community investors are generally prepared to accept lower rates of return compared to commercial investors and, therefore, a scheme with some local share ownership can be a source of relatively cheap finance. Of particular relevance to the Northern Ireland context is also the fact that where grid capacity is low then smaller developments which can be built close to where the power is used can avoid major investment in transmission systems and grid reinforcement.

4.6.4 Secondary economic benefits

The secondary economic benefits of renewable energy developments have been explored in a number of studies. Amongst the commercial developers in our study we found a great awareness of this aspect of benefit. Some had taken a number of steps to ensure that this aspect of benefit was delivered through, for example:

- Use of local supply chains wherever possible including electrical contractors for infrastructure works,

[64] Scene Connect is a community sustainable energy agency and consultancy. See: connect.scenetwork.co.uk/

> "The main plant contractor is a with a specialised construction company, but as part of their contract they have to use as much local labour as they possibly can - including taking on apprentices."
>
> Wind energy developer En.

- Use of professional services of local consultants to conduct environmental impact assessments
- Training in electrical engineering and subsequent employment of local people to maintain the installation
- Relocation of European office to the Scottish highlands

In addition to these supply chain type benefits we found further indirect benefits. For example, a dairy farm which had installed an anaerobic digestion plant meant that the dairy could market its produce as zero carbon. This had "put the dairy on the map" allowing a marketing boost which had lead to an increase in sales.

4.6.5 Benefits and audiences

The evidence suggests that there are distinct classes of opposition to renewable energy schemes. As with engagement strategy (Bell et al., 2005) each class of oppositional type may have its agenda more or less addressed by the various types of benefit that have been outlined above. For example, the EU Re: Share project recognises 3 classes of social non-acceptance of renewable energy schemes as follows:

- Environment – environmental resistance stems from fears that the project will harm the local environment and residents. Threatening local flora and fauna, noise and health effects are all examples of environmental reasons for resisting the development. The Environmental Impact Assessment required for larger schemes will explicitly seek to describe these impacts and for this reason is often disputed or used in evidence by opposition groups. EWEA states that 40% of wind energy planning applications are subject to legal challenges at the EIA stage (EWEA, 2010)
- NIMBY – "Not In My Backyard". This classification has been described as an unhelpful oversimplification by some authors e.g. Wolsink, (2007) however it is used by Re: Share to describe a personal type of resistance motivated by the preservation of one's surroundings, compensation for economic loss and a desire to return to the situation prior to the development. Fears that the project poses a threat to local tourism, devalues property, causes a loss of visual amenity, or changes the character of an area, are all examples of this.
- Opportunism – opportunistic resistance to a project is largely motivated by extracting the highest possible additional benefit or personal side-benefit out of a project. It often presents itself as environmentalism or NIMBYism but unlike these resistances the opportunist does not wish the project to fail.

The principle objections of each of these classes of opposition can be addressed to greater or lesser extents by the various forms of community benefit – e.g. funds, ownership option etc. Through analysis of the local objections raised in 23 case studies of various renewable energy schemes across Europe and the degree to which community benefits of various kinds were able to address the objection, the Re:Share project was able to create a matrix showing how effective each type of benefit was in meeting the objections of each class of opposition. This is shown in Table 2.

Mechanism	Environment	NIMBY	Opportunism
Community funds	+	++	+
Local ownership	0	+++	++
Compensation	+++	+	0
Benefits in kind	+	++	+
Local contracting	0	++	+
Local employment	0	++	+
Energy price reductions	n/a	+	+
Indirect benefits	0	+	n/a

Table 2 Benefits and 3 classes of resistance. Source: Rebel Group Advisory et al., (2011) **page 24**

Key:

+	Positive impact on factor
++	High positive impact on factor
+++	Very high positive impact on factor
n/a	Not Applicable: the resistance factor was not identified for this project
0	No impact

Note that "compensation" in this table means restoration of environmental damage caused by the development rather than financial compensation to affected parties.

This recognition of different classes of resistance was recognised by our respondents. For example, one wind developer described how community benefit funds were more effective in helping create support for a project in areas where the host community was more economically disadvantaged. In wealthier areas, perhaps with large numbers of retirees, community benefit funds were considered markedly less effective: "people that have retired to the area feel that they have also bought the landscape". Therefore our evidence suggests that there could be a useful role for sensitive segmentation of the host community, ensuring that the engagement strategy addresses the needs and concerns of each segment. However we found no evidence amongst our respondents that a conscious segmentation of each host community was used to design engagement strategy or the design of benefits packages.

4.7 Conclusions on best practice

4.7.1 The initial phases of engagement

4.7.1.1 Appropriate engagement

CSE et al., (2007) have developed a model of community engagement describing increasing levels of engagement. This is reproduced below:

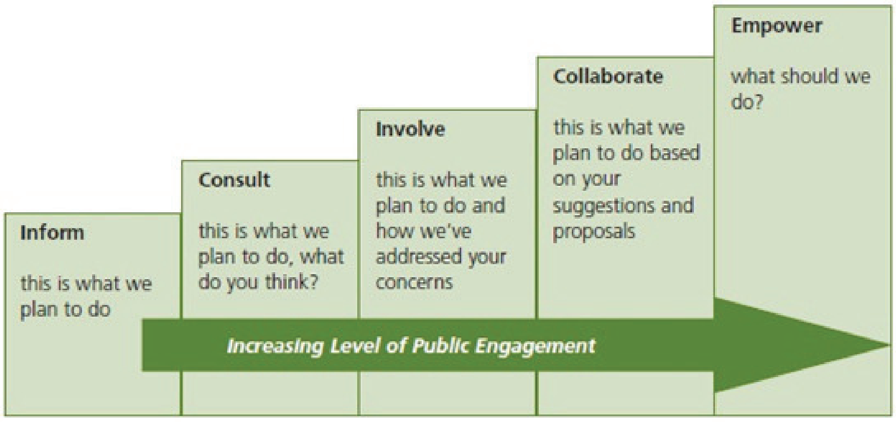

Figure 4: Increasing levels of community engagement

At one extreme is "Inform" which involves very little engagement and broadly corresponds to a "decide-announce-defend" mode of consultation with the public. Nonetheless this level may still be appropriate in some instances for example, where the development has little or no impact and does not require planning permission. Some of the smaller solar PV schemes in our sample fell into this category.

At the other extreme is "Empower" where the planning process is opened up as a collaborative enterprise between the developer and the community. This is comparatively rare, even amongst cooperatively owned schemes, but may draw a proportion of the silent majority into the planning process thereby reducing the likelihood of creating opposition and potentially creating new opportunities for aligning the design of the scheme with the host communities objectives and plans.

The Scottish Government has produced an engagement tool for assisting scheme developers and planners which is aligned with this model, the SP=EED tool[65]. This describes three levels of engagement: Informing; Consulting; and Partnership. Most engagement takes the form of "consulting", i.e. is somewhere in the middle of the spectrum. All of the larger developers in our sample were in this middle range. However, the evidence of local opposition to many specific proposals suggests this model of engagement is often insufficient to ensure wide community buy-in, while a more progressive partnership model enables developers and communities to negotiate a more mutually beneficial outcome (Devine-wright, 2005) .

We conclude that the appropriate level of engagement should be broadly driven by the degree of impact or benefit that a renewable scheme has on host communities. The more impact and the more potential benefit from a scheme then the further to the right of the scale a developer should

[65] This tool is available at: www.planningaidscotland.org.uk/images/SP=EED%20Practical%20Guide%20to%20Engagement%20in%20Planning.pdf

go in order to gain the support of host communities and ensure that benefits are distributed equitably.

4.7.1.2 Learning from past experience and using the guidance

The literature review conducted as part of this research included a number of protocols and guidance notes (listed in 4.4.2.1). However it is clear from our evidence base that much of this material is not yet usefully employed (we asked what, if any, published guidance was used in developing engagement strategy). Perhaps this is because the recognition of the imperative for good engagement is relatively new to the industry, or at least the materials and thinking to create good engagement have only relatively recently been brought to the table.

In the new context of local government reform and changes to the planning system, which will devolve much greater decision-making power to the local level and mandate greater levels of community consultation, it is clear that there is a real need for good quality usable best practice guidance to assist planners, communities, developers and others to navigate the new planning landscape.

A key challenge in further developing this guidance will be to assemble robust, comparable evidence of the benefits of renewable energy developments. At present, for example there is no standard way of measuring benefits to the local economy so these cannot be treated consistently as a material consideration in planning decisions.

4.7.1.3 The role of knowledge, attitudes and the source of information

A common theme emerging from the research was that people tend to hear what they want to hear, selectively attending to and incorporating information which fits with pre-existing value systems and worldviews. Indeed, the expectation that people will respond “rationally” when presented with the facts, in line with neo-classical economic theory, has been thoroughly critiqued by social science and modern economic theory as found in disciplines such as behavioural economics (e.g. Arvai, Campbell-arvai, & Steel, 2012). Wolsink (2007) for example finds no evidence of a relationship between knowledge of wind energy and holding a positive attitude to wind farms. Instead, Wolsink finds that attitudes to landscape are the overriding determinant of a positive attitude to wind farms.

Even where attitudes can be shifted via changing certain beliefs through the provision of credible information there is often only a very weak relationship between attitudes and actual behaviour because of the many other determinants of behaviour that intercede. Examples of interceding variables are knowledge of the correct procedures for action or availability of sufficient financial resources. Social “norms” (i.e. one’s sense of how others think and behave) are also commonly cited as highly influential on our behaviours, sometimes overriding our attitudes to a particular behaviour.

Despite the limited influence of providing clear information in building favourable beliefs and attitudes to renewable energy, it does still have a role to play in any engagement strategy not least because it can serve to galvanise debate and raise interest in the proposals. Engagement experts know that if information is to have a chance of being used it must be clear, simple, credible and noticeable. The source of the information is particularly important. Unless this is perceived as originating from an unbiased credible source, information is likely to be disregarded. Developers need to consider how to get across information in this way. A potential solution identified during the research was the use of independent third party organisations to assemble and disseminate information.

4.7.1.4 Segmenting the host community and understanding types of objection

The research suggests that host communities comprise a patchwork of individuals and groups holding distinct agendas towards renewable energy development. These groupings are influenced by a range of historical and socio-demographic factors. The concerns and agendas of each of these individuals and groups require different policy and targeted engagement strategy. Best practice guidance should incorporate insights from this work.

4.7.1.5 Resourcing the engagement process

Engagement requires resources to do it well and funds are required at the beginning of project development, possibly years before any financial returns are created by the scheme itself. Whilst this is less of an issue for large developers, it is clear from our sample that resourcing engagement can be a major difficulty for smaller developers and community groups.

> "One of the issues is the time, energy and commitment that that takes - working on a shoestring budget, no development finance - it does take resources to do it and they didn't have that".
> Community group P

We can conclude that smaller organisations would benefit greatly from provision of loans and other resources for engagement and other development purposes at favourable terms.

4.7.1.6 What is public opinion and how do we gauge it

Gaining an accurate sense of community opinion and ensuring that the opinions of the majority rather than the vocal minority gain the most attention in the planning process is often problematic and can be very resource intensive. Various solutions have been offered (see Bell et al., 2013) including:

- having a public vote
- conducting an independent opinion survey
- structuring the planning process so that it is collaborative from the outset

Each of these has its pros and cons. A public vote would be expensive and there is the problem of defining the constituency. The process could also become politicised and would not necessarily provide an accurate reflection of local opinion due to the problem of voter apathy.

An independent opinion survey is likely to give a more accurate sense of local opinion but is less democratic in the sense that if you are not included in the survey sample then your voice is not heard. This can be addressed by ensuring that channels remain open for the community to make its voice heard via the usual mechanisms of responding to invitations to respond to the proposals. A number of our respondents mentioned conducting opinion surveys as a part of their consultation process.

Structuring the planning process so that it is more collaborative from the outset is likely to draw more of the silent majority into the process but would present significant resourcing issues. Bell et al., (2005) recommend a middle way which makes more use of opinion surveys allied to existing consultation procedures.

4.7.1.7 Fairness

There is also the issue of fairness. Good engagement should be fair in that it should encourage and allow all sections of the host community to express their views. For disadvantaged communities that are perhaps less skilled in taking part in the governance of their local areas, this suggests that particular support may be required.

4.7.2 Subsequent phases: community benefit, planning and ownership

There is a significant amount of guidance dealing with best practice for negotiation and management of community benefit already available. We do not propose to reiterate it here. Instead we offer some specific conclusions based on the evidence base assembled for this project.

4.7.2.1 Community benefit and planning

The role and management of community benefit funds remains a grey area, with the materiality of community benefit as yet untested in the courts. This suggests a need for best practice guidance for the management of community benefit so that local planning authorities, communities and developers are clear on their duties and the best way to handle benefit packages. This should include particular consideration of the distinction between mitigation activity required under section 76 of the 2011 Planning Act (the transposition of article 40 of The Planning (Northern Ireland) Order 1991) and additional in-kind benefits.

4.7.2.2 Smart negotiation of the community benefit package

Our analysis suggests that communities are well advised to prepare for negotiations with developers but also that commercial developers are keen to work with community groups either directly or through agents and representatives such as councils or charitable organisations with a remit to help local communities in this way.

Local councils that are well versed in managing renewable energy schemes in their locality with clear guidelines and policies are well placed to ensure that community benefit funding is used strategically and linked to local planning for the area. However, it is not always clear that local council objectives resonate with the wishes of local communities. We also found that developers were sometimes wary that community benefit funding could become “politicised” if its management was too closely associated with delivering local council planning objectives and that communities were sometimes “suspicious” of local authorities or councils exerting too much control over the management of community benefit funds.

Although this does not appear to be an issue for NI under current arrangements, the changes to the planning powers of councils required by the Planning Act (NI) 2011 will mean that these issues will become a consideration in the medium term.

Therefore where local communities do not have a plan for their area and they do not wish to rely on council resources for negotiation and support they are strongly advised to create a plan as the basis for negotiation with developers. A development plan that has been developed by the local community should therefore have its full backing and support and will minimise the potential for infighting and political wrangling later on.

Developers are advised to begin negotiation on community benefits at the earliest possible opportunity. This will ensure that synergies between the needs of the community and the design of the scheme are captured wherever possible and that a collaborative approach is fostered which should create greater trust between developer and host. If certain procedures are followed using this "parallel" process (i.e. separation of planning officials with those negotiating benefits) then probity of the planning process can be maintained. This guidance will be useful to inform arrangements required by the Review of Public Administration which should come into effect in 2015

4.7.2.3 Management of the community benefit package

Developers showed an awareness that community benefit would fail or cause ill feeling if the activities funded were not aligned with community wishes or that the funds were not well managed. For this reason some offered support to establish good governance and even paid for secretarial services.

> "Successful community benefits fit with what is happening in the local community. Failure means providing benefits with a list of restrictions - just blindly throwing money at it"
> Wind energy developer I.

Another wind energy developer described how, now that community benefit had become more formalised as part of the development process with some governmental bodies increasingly recognising that it had a potentially useful role in regenerating disadvantaged areas, there was a need for government to ensure that communities were correspondingly supported to manage the funds well rather than "leaving it to the developer":

> "if there is a pressure from government to formalise giving community benefits out then they also need to expect that there needs to be a certain amount of investment given to local communities to help them get the most of the money, and at the moment this is all on the developer. Some projects have lots of money but it just sits there because the community doesn't really know how to invest it or how to manage it." Wind energy developer R.

Therefore communities are advised to ensure they have capacity to manage the funding and any in-kind benefit provision. Creating this capacity may require funding for a paid position. Where benefit funding is being used to meet formal (local) government objectives such as alleviation of fuel poverty then there is a particularly strong case to be made for community groups that are managing the funds to be given government support.

Our evidence also suggests that where community benefit funds are utilised in areas linked to efficient and sustainable energy use, there are win-wins to be had. Funds can be used as seed funding for other energy schemes creating a snowball effect of greater awareness and support for renewable and sustainable energy in the locale, thereby making future planning processes for other renewable schemes easier and quicker.

4.7.2.4 Application of benefit sharing mechanisms and acceptance

The evidence suggests that there are opportunities for smarter engagement with communities and opposition groups through a deeper understanding of the motivations and agendas of different types of community and the various groups within them. This also extends to opposition groups who have been classified in a number of ways and whose objections can be a least partially addressed through carefully crafting the range, type and delivery of benefits (including ownership options). We can conclude that there is scope for smarter design of benefits packages and engagement strategies by not treating host communities as though they were a single unified body. Instead an approach that pays attention to the needs and wishes of groups within the community is advised.

The evidence is also clear that creating social acceptance of renewable energy schemes is not only about clever delivery of benefit packages. It is also about a range of other social issues such as perception of the agenda of the developer, the degree to which the developer and local authorities are trusted and whether the host community feels it has a real say in decision making around the scheme.

4.7.2.5 Community ownership

Our review of the published literature and our discussions with developers has highlighted that community acceptance of wind energy projects can be influenced by ownership. Host communities are more likely to reject schemes where they are perceived to be owned by outsiders or large multi-national companies (Queens University Belfast & SQW, 2012). This presents a strong case for the inclusion of some element of community ownership in the design of schemes where the scheme is developer led. This is for multiple reasons, but primarily:

a) because community ownership can ensure that greater financial benefits are available to the host community than the standard community benefit fund model; and,
b) that engagement is deeper and conducted on a more collaborative basis thereby minimising opposition to the scheme and creating a space where various synergies can flourish, such as including in-kind benefits to scheme design.

This need not mean that developer cedes management of the scheme to the community. Various mechanisms are available which give the community a stake without management responsibilities. However there is a clearly a role in the bigger picture for co-operatively and wholly community owned schemes too. In fact the evidence suggests (particularly the examples of Germany and Denmark) that the more schemes of this type are in existence the more there is a network of support for renewable energy development in general including by commercial developers. This evidently reduces opposition and smoothes planning.

The German experience, whereby 50% of new wind capacity is owned by local communities and planning consent is more easily obtained, plus the small but growing number of cooperatively owned schemes in GB (Willis & Willis, 2012) suggests that community groups can get involved in the development of a project of any size and scale and should not be constrained by money. If a community feels they have the capacity to develop a large scheme, then mechanisms such as the

Energy4All model[66] allows them to do that. Communities do however need the support from their government to undertake larger projects. For example in Scotland there is the CARES scheme which offers at-risk loans. This is vital to enable larger projects to go ahead.

We conclude that there is a clear role for government to do more to encourage community ownership such as offering at risk loans, support and guidance from trusted 3rd parties and potential changes to regulation such as the Danish requirement that all new developments over a certain size should offer 20% of the scheme to host communities. A recent study for the Sustainable Energy Authority Ireland on social acceptance of wind energy also concludes that there is a need for the ROI Government to develop clear policy to support the community ownership sector (Queens University Belfast & SQW, 2012).

4.7.2.6 Local targets?

Some developers highlighted the gap between national targets and their absence at regional and local level. It was thought that the lack of localised targets reduced the incentive for local authorities to invite developers in to the area to discuss collaboratively how deployment targets could be achieved. Instead the developers found themselves framed as prospectors, searching out suitable sites for development and then having to make the case for their activity.

> "I think that the whole process is flawed at the moment because there are no regional targets for renewable energy anymore. We would prefer to go to a community that has targets so that we can play a part in helping them achieve their targets - that way it doesn't create the sense that we are forcing the development on people. There are national targets but who will enforce national targets? Need a pull from the local authority to help." Wind energy developer F.

We can conclude that it would assist developers, including local community groups, to implement projects where the council is providing a "pull". Targets might be one good way to encourage this. To do this would require legislation to give NI Departments the power to set this type of target for NI councils and may or may not be welcomed by those councils.

4.7.2.7 Final thoughts

The work of Devine-wright, (2005) indicates that high levels of community support can exist for renewable energy projects when they are embedded within the local community, and that proposed renewable energy developments are less likely to be controversial and consequently renewable energy policy targets are more likely to be met, if and when developers and statutory institutions adopt a more locally embedded approach. This would entail a role for local councils in not only controlling development but also forming partnerships with private developers and local people to deliver local community energy projects.

[66] The Energy for All model allows the local community to have a financial stake in large renewable energy developments via creating a "royalty instrument ". Essentially, the local community forms a cooperative which buys the right to a share of the profits of the development. This allows the local community to invest small amounts of money in the scheme : see www.energy4all.co.uk/

5 Recommendations

The following recommendations are drawn from the research, stakeholder engagement and subsequent analysis conducted by the project team over the course of the study. As such, they share the broad goals to improve levels of community engagement and benefits from renewable energy developments in Northern Ireland; support the achievement of national renewable energy targets; and contribute to local economic prosperity and community wellbeing.

Although presented as individual recommendations, there are strong linkages between many of the actions identified as important for achieving these goals. For example, the proposed best practice guidelines will form a key input to both the community capacity-building and engagement with local authorities. Furthermore in order to achieve the desired impact many of the recommended measures would benefit from stakeholder involvement in their development and a clear framework for monitoring of their effectiveness.

5.1 DECC Communities Work

DETI and other relevant government departments should take into consideration emerging work from DECC on its Community Energy Strategy and actions arising from the Call for Evidence on Community Engagement and Benefits when they become available. While there are clear benefits in establishing guidance that is specific to the Northern Ireland context, co-ordination of a UK-wide approach would be helpful in providing a degree of consistency in the operating environment for developers. It would also help to ensure that communities in Northern Ireland reap comparable benefits from renewable energy developments, taking into account differing contexts, to those in Scotland and elsewhere.

5.2 Renewable Energy Information

Feedback from the stakeholder workshops identified that there is a need for credible information about renewable energy in Northern Ireland. It was also evident that there is a lack of trust and understanding by many people about the issues concerning renewable energy.

We recommend that DETI should use the Sustainable Energy Inter Departmental Working Group (SEIDWG) Communications sub-group to co-ordinate information, under the Energywise banner, to inform the public on the facts associated with Renewable Energy, the focus of the Strategic Energy Framework, including the importance to Northern Ireland of reducing its fossil fuel usage and addressing security of supply issues.

This work could, resources permitting, involve:

- producing factual and evidence based material, that presents the facts about Renewable Energy and address the most common misconceptions[67].

[67] Common Concerns about Wind Energy, produced by CSE is an example of this

- using information, resources and assistance from industry, the third sector, and community development organisations, to contribute to messages coordinated by the SEIDWG communications sub-group.
- developing a co-ordinated message, from the relevant Government departments, in Northern Ireland, including DETI, DoE, DARD and the DHSSPS, which supports the information and reinforces the message that Northern Ireland can benefit from Renewable Energy development.
- communicating more widely, work already undertaken that identifies the job creation opportunities in Northern Ireland from Renewable Energy developments, particularly those which are on-going after construction.

There is a need for ongoing, meaningful dialogue between government (regional and local), industry and community interests in all aspects of the development of renewable energy in Northern Ireland and we recommend that all Departments with a role in promoting renewable energy ensure that transparent stakeholder engagement is fundamental to the out-workings of this study.

5.3 Best Practice Guidelines

Effective engagement between developers, local councils, statutory consultees and communities, can help to deliver renewable energy projects. This engagement includes access to reliable information (see 5.2), and the opportunity for all parties to contribute to and be part of the decision making process.

Consider the draft outline guidance, contained in Annex A of this report, as the basis for a new set of Best Practice Guidelines. DoE is the Department responsible for planning issues for community engagement in renewable energy projects, but we acknowledge that these guidelines would be outside the planning system. The Planning Bill does contain provisions in relation to Community Engagement, but these have not commenced.

The Best Practice Guidelines should be aimed principally at developers and communities although they might be extended to include local councils as they assume greater planning powers. The guidance should include recommended tools and techniques for engaging with communities and other local stakeholders at the various stages of scheme development; examples of best practice in engagement including consultation during the planning process; development of community benefit packages and shared ownership options.

5.4 Community Benefits Register

We recommend the introduction of a Community Benefits Register, similar to the scheme that has been operational in Scotland. This is a tool to help communities identify the kinds of benefits that can accrue from renewable energy projects. The scheme should be launched in Northern Ireland, with a list of case studies that describe the range of benefits, and how they can be derived and how funds might be used for community advantage.

Together with the best practice guidance, the register could include:

- a protocol, to be implemented by local councils, for engaging communities in designing and delivering a benefits package that addresses local needs and priorities, and ensuring sufficient community capacity to administer the benefit fund.
- examples of progressive community benefits packages, including reduced domestic energy bills; direct supply of energy to local community buildings (e.g. schools); improvements to the energy efficiency of the local housing stock; strategic funds (e.g. to support community-led renewables.
- examples of different shared ownership models.
- advice for communities on engaging with commercial developers.

We recommend that this Register should be implemented on a voluntary basis, and community groups and developers should be encouraged to use it.

5.5 Community Capacity Building

Capacity Building is recognised by Government as an essential component in the process of community development and in ensuring that communities fully engage with local and regional regeneration initiatives[68].

We recommend that, resources permitting, DARD should use the existing Rural Community Development Support Networks to help support communities in relating to and benefiting from, renewable energy developments. The work is linked to the information programme (Recommendation 5.2) and should focus on:

- making communities and Local Councils, aware of the local opportunities for, and potential benefits of, renewable energy developments.
- supporting communities in engaging in a positive way with developers; and helping to develop more community-led schemes This would ensure that the groups could exploit the opportunities that exist in the Renewable Energy sector. DARD's renewable energy and climate change unit, or DETI, could provide the skills base in Renewable Energy to allow the Rural Community Development Support Networks to provide a capacity building function to Community groups.

There will also be the opportunity for the DoE to be involved in capacity building with local councils, as part of the transfer of functions, which is anticipated in 2015. This could include capacity building in renewable energy engagement and community benefit.

[68] DSD Capacity Building Manual: http://www.dsdni.gov.uk/vcni-community-capacity-building.pdf

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5.6 Structural support for community led energy schemes

A community may not have the funding available to carry out the necessary feasibility and other studies necessary to determine whether a renewable energy project is viable for their community. This represents a significant barrier to communities developing projects with the result that potentially pioneering schemes that could provide inspiration to others will not succeed. This may lead to less community engagement and buy-in to renewable energy more widely, affecting Executive targets in this area. We recommend that DETI should work with other government departments, including DECC and DSD, to explore the potential for funding, including EU funding, to support community groups with the costs of feasibility studies, business planning and planning applications for renewable energy projects. If the potential of a Fund can be realised, then this will provide a very significant boost to community energy in Northern Ireland as well as to communities' perceptions about renewable energy across the region as a whole.

5.7 Community Ownership

Section 4.6.3.2 identifies the value of Community owned projects. There is a large variation in the percentage of community owned projects across Europe, but several studies (Munday and Wolsink) have identified that local ownership is one of the most important drivers of the relatively rapid deployment of wind energy in Germany and Denmark. The Danish Renewables Act requires 20% of the scheme to be offered locally. Community ownership is one of the most significant means of creating productive engagement and mitigating opposition. Evidence also suggests that local ownership pumps proportionally more money into local communities than community benefit funds.

DETI and other relevant government departments should take into consideration emerging work from the DECC Community Energy Strategy when available. Policy measures should be explored about encouraging investment in renewable energy projects in Northern Ireland. Community ownership is one form of investment that is likely to stimulate and support renewable energy development. Alongside the best practice guidance and funding support recommended by this study, this might include developing new local planning guidance on community ownership and examining regulatory options adopted in countries such as Denmark.

ANNEX A

OUTLINE FOR BEST PRACTICE GUIDANCE ON COMMUNITY ENGAGEMENT IN RENEWABLE ENERGY IN NORTHERN IRELAND

1 Introduction

A key recommendation of this study is that, together with other relevant government departments, DOE works with industry and community bodies to establish an agreed set of Best Practice Guidance for community engagement in renewable energy.

We recommend that the guidance be aimed initially at developers and communities although this may be extended to local councils as they assume greater planning powers. The guidance should therefore be designed to be of relevance to developers and communities (both as stakeholders in developer-led projects and as developers in their own right). Where elements of the guidance relate only to developers or communities (as stakeholders) this should be specified.

Below we set out a set of principles of effective engagement drawn from the literature; a draft outline for the guidance, informed by the research undertaken for this study (as described primarily in Paper 1c and Chapter 4 of the main report); and a recommended process for developing the guidance through further stakeholder engagement.

2 Principles of effective engagement

In Chapter 4 of the main report, we set out the existing research and evidence on principles of effective engagement, including examples of good practice. To summarise, the following have been identified as principles of effective engagement:

- Build relationships and develop links with key groups, including existing community groups, networks and representatives. Consider what help might be needed to build capacity to engage.
- Ensure that information provided is clear, accessible and sufficient.
- Be clear about the scope of engagement – what the issues for debate are, and what cannot be changed.
- Provide a clear, realistic timetable and estimate of input required by all parties.
- Ensure under-represented groups are included. Be aware that the most vocal groups are not always the most representative groups.
- Monitor and evaluate. Show participants how their views have been taken into account.
- Learn from the process, and share experiences with others.

3 Draft outline guidance for developers and communities

3.1 Why engage?

The target audiences need a compelling reason to consider the guidance and integrate its recommendations in their own practices. This section should provide a brief summary of the key drivers and benefits of greater community engagement in renewable energy developments, from the perspectives of both developers and communities (and informed by further stakeholder engagement).

3.2 Aims of engagement

It is important at the outset to be clear about the purpose of any engagement process. While the outcome cannot be prescribed, it should be acknowledged by all parties which issues and options are within scope and which are not. This section should distinguish between the different aims of a community engagement process and set out how this would affect its design, timetable etc, e.g:

- To identify and address key issues of concern to the community over local impacts of the development;
- To develop a suitable package of community benefits (including community fund, in-kind benefits);
- To explore the scope for shared ownership; and
- To maximise the local economic benefits flowing from the development.

3.3 Levels of engagement

This section should describe the five levels of engagement in renewable energy as identified in Chapter 3 of the main report (inform, consult, involve, collaborate and empower) with example activities for each.

3.4 Community engagement through the project development process

This section should provide a brief description of the main stages of development of a renewable energy project, i.e.:

i. Site identification - mapping local resources and constraints, planning policies, landscape designations etc
ii. Pre-application - detailed feasibility and design options, with EIA (if required)
iii. Post application - submission of planning application, statutory consultation period, decision by planning authority and planning inquiry (if required)
iv. Post-consent - construction and operation.

It should also map different engagement activities against development stages ii, iii and iv above according to the levels of engagement identified in 3.2, e.g:

	Inform	Consult	Involve	Collaborate	Empower
Pre-application	Media release Leaflet drop Website	Public exhibitions Door-knocking Mail-out with questionnaire Telephone hotline	Focus groups / workshops, e.g. to discuss mitigation measures Use of interactive software to visualise local impacts	Meetings with community representatives to scope out needs for benefits package	Formation of community forum
Post-application	Website Newsletter	Public exhibitions Presentations at existing community fora	Site visits to similar developments	Workshops to design community benefits package Mediation if appropriate	Dialogue with community forum around shared ownership options
Post-consent	Website Newsletter	Presentations at existing community fora	Site visits	Discussions with local suppliers on contracting opportunities	Formation of community enterprise Local share issue

3.5 Community engagement in the design and delivery of a benefits package

Covering the key elements of an engagement process designed to develop a community benefits package, including:

- Identify or establish appropriate community representative body
- Review existing community development plans/priorities
- Short-listing and development of options
- Management and administrative resources
- Monitoring and reporting
- Examples of good practice in community benefit

3.6 Community engagement to explore shared ownership options

Covering the different models of shared ownership and processes for exploring each, e.g.:

- Costs and benefits of shared ownership
- What's involved – models and processes
- Third party providers, e.g. : Abundance Generation, Energy4All
- Building local capacity to engage in shared ownership
- Examples of good practice in shared ownership

3.7 Community engagement to deliver other local economic benefits

Covering the different types of models of shared ownership and processes for exploring each, e.g.:

- Opportunities for supporting the local supply chain
- Constraints on procurement (e.g. specialist technical skills)
- Supporting local apprenticeships, training and education
- Examples of good practice in delivery of local economic benefits

3.8 Delivering good practice in community engagement

This section should provide a framework for delivery of effective community engagement using the 'plan-do-review' project management model, e.g.:

- Plan
  - Understand the local area
  - Identify key stakeholders
  - Clarify objectives to define appropriate engagement methods
  - Establish clear lines of communication
  - Estimate resources required by all parties (including use of independent facilitation, if required)
  - Agree timescales

- Implement
  - Engagement starts before earliest plans become public
  - Clarify scope of engagement (issues for discussion)
  - Separate planning issues from community benefit
  - Ensure broad and inclusive representation of cross-community views
  - Ensure clarity, frequency and consistency of communication
  - Provide timely feedback to build trust and credibility
  - Monitor the engagement process and adapt if required
  - Produce report on community engagement

- Evaluate and review
  - Collate monitoring data
  - Gauge feedback from stakeholders on process and outcomes
  - Analyse lessons learned for future engagement

3.9 Frequently asked questions

This section should identify a set of common concerns about community engagement in renewable energy developments and provide answers with practical examples where appropriate, for example:

- How can developers ensure they are gathering views that are representative of the whole community?
- How can communities ensure their views are taken seriously?
- How can developers ensure community engagement doesn't hold up project delivery?

4 *Process for developing and implementing the guidance*

The outline presented above should be seen as a starting point for a multi-stakeholder process to develop a full set of best practice guidance. This process might consist of the following steps:

- Seek comment from key stakeholders on this draft outline and proposed process towards the development of full guidance;
- Integrate findings from DECC's Onshore Wind Call for Evidence : Community Engagement and Benefits;
- Publish a consultation draft of the best practice guidelines;
- Hold a dialogue event with the steering group and wider stakeholder representatives from industry, communities and government, to refine the draft Guidelines
- Produce final draft guidances for ministerial review and approval as appropriate;
- Publish guidance and monitor take-up and use.

Annex B

Case studies

Case studies are presented below which exemplify a number of aspects of current and best practice. The information contained within the case studies has been collected from interviews with developers and publically available information:

- Case study 1: Allt Dearg demonstrates how partial community ownership can create greater acceptance of a project and provide significant funds for local economic development;
- Case study 2: Gwynt y Môr Offshore Wind Farm exemplifies the challenges of identifying the community of benefit and the community of impact. It also shows how a comprehensive engagement strategy is developed, implemented and used;
- Case study 3: Callagheen highlights the community funding that has resulted from a Northern Ireland wind farm and how this funding has been used within the local communities;
- Case study 4: RES – Multiple Wind Farm Community Funds shows the variety of community benefits that can be achieved via funds managed by different community based organisations;
- Case study 5: Scottish and Southern Electric – Multiple Wind Farm Community Funds shows the approach that SSE has taken to develop various levels of community benefit in NI, ROI and Scotland.
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Case study 1: Allt Dearg Community Wind Farm[69]- West of Scotland

This case study outlines some of the financial benefits that community ownership of a renewable project brings. The original planning application for 14 turbines was rejected, but a smaller 12 turbine, 9.95MW development, partially owned by a local community trust was accepted.
This ownership model, with the community owning one turbine within the development, was successful in securing a regular income for the local development trust, Ardrishaig Community Trust, estimated at £80,000 - £100,000 per annum, equivalent to almost £10,000/MW.

Retaining majority ownership within the local area underpinned local employment opportunities and the sustainability of two estates. Through a local educational trust fund broadened further educational opportunities for local people.

Project timeline	Conception: 2008 Construction start: Oct 2011 Commissioned: Dec 2012

[69] Information gathered from telephone interviews with the developer Lomond Energy and publically available information.
Ardrishaig Community Trust Press Release,
http://www.ardrishaigcommunitytrust.org/Allt%20Dearg%20Community%20Windfarm%20information%20sheet%20v5.pdf
Allt Dearg Flyer,
http://www.lomondenergy.co.uk/uploads/files/Allt%20Dearg/AD.ALLT%20DEARG%20COMMUNITY%20WIND%20FARM.A3%20Flyer.Standard.pdf

Type of technology	Onshore wind
Location	Argyll, Scotland
Capacity of development	12 onshore wind turbines Export capacity 9.95 MW
Cost of installation	The total project development cost is estimated at £17m
Local community	Ardrishaig is a lochside village at the southern entrance to the Crinan Canal in Argyll, West Scotland (Population ~1,300)
Level of community engagement	The project was developed by the two resident landowner estates (Ormsary and Stronachullin) with support from developer Lomond Energy. Informal meetings were held with local village members outlining development plans. Individual communications took place as required, either by personal meeting, phone or email as appropriate. A postal ballot organised by the Ardrishaig Community Trust, indicated 86% of respondents expressed a preference for the community to become involved in the project.
Local community involvement in renewable project	The local community were involved 18 months prior to the planning application. The Ardrishaig Community Trust (the Trust) is a partner in the project and owns a one-twelfth share in the Allt Dearg Community Wind Farm. A share of the cash surplus generated by the Wind Farm over the next 20 years will be distributed as a charitable donation to the Trust via a trading subsidiary ARE Ltd. These funds are intended to be used to help facilitate the development and regeneration of the area for the benefit of the local community and wider public. The Allt Dearg Wind Farmers partnership funded the project development costs, whilst construction equity financing was raised from a number of sources with residual debt financing of the project provided by the Co-operative Bank.
Financial benefit to local community £/MW	Projected £80,000-£100,000 per annum for the community trust fund (after loan-repayments) as of 2014 onwards – increasing in later years equivalent to ~£10,000/MW.
Additional benefits to the local community	Local Benefits • Sustainably underpins the long term socio-economic and environmental future of two large estates through self-ownership generated revenues. • Community share ownership of the wind farm, equivalent to one wind turbine, secures a long term, sustainable income in support of a major local regeneration project and other local community development aims. • Local jobs through construction and operational support • Improved public access to site Environmental Benefits

	• 40 million units of carbon-free electricity annually, equivalent to the consumption of 8,000 homes • Creation of a habitat & land management plan to preserve and enhance the nature conservation value and landscape qualities of the site • Supports the continued development of traditional and sustainable farming and land management practices Educational Benefits • In addition to the financial benefits accrued to the Trust, the other investing partner, Allt Dearg Wind Farmers LLP, will provide annual funding of £30,000 to the Allt Dearg Educational Trust.

Case study 2: Gwynt y Mor Offshore Wind Farm[70]

RWE npower renewables' (RWE) Gwynt y Môr Offshore Wind Farm is currently the largest in construction anywhere in Europe, comprising 160 Siemens 3.6MW turbines, totalling a capacity of 576MW.

This case study highlights the comprehensive community engagement strategy across 6 county councils in North Wales, implemented by RWE as part of the project development. The aim of this engagement programme is to ensure the Gwynt y Môr Community Benefits Package is designed and delivered as much by local people as possible, with many of the local community providing input. The project will deliver an annual community benefit package of £768,000 index-linked to inflation, to be paid for the lifetime of the project – a total of more than £19 million.

Project timeline	Construction onshore commenced in November 2009. Offshore elements began in 2012. Due to be fully operational by the end of 2014
Type of technology	Offshore wind
Location	Liverpool Bay, off the North Wales coast. Adjacent to RWE Innogy's North Hoyle and Rhyl Flats offshore wind farms.
Capacity of development	576MW (160 Siemens 3.6MW turbines). Generating enough energy to meet the average annual energy needs of around 400,000 homes.
Cost of installation	€2 billion
Local community	As an offshore wind farm project, the definition of local community area is not clear cut. As a starting point, 6 county councils were considered. As part of the consultation process, the community was asked to identify the areas that should benefit from the project. The three main areas identified to benefit were communities in Flintshire Country Council, Denbighshire County Council and Conwy County Borough Council

[70] Information gathered from interviews with the developer RWE npower renewables and publically available information. http://www.rwe.com/web/cms/mediablob/en/1910392/data/1203864/2/rwe-innogy/sites/wind-offshore/under-construction/gwynt-y-mr/latest-news-and-information/23-April-2013-First-Gwynt-y-Mr-Tourism-Fund-scheme-officially-opened-in-Rhyl.pdf

Outline of community engagement	RWE is managing a programme of engagement with North Wales' communities. The aim of this engagement programme is to ensure the Gwynt y Môr Community Benefits Package is designed and delivered as much by local people as possible. Due to the scale of the development, RWE considered it appropriate to approach local authorities and the Welsh Government to provide input to the development of the community benefit package. Questionnaires were developed with input from the local community, to reflect the local feelings about the area, and structured using language relevant to the local community. The online and paper questionnaires, alongside focus groups and in-depth interviews were used to gather opinions on priorities and the structure and operation of the Gwynt y Môr Offshore Wind Farm Community Benefits Package. Market research days were held in shopping centres, sectioned off area of pubs and other areas of high footfall, actively pulling people into the engagement, trying to engage with the silent majority. The consultation is one of the largest and most inclusive undertaken in support of the delivery of community benefits and it received over 1000 responses from a wide range of North Wales communities, individuals, councils, charity groups and the voluntary sector[71].
Financial benefit to local community £/MW	Around £20million will be invested locally over the lifetime of the project as a result of the construction of Gwynt y Môr. This investment is being made via two schemes: • An annual community benefit package of £768,000 index-linked to inflation, to be paid for the lifetime of the project – a total of more than £19 million. This equates to a payment of £1,333/MW installed. • A tourism fund of £690,000 to be paid from the start of offshore construction over three years, and invested across Conwy and Denbighshire to support local tourism initiatives. The tourism fund leverages additional funding streams via the local councils. For example, the £250,000 Rhyl Beach Access Project which includes a new ramp to make it easier for disabled visitors to get down to the beach, and will also help people wanting to launch small water craft. The project has been funded by the Gwynt y Môr Tourism Fund (£125,715), the Green Seas Beach Improvement programme (£107,785) and Denbighshire County Council (£20,144). In addition to the funds provided by RWE, coastal communities are able to apply for project funding from the Coastal Communities Fund which receives payments from the Crown Estate's marine assets[72].

[71] http://www.rwe.com/web/cms/mediablob/en/1877734/data/1252462/4/rwe-innogy/sites/wind-offshore/under-construction/gwynt-y-mr/communities/13-February-2013-GWYNT-Y-MR-OFFSHORE-WIND-FARM-Project-Update-7-.pdf
[72] http://www.thecrownestate.co.uk/coastal/marine-stewardship-fund/working-with-us/coastal-communities-fund/

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Associated benefits to the local community	Local Benefits The results of the local community consultation indicated that funding from the community benefit package should benefit the local community in the following ways: • Funding support for local area, including immediate coastal area • Funding to a mix of small, medium and larger sized projects. • Funding to support increased employability and to assist young people • Funding benefit for local voluntary and charitable organisations and schools. Environmental benefits • Improvements to local beaches • Reduced carbon emissions from enough clean energy to power 400,000 households Supply chain benefits • Investment in local supply chain – by 2012, the project had realised an investment of over £200million into the UK supply chain, with more than £70million of this awarded to Welsh companies. Employment opportunities • A socio-economic study of the project found that around 1000 jobs could be created in the UK, with a significant number being realised in and around Wales. • Over 100 new jobs are likely to be created in support of the Operations and Maintenance of the wind farm throughout its working lifetime of 25 years.

Case study 3: Scottish Power Renewables - Callagheen Community Wind Farm Fund[73]

The Callagheen wind farm, with a total capacity of 16.9MW and consisting of 13 1.3MW turbines, is owned by Scottish Power Renewables. They own a number of operating wind farms in Northern Ireland including the Rigged Hill and Corkey developments, two of Northern Ireland's oldest wind farms. Scottish Power Renewables make payments to The Callagheen Community Wind Farm Fund.

This case study exemplifies a Northern Ireland scheme that has been operating successfully for a number of years, where community funds are spent on a very broad range of activities, not only related to sustainable energy.

[73] Information gathered from publically available information including http://www.scottishpowerrenewables.com/pages/callagheen.asp

Project timeline	Operational in 2006
Type of technology	Onshore wind
Location	Between Belleek and Garrison, County Fermanagh, Northern Ireland
Capacity of development	Total capacity of 16.9 MW, consisting of 13 turbines, each 1.3MW.
Electrical power generated	42 GWh/ year (for an equivalent of 2,500 hours of full load/year)
Local community	The area around the wind farm is sparsely populated. The closest communities of Belleek and Garrison have a joint population of less than 1000.
Description of local community involvement in renewable project	The Callagheen Community Wind Farm Fund is administered by The Fermanagh Trust[74]. Each year, local community projects are invited to apply for funding. Priority is given to applications from communities and projects within 7km of the development, although projects beyond this area have been funded in the past.
Financial benefit to local community £/MW	Scottish Power Renewables make annual payments to the Callagheen Community Wind Farm Fund of £1,000/turbine equivalent to £769/MW.
Additional benefits to local community	Preference is given to proposals that have an environmental theme and/or are linked to sustainable local activities and have a positive impact on the local community. A number of environmental and youth based projects have received grants in the Belleek and Garrison areas of County Fermanagh close to the Callagheen Wind Farm. Primary schools in the area including Belleek Primary School, St Davog's Parents Association and St. Martins Primary School have received funding towards environmental and gardening projects. Belleek Primary School received £1500 for their environmental initiative 'From Plot to Pot Project'. Young people from across the region have also benefited as a result of an award to the Erne Music Club to hold master classes and workshops on three separate weekends in Belleek. The master classes focus on singing and a range of instruments including the flute/whistle, banjo, mandolin and the bodhran. In the Garrison area the local women's group received an award to run a health and fitness programme for local women from across the area.

[74] http://www.fermanaghtrust.org/

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	Devenish GAA club has also been offered support towards an energy efficiency project aimed at reducing the Club's carbon footprint and their yearly running costs. Another beneficiary was Cashel Community Association which received £2000 to improve facilities in their community group. This diversity of projects highlights the wide range of potential benefits to the local community from a local wind farm development

Case study 4: RES – Multiple Wind Farm Community Funds[75]

RES have been developing wind farms in Northern Ireland for over 15 years with 14 operating wind farms (4 in the Republic of Ireland). Four of these wind farms in Northern Ireland, ranging from a capacity of 7.8MW to 37.7MW, are outlined in this case study.

This case study highlights the differing scale of community benefit payments that have resulted from some of these wind farms and the wide ranging activities that have been funded including improved growing spaces and building renovation. The flexibility of this approach to long term funding allows community groups to determine where the greatest benefit to the group would be realised.

Wider supply chain benefits and employment benefits in the local community have also resulted from the wind farm developments.

Project timeline	Altahullion and Lough Hill in operation from 2007 Gruig Wind Farm in operation from 2009 Altaveedan[76] in development; currently in Planning
Type of technology	Onshore wind
Location	Various locations in Northern Ireland (see Local community below)
Capacity of development	Altahullion I & II has a capacity of 37.7MW, consisting of twenty nine 1.3MW turbines Lough Hill has a capacity of 7.8MW, consisting of six 1.3MW turbines Gruig Wind Farm has a capacity of 25MW, consisting of ten 2.5MW turbines Altaveedan will have a capacity of approx 18MW
Local community	Altahullion – near Dungiven (population ~ 3000) Lough Hill – near Drumquin (population ~ 300) Gruig – near Loughgiel (population ~ 2300) Altaveedan – near Loughguile (population ~ 2300)

[75] Information gathered from telephone interviews with the developer and publically available information
[76] http://www.res-group.com/media/597442/Door-to-door%20and%20Community%20-%20September%202010%20-%20Project%20Leaflet%20and%20Exhibition%20Dates.doc.pdf

	Each of the communities are rural. RES give priority to communities within a 6km radius of a wind farm.
Description of local community involvement	The community funds accrued from each of the operating wind farms have been allocated to local community groups and associations. These groups are identified during the development phase of the project and enter into contracts with RES.
Financial benefit to local community £/MW	Altahullion I & II – £29,000 p.a (+2%) – 769 £/MW (£1000/turbine) Lough Hill – £6,000 p.a (+2%) – 769 £/MW (£1000/turbine) Gruig – £10,000 p.a (+2%) – 400 £/MW (£1000/turbine) Altaveedan – £29,000 p.a (+2%) – 2000 £/MW RES policy is to now provide £5000/MW of community benefits across all new sites entering planning throughout the whole of the UK. £2000/MW will continue to be paid to community funds. £3000/MW will provide discounted electricity to the local community reaching those householders, community buildings and businesses closest to the wind farm.
Additional benefit to local community	Payments from each of the wind farms are made to separate community funds. These community funds are then distributed to a number of community groups in the local area. The funds will be made available to the same community groups for the lifetime of the fund. A consistent message from the community groups benefiting from funding from the RES wind farms is that the flexibility of the community fund allows them to use the fund where it is most needed each year. Community groups have used funds for: • Staffing for a playgroup • General running costs including insurance, electricity and telephone bills • Reducing carbon footprints through energy efficiency • Improved community growing facilities • Building renovations • Local habitat renovation Employment opportunities During the construction phase of all projects, local construction contractors, civil and security staff, and catering personnel are employed

	where possible. Local maintenance and operational staff are also employed[77]. Supply chain benefits RES policy is to source materials locally wherever possible. This typically includes materials such as stone and concrete. Management of the Altaveedan community fund will be developed through consultation. RES will consider ideas for a range of projects that could be usefully supported over the life of the wind farm[78].

Case study 5: Scottish and Southern Energy (SSE) – Multiple Wind Farm Community Funds[79]

SSE own and operate a number of wind farms in Northern Ireland and the Republic of Ireland. This case study highlights ongoing community engagement and the level of community benefit payments which SSE (and wholly owned subsidiary Airtricity) make to communities.

SSE has a consistent approach to determine the level of community benefit payments across the island of Ireland. In Northern Ireland and the Republic of Ireland payments to community funds are calculated as a percentage of wind farm revenue, which typically translates to £2,500 per MW installed, rising to £3,000 per MW installed on newer sites. As the community fund is calculated from revenue, it retains its real value for the lifetime of the project.

Project timeline	SSE/ Airtricity wind farms have been operating for over a decade, with additional projects in various stages of development. Normal project timeline 20-25 years.
Type of technology	Onshore wind
Location	SSE operate a number of wind farms across Northern Ireland and the Republic of Ireland
Capacity of technology	Various capacities across 23 operational wind farms, including 3 located in Northern Ireland ranging from the 5MW (Bessy Bell 1)to 27.6MW (Slieve Kirk).
Local community	SSE define local communities as those living within 12 miles of the site. Priority is given to applications to the community fund from groups within this area, with a particular emphasis on those sites within 3 miles.
Description of local	Local community groups and projects apply for funding from the Airtricity

[77] http://www.reshare.nu/en/reshare/reshare-database/show/39/altahullion-wind-farm-i-and-ii
[78] http://www.res-group.com/media/603324/Altaveedan%20NTS.pdf
[79] Information gathered from interviews with SSE and publically available information.
Airtricity Community Fund, http://www.airtricity.com/uk/home/about-us/community-fund/

community involvement	Community Fund. Airtricity have a dedicated Community Liaison Officer who manages the fund. Applications are considered annually from projects aimed at improving local energy efficiency and sustainability.
Level of community engagement	Projects are owned by SSE, providing benefits to the community through community funds. SSE/Airtricity takes a proactive approach to community engagement throughout the entire lifecycle of the project. Airtricity has a full time Community Development Officer who is responsible for communicating directly with local communities. Tools used for community engagement include adverts in the local press; the Airtricity web site; letters to local political stakeholders notifying them of the fund and its benefits; direct contact with local community groups and community award evenings for fund recipients.
Financial benefit to local community £/MW	The financial benefit package for a local community is calculated as a percentage of the revenue from the wind farm, which means it varies from year to year. This ranges from between £2500/MW to £3000/MW, index linked to revenue received by the site.
Additional benefits to the local community	Projects that have been funded by SSE through the Airtricity Community Fund, include: • Insulation and double glazing for schools, various sports clubs and community halls • Replacement of windows and doors • Energy efficient pitch lighting for sports clubs and sports halls • Installation of solar panels • Energy efficient lighting for various community buildings • Composters for community projects • Rainwater harvesting systems • The installation of smart electric heating Supply Chain Benefits Projects bring welcome economic benefits, not only through community funding but also local authority rates, land rental, local civil infrastructure upgrades and increased demand on a variety of local businesses. Wherever possible, local contractors and subcontractors are used in construction. In Kind Benefits During construction the project manager has authority to consider in-kind benefits if deemed appropriate. These have included: • New car park for a local school • Football kits for local team • Enhanced roads, beyond those required for farm access • A visitor centre created as part of a larger site

ANNEX C

Stakeholder Engagement

Process

Action Renewables set-up and facilitated, with input from CSE and Ricardo-AEA, three half-day consultation workshops aimed at stakeholders in the community, government and industry sectors. Each event included a presentation of the results of the research undertaken to date, the models identified and an overview of exemplar schemes and case study examples. Some of the issues discussed were common throughout all of the events, however, the workshops varied in terms of the research questions explored. Particular focus was on identifying issues, lessons and recommendations relevant to Northern Ireland.

The key stakeholders, invited to each event were identified and agreed in collaboration with DETI and DOE.

Community sector event

Date:	20th February
Venue:	CAFRE, Cookstown
Time:	1400 – 1700
Invited:	214 Community Groups
Attendees	35, + 2 Action Renewables staff, +1 CSE staff
Aim:	To explore the opportunities that exist for Communities to benefit from renewable energy projects, to discuss different forms of engagement, and to identify what could be done to improve the situation.

Government sector event

Date:	21st February
Venue:	Action Renewables Office, Belfast
Time:	09:00 – 12:00
Invited:	30
Attendees	12 +2 Action Renewables staff, +1 CSE staff
Aim:	To identify what Government Departments could do to facilitate better engagement between communities and developers, to identify barriers to engagement and to find solutions.

Industry sector event

Date:	21st February
Venue:	Ramada Hotel, Shaws Bridge, Belfast
Time:	14:00 – 17:00
Invited:	54
Attendees:	17 +2 Action Renewables staff, +1 CSE staff

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Aim: To identify what the industry is doing in terms of engagement with communities, to discuss the value of engagement to the developer, and to highlight what is required in the future.

Outcome

The Stakeholder events were a valuable way of understanding the existing relationships between communities and renewable energy developments in Northern Ireland. The aim was to determine how communities can best engage with renewable energy to generate benefit for their areas. It allowed community groups, representatives from government departments and from industry to discuss what is required in Northern Ireland, in terms of actions and supportive policy.

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