Committee for the Environment

Report on the Committee's Inquiry into Wind Energy Volume 5

Departmental Papers, Papers from Other Departments and Research Papers 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

Table of Contents

Volume 1

Volume 2

Volume 3

Volume 4

Volume 5

Volume 6

Volume 7

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

Appendix 4

Departmental Papers

Departmental response re independent EIA assessments into wind farms

Department of the Environment
www.doeni.gov.uk

DOE Private Office
8th Floor
Goodwood House
44-58 May Street
Town Parks
Belfast
BT1 4NN

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

Telephone: 028 9025 6022

Email: privateoffice.assemblyunit@doeni.gov.uk

Your reference:
Our reference: CQ 124 /2013

Date: 2 July 2013

Dear Sheila,

Further to the Departments response to issues arising from the Windwatch Umbrella Group meeting with the Committee, Windwatch has requested copies of 'independent (i.e. those carried out by government rather than the Developer) EIA assessments into wind farms'.

I can advise that the Department does not carry out independent EIA assessments of any wind farm developments. The onus is on the applicant to compile the environmental information (and which should contain at least the information referred to in Part II of Schedule 4 of the EIA Regs.), and to demonstrate the environmental acceptability of the project.

Upon receipt of the EIA, the Department will then consult its statutory consultees or such other authorities likely to be concerned by the proposed development by reason of their specific environmental responsibilities. It is the Department's role of to weigh up and balance the environmental information, all consultation responses and third party representations before arriving at a recommendation. If the Department or consultees consider that insufficient information has been provided to enable a proper determination, the Department may request Further Environmental Information under Reg. 19 of the EIA Regs.

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

Yours sincerely,

Helen Richmond
DALO
[by e-mail]

Departmental response re reconditioned wind turbines

Department of the Environment
www.doeni.gov.uk

DOE Private Office
8th Floor
Goodwood House
44-58 May Street
Twin Peaks
Belfast
BT1 4NN

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

Telephone: 028 9025 6022

Email: Private.office@doeni.gov.uk

Your reference:
Our reference: COR 993/14

Date: September 2014

Dear Sheila

INQUIRY INTO WIND ENERGY

Following a recent briefing from the Committee's specialist advisor, Members agreed to ask the Department if it has any knowledge of reconditioned turbines being used in Northern Ireland and, if so, if further information can be provided on the relevant sites.

The Department is not aware of any reconditioned turbines being used in Northern Ireland as this information would not be required in the determination of a planning application. All applications take into account issues such as visual impact in the local landscape, noise and other impacts on residential amenity. It is our understanding in terms of efficiency wind farm operators will use new turbines but if any operator (wind farm or single turbine) used reconditioned turbines they would be required to demonstrate the noise levels associated with the type of turbine being proposed.

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

Yours sincerely

Helen Richmond
DALO
[by e-mail]

Departmental response re Wind Farm Noise Conditions

Department of the Environment
www.doeni.gov.uk

DOE Private Office
8th Floor
Goodwood House
44-58 May Street
Town Parks
Belfast
BT1 4NN

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

Telephone: 028 9025 6022

Email: Private.office@doeni.gov.uk

Your reference:
Our reference: COR/1066/14

Date: 2 October 2014

Dear Sheila

The Committee noted the Department's response on the use of reconditioned turbines. They further queried as to what data the Department collect on the noise levels produced by wind turbines and who has responsibility for measuring & monitoring this and determining if these fall within appropriate levels.

The Department does not collect data on the noise levels produced by turbines. As a consequence of conditions imposed by the Department on a planning approval, a turbine operator has responsibility for measuring and monitoring the emitted noise levels to ensure they fall within appropriate levels. The decision notice will typically include conditions that:

1. Limit noise immissions from the wind farm.
2. Advise of the required timeframes/actions in the event of a noise complaint.
3. Require the operator to provide to the Department within a specified timeframe the consultant's assessment and conclusions regarding the said noise complaint (inc. all calculations, audio recordings/raw data upon which that assessment and conclusions are based).

With regard to those submitted reports, the appropriate Environmental Health Department advises the Department on the detailed information submitted and if it is complying with the conditions and noise levels imposed.(For information, a copy of typical wind farm noise conditions is attached.)

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

Yours sincerely,

Helen Richmond
DALO
[by e-mail]

TYPICAL WIND FARM NOISE CONDITIONS (2014)

1. No development shall take place until details of the model of the turbine to be installed, its noise specification, colour and finish, have been submitted to and approved in writing by the Department.

Reason: To ensure that wind turbines with excessive sound power levels are not installed.

2. The developer shall notify the Department in writing of the date of commencement of works on site and of the date when the turbines have become fully operational.

Reason: To ensure compliance with appropriate conditions.

3. The level of noise immissions from the combined effects of the wind turbines (including the application of any tonal penalty when calculated in accordance with the procedures described on pages 104 - 109 of ETSU-R-97) shall not exceed predicted values set out in tables XX and XX included in Section XX of the Environmental Statement received by the Department on XX. Noise limits for any dwellings which lawfully exist or have planning permission for construction at the date of this consent but are not listed in these tables shall be represented by the physically closest location listed in the tables unless otherwise agreed by the Department.

Reason: To control the noise levels from the development at noise sensitive locations.

4. Within 6 months of the development first becoming fully operational (unless otherwise extended with the Department) the wind farm operator shall at his/her expense employ a suitably qualified and competent person to undertake a noise survey to assess the level of noise immissions from the wind farm. The duration of such monitoring shall be sufficient to provide comprehensive information on noise levels with all turbines operating across the range of wind speeds referred to in tables XX and XX in Section X of the Environmental Statement received by the Department on XX, and covering a range of wind directions. Details of the noise monitoring survey shall be submitted to the Department for their written approval prior to any monitoring commencing. The Department shall be notified not less than 2 weeks in advance of the date of commencement of the noise survey.

Reason: To assess compliance with noise immission limits as required by Condition No. 3.

5. Within 4 weeks of a written request by the Department, following a noise complaint from the occupant of a dwelling which lawfully exists or has planning permission at the date of this consent, the wind farm operator shall, at his/her expense employ a suitably qualified and competent person, to assess the level of noise immissions from the wind farm at the complainant's property following the procedures described in Pages 102-109 of ETSU-R-97. Details of the noise monitoring survey shall be submitted to the Department for written approval prior to any monitoring commencing. The Department shall be notified not less than 2 weeks in advance of the date of commencement of the noise monitoring.

Reason: To control the noise levels from the development at noise sensitive locations.

6. The wind farm operator shall provide to the Department the results, assessment and conclusions regarding the noise monitoring required by Conditions 4 or 5, including all calculations, audio recordings and the raw data upon which that assessment and conclusions are based. Such information shall be provided within 9 months of the

wind farm becoming fully operational in respect of condition 4, or within 3 months of the date of the written request of the Department under condition 5 unless, in either case, otherwise extended in writing by the Department.

Reason: To control the noise levels from the development at noise sensitive locations.

7. Wind speed, wind direction and power generation data shall be continuously logged throughout the period of operation of the wind farm. This data shall be retained for a period of not less than 12 months. At the request of the Department, the recorded wind data, standardised to 10m height above ground level and relating to any periods during which noise monitoring took place or any periods when there was a specific noise complaint, shall be made available to it.

Reason: To facilitate assessment of monitoring exercises and complaint investigation.

8. Within 4 weeks from receipt of a written request from the Department, following an amplitude modulation (AM) complaint to it from the occupant of a dwelling which lawfully exists or has planning permission at the date of this consent, the wind farm operator shall submit a scheme for the assessment and regulation of AM to the Department for its written approval. The scheme shall be in general accordance with:

- Any guidance endorsed in National or Northern Ireland Planning Policy or Guidance at that time, or in the absence of endorsed guidance,
- Suitable published methodology endorsed as good practice by the Institute of Acoustics; or in the absence of such published methodology,
- The methodology published by Renewable UK on the 16th December 2013;

and implemented within 3 months of the written request of the Department, unless otherwise extended in writing by the Department.

Reason: To control the levels of AM from the development at noise sensitive locations.

9. Construction work, which is audible at any noise sensitive property outside the site, shall only take place between the hours of 07.00 - 19.00 hours on Monday to Friday, 07.00 - 13.00 hours on Saturday with no such working on Sunday. Outwith these hours, work at the site shall be limited to turbine erection, testing/commissioning works, emergency works, or construction work that is not audible at any noise sensitive property.

Reason: To control noise levels from construction noise at noise sensitive locations.

Department response re wind inquiry questions

DOE Private Office
8th Floor
Goodwood House
44-58 May Street
Town Parks
Belfast BT1 4NN

Telephone: 028 9025 6022
Email: privateoffice.@doeni.gov.uk

Your reference:
Our reference: COR/1229/14

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

Date: 1 December 2014

Dear Shelia

Following the inquiry into wind energy, the Committee agreed to forward a list of questions to the Department for a response. Members also sought confirmation that the same application form is used for dwellings/turbines and sought clarification on the type of conditions which may be attached to permissions for wind turbines.

Please find attached from the Department answers to the questions raised and also to the clarification/confirmation sought above.

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

Yours sincerely

Helen Richmond
DALO
[by e-mail]

Q 1. What is the definition of cumulative impact, where is the established criteria that the DOE use and how is it applied when considering planning applications for wind turbines and wind farms?

Planning Policy Statement (PPS) 18 Renewable Energy - Policy RE 1 Renewable Energy Development seeks that 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. This is a material consideration in assessing any proposal.

The nature and character of the location, and the landscape in which a development is located, will also in part determine the acceptability or otherwise of siting proposals in proximity to each other also shall be considered in any determination.

Each application for wind energy is assessed on a case by case basis, based on site specific conditions, it shall have regard to the development plan, so far as material to the application, and to any other material considerations.

The draft Strategic Planning Policy Statement (SPPS) requires councils, in preparing development plans for their locality, to clearly set out the factors that will be taken into account when determining applications for renewable energy development. This includes consideration of the cumulative impact of such proposals. The SPPS does not, however, define the term 'cumulative impact'.

The objective of PPS 18 (which will be retained as part of transitional arrangements and therefore remains a material consideration in the assessment of proposals post April 2015) is to ensure that the environmental, landscape, visual and amenity impacts associated with or arising from renewable energy development are adequately addressed. It requires developers to consider the potential cumulative adverse impact of a proposal in the context of existing turbines; those that have received permission but have not yet been constructed; and those that are the subject of valid but undetermined applications.

The Best Practice Guidance that accompanies PPS 18, and which is a material consideration in the assessment of proposals for renewable energy development, advises that 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.

Q 2. What is the definition of negative visual impact, where is the established criteria that is used and how is it applied when considering planning applications for wind turbines and wind farms?

As stated above, the objective of PPS 18 is to ensure that the environmental, landscape, visual and amenity impacts associated with or arising from renewable energy development are adequately addressed. The policy does not define 'negative visual impact' because every development proposal is unique and there remains a need for detailed consideration of the visual impacts of individual applications on a case by case basis before determining if a proposal would give rise to adverse visual impact.

The Best Practice Guidance to PPS 18 advises that turbines in wind farms will normally be tall, frequently located in open land, and therefore will often be highly visible. 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. It advises that developers should seek to ensure that through good siting and design, landscape and visual impacts are limited and appropriate to the location.

In addition, the Supplementary Planning Guidance 'Wind Energy in Northern Irelands Landscapes' (NIEA) provides broad, strategic guidance in relation to the landscape and visual

impacts of wind energy development and is a material consideration in the determination of planning applications for wind energy proposals.

Q 3. How is Low Frequency Noise and Infrasound measured and how is Shadow Flicker measured and how does the DOE allow for it when considering a planning application for a wind turbine or a wind farm and from what established criteria do they refer to when considering these issues?

PPS 18 requires, inter alia, that wind energy development will not cause significant harm to the safety or amenity of any sensitive receptors (including future occupants of committed developments) arising from noise; shadow flicker; ice throw; and reflected light. In assessing noise impacts of wind energy development, the policy recommends the use for the ETSU-R-97 standard 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 Best Practice Guide to PPS 18 advises that there is no evidence that ground transmitted low frequency noise from wind turbines is at a sufficient level to be harmful to human health. The Best Practice Guide reports the findings of a Department of Trade and Industry study measuring low frequency noise at three UK Wind Farms. 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 assessing the noise impacts of a wind energy proposal the Department will be guided by the expert consultee advice of Council Environmental Health Officers who possess the necessary expertise in the application of the ETSU-R-97 methodology in order to determine the potential noise impacts of a development proposal.

The Best Practice Guide to PPS 18 advises that problems caused by shadow flicker are rare and, at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low. Where shadow flicker could be a problem, developers can 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

4. On the point of setback distance, 10 times the rotor diameter setback distance from a wind turbine to a dwelling and 500 metres setback distance from a wind farm to a dwelling that is currently in place, where does this come from?

Policy RE1 of PPS 18 'Renewable Energy' 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.

This separation distance ensures that wind farm developments are sited appropriately whilst also supporting the achievement of Northern Ireland's renewable energy targets.

This distance is set out to assist in preserving the general amenity of occupants of sensitive receptor(s). It is not imposed to prevent noise nuisance as this is subject to separate development management considerations, including ETSU-R-97, although it can be helpful as a rule of thumb in this regard.

In Wales and the Republic of Ireland, Wind Energy planning guidelines recommend a 500 metre separation distance between a wind turbine and a residential property to help address noise and shadow flicker impacts. English planning policy does not recommend a minimum separation distance between wind turbines and dwellings. No UK or Irish jurisdiction has established a mandatory separation distance between a dwelling house and wind turbine of greater than 500 metres.

Q. 5 What scientific or medical reports or established criteria doe the DoE use to state that these set back distances are proven to be safe for people to live and work beside?

PPS 18 requires that no renewable energy development should give rise to an unacceptable adverse impact on public safety or human health. However the separation distance, for wind farm development, of 10 times rotor diameter to occupied property, with a minimum distance not less than 500m, is established for reasons of general amenity and not safety or public health.

The Best Practice Guide to PPS 18 advises that properly designed and maintained wind turbines are a safe technology. The only source of possible danger to human life from a wind turbine would be the loss of a piece of the blade or, in most exceptional circumstances, of the whole blade, which is considered most unlikely.

The Best Practice Guide to PPS 18 advises that, although not established for safety reasons, the separation distance of 10 times rotor diameter to occupied property should comfortably satisfy safety requirements in this regard. For a smaller individual wind turbine, for example on a farm enterprise, the Best Practice Guide to PPS 18 recommends a safe separation distance of fall over distance (i.e. the height of the turbine to the tip of the blade) plus 10% as appropriate for safety purposes.

Where matters of public health are raised in respect of any proposal for wind energy development the Department will consult the Public Health Agency (PHA). The advice of the PHA is that 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.

6. What is the recommended safe setback distance for a dwelling to be from a substation and also from a huge pylon with overhead power lines, especially as there are many pylons currently being upgraded with 110kv overhead power lines and from what established criteria does the DOE refer to, to prove that these are safe setback distances from people's homes, schools or places of work?

There are no established mandatory separation distances in policy in relation to these matters. Each application for such proposals is assessed on a case by case basis, based on site specific conditions, it shall have regard to the development plan, so far as material to the application, and to any other material considerations.

7. What assessment has been done on the environmental, economic and social benefits of single wind turbines and wind farms currently operating in Northern Ireland?

DETI Input Required

8. Can you please provide me with a copy of the Department's Strategic Plan for wind energy development which includes all the single wind turbines and wind farms in Northern Ireland?

The Department does not have a Strategic Plan for wind energy development.

9. In your presentation to the Environment Committee you stated "that a moratorium into wind energy was not necessary". Who have you consulted with and what research has been done for the Department to come to this conclusion?

In its evidence to the Environment Committee, the Department stated that a moratorium on wind energy development would not be appropriate. Such a measure would not support the achievement of Northern Ireland's renewable energy targets and would result in a build-up of planning applications to be determined when the moratorium was lifted.

The Programme for Government (PfG) 2011- 2015 commits the Executive to encourage the achievement of 20% of electricity consumption from renewable sources by 2015. The

Department of Enterprise, Trade and Investment's Strategic Energy Framework seeks to achieve 40% of its electricity consumption from renewable sources by 2020. A moratorium on wind energy would therefore fail to support wider Government objectives on renewable energy and would not be appropriate on this basis.

Q 10. Is it the intention that all planning applications for wind farms as well as single wind turbines will be dealt with by the new councils?

A new classification hierarchy for planning applications came into effect on 1st April 2014 in advance of transfer of planning functions to Local Government from 1st April 2015. The new categories are –

Regionally Significant, Major and Local.

Once responsibility for the majority of planning decisions transfers to councils, the Department intends to deal only with those planning applications that are recognised as being regionally significant. This follows the spirit of local government reform and the devolution of planning functions to a local level. The Planning Act (Northern Ireland) 2011 (the 2011 Act) provides arrangements for regionally significant development proposals to be determined by the Department. Applications for renewable energy developments including wind farms and single wind turbines will largely be dealt with by the new councils as they are likely to fall with the major and local development categories set out in the proposed Planning (Development Management) Regulations (NI) 2015.

Section 29 of the 2011 Act also allows the Department to direct that certain applications be referred to it instead of being dealt with by a council. This provision allows the Department to call-in any planning application for determination.

In recognising and respecting the important role of councils in making decisions on the future development of their areas, the Department would only envisage this power being exercised in exceptional circumstances. However, there may be circumstances where the proposed development raises issues of such regional importance or strategic interest that the application should be called in for the Department, in effect, to take over the role of decision maker.

Q 11. Another point that has been brought to my attention is it acceptable for a senior building control officer or indeed any other member of the planning department to assist landowners or developers in making planning applications for single wind turbines or wind farms or any other planning development and is this a conflict of interest and is it acceptable?

Building Control officers are employees of the existing local councils and are not DOE staff, therefore it is not appropriate for the Department to comment with regard to building control officers.

With respect to DOE Planning, the Department is committed to pre-application discussions (PAD) in advance of the submission of a planning application. This involves engaging with developers who wish to bring forward a development proposal and it will also involve engagement with statutory consultees. It has been demonstrated to be an effective means of improving the planning system and assisting the decision making process.

The purpose of the PAD is not to predetermine applications, as they must go through the statutory process. Rather it is to provide advice to applicants and 'front load' the planning system to ensure the submission of high quality planning applications and also reduce processing times. This can be particularly beneficial when dealing with the highly complex environmental issues that surround wind farm developments.

It is also a requirement of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2012 that the Department shall notify, if requested by a developer who intends to submit an Environmental Statement, those environmental bodies likely to be

concerned by a development that they make available to the developer information that it holds that is considered relevant to the preparation of the environmental statement.

Additional question in e-mail

12. **Members sought confirmation that the same planning application form is used for dwellings/extensions and for wind turbines. The Committee would also appreciate clarification on the current situation on the type of conditions which can be attached to planning consent for wind turbines.**

The same application form is used for dwellings and wind turbines/wind farms. However, any application for a wind farm/wind turbine should also be accompanied by the supplementary P1W form which requires the applicant to provide further details on the proposal such as the turbines dimensions and exact location co-ordinates.

A very wide range of conditions can be attached to a wind farm approval including those covering control of elements relating to protection of ecology/habitat management, archaeology, noise, shadow flicker, decommissioning of turbines, hydrology impacts, aviation lighting, traffic/roads/access, and t.v. remediation schemes. Single turbines generally do not require such detailed conditions as the environmental impacts are less. However similar types of conditions can be applied where necessary on a case-by-case basis.

Northern Ireland Assembly

Appendix 5

Papers from Other Departments

ETI Committee update re renewable energy inquiry

Northern Ireland Assembly

Committee for the Environment
Room 375
Parliament Buildings

Tel: +44 (0)28 9052 1614

To: **Sheila Mawhinney**
Clerk to the Committee for the Environment

From: **Jim McManus**
Clerk to the Committee for Enterprise, Trade and Investment

Date: **2 December 2013**

Subject: **Committee Inquiry into Renewable Energy**

At its meeting on 28 November 2013, the Committee for Enterprise, Trade and Investment considered updates from the Department regarding the Committee Inquiry into Renewable Energy and the Strategic Energy Framework Implementation Plan.

Members agreed to forward the attached updates to the Committee for the Environment to inform its Inquiry and to make it aware that the Department has indicated that a review will be carried out of the Strategic Energy Framework in the near future.

Jim McManus
Clerk
Committee for Enterprise, Trade and Investment

Energy

Department of Enterprise, Trade and Investment
www.detini.gov.uk

Jim McManus
Committee Clerk,
Enterprise Trade and Investment Committee
Northern Ireland Assembly
Room 424, Parliament Buildings
BELFAST
BT4 3XX

18 November 2013

Dear Jim

UPDATES ON THE REPORT ON THE INQUIRY INTO RENEWABLE ENERGY & THE STRATEGIC ENERGY FRAMEWORK (SEF) IMPLEMENTATION PLAN

Inquiry into Renewable Energy

The Department responded to the Committee on the "Report on the Committee's Inquiry into Barriers to the Development of Renewable Energy Production and its Associated Contribution to the Northern Ireland Economy" on 27 June 2011, and supplied additional information following Committee consideration on 11 August 2011. Updates on progress towards implementation of the recommendations were provided on 21 November 2011, 23 May 2012, 21 November 2012 and 15 May 2013. I am now writing to advise you of progress since the last update; and, as agreed by the Committee, following the May 2013 update, this covers only those recommendations against which there are actions still to be completed.

The current position includes input from other departments with responsibility for a number of the recommendations. The information provided should be considered in conjunction with the update provided in May. You will note that a significant number of the actions are now complete.

Strategic Energy Framework

It was also agreed that updates on the SEF Implementation Plan would be provided every six months and the attached version reflects progress up to the end of September 2013.

Yours sincerely

FIONA HEPPER
Head of Energy Division

ANNEX B

Update on progress towards implementation of recommendations in the Committee for Enterprise, Trade & Investment's Inquiry into Renewable Energy – November 2013

Recommendation	DETI Update (May 2013)	DETI Update (November 2013
1. The Barnett review stated that the Executive must provide clear focus and leadership to the range of energy policy issues as a separate and distinct Government priority. The Committee supports this recommendation and calls on the Executive to provide appropriate leadership in delivering the overall energy agenda by bringing all responsibility for energy policy and strategy under a single Government department	Response provided by: DETI Work suspended pending Budget Review group outcome – no further update can be provided by DETI. – **The Committee sought further information following its meeting on 30 May 2013 in relation to when this is likely to take place. DETI & OFMDFM responded as follows;** The update provided in November 2012 advised that the Executive agreed in May 2012 that there are no policy gaps of sufficient size to merit substantive change, but that the consolidation of energy functions should be revisited sometime in the future. The Executive also agreed that the small scale tactical reorganisation of energy efficiency functions should be kept under continuous review. OFMDFM has advised that suspension was due to the review undertaken by the Assembly and Executive Review Committee (AERC) on the size of the Assembly and number of Northern Ireland departments. The AERC also reported to OFMDFM in late 2012 and the report has been referred to the Party leaders Group for consideration. There is no indication as to when the process will be concluded.	Response provided by: OFMDFM No further information is available at this time.
2. The Executive must develop a long-term vision for renewable energy which includes both an energy perspective and an economic perspective and establishes long-term partnerships to the benefit of Northern Ireland with other devolved administrations in the UK and with the Republic of Ireland, and should, where appropriate, include an all-island dimension for renewable energy.	Response provided by: DETI The contract to carry out a study to establish a long term vision, to 2050, for energy in Northern Ireland was awarded in November 2012. Work commenced in December and is well advanced. The study will be published by September.	Response provided by: DETI The study is complete and the report 'Envisioning the Future – Considering Energy In Northern Ireland to 2050 was published on 16 September 2013. A copy of the report was forwarded to the Committee on 12 September.

DT1/13/0173365

Recommendation	DETI Update (May 2013)	DETI Update (November 2013
11. DETI should undertake an analysis to determine the costs and benefits to the Northern Ireland economy, business and renewable energy developers of introducing a FIT for small-scale generation along the lines of what has been introduced in GB.	Update provided by DETI Analysis on suitability of a small scale FIT, including how the GB FIT can be adapted for Northern Ireland, was commissioned on 1 March 2013 and is due for completion at end May. The study will assess the various options for introducing a FIT which replicates or is similar to the GB FIT. These options will include costs and benefits. A separate report will be provided to the Committee on the report's conclusions and next steps once it has been assessed by DETI.	Update provided by: DETI The study and it findings, which was undertaken by Cambridge Economic Policy Associates, was shared with the Minister and the ETI Committee in October. The study concluded that the GB small scale FIT can be adapted for use in Northern Ireland and that the same technologies should be supported under the same tariff levels as in GB. The necessary legislative powers for a FIT are currently being drafted as part of DETI's Energy Bill. The intention remains to have a small scale FIT in place before the NIRO's closure to new applications in 2017.
20. The Utility Regulator should review the process for grid connection to ensure that it is fully transparent and costs are fully explained. Connections for installations should be made in a timely fashion, with both parties aware of how long the process is going to take.	Response provided by: NIAUR The UR is planning to review the NIE Statement of Charges for connections. This is an annual process and any updates required will be in place for October 2013. In addition, the Utility Regulator has been working closely with NIE in developing the Statement of Charges for Wind farm cluster connections. It is expected that this will be approved and published in May 2013.	Response provided by: NIAUR The NIE Statement of Charges for connections was updated and is effective from 1 October 2013. The Statement of Charges includes the charging arrangements for Authorised Generators connecting to the network as part of a Generator Cluster and the methodology for connecting groups of generators to the NIE Distribution System using Cluster Substations. These were effective from 9 May 2013. The Utility Regulator has been working closely with NIE to ensure that the Statement of Charges will be updated to cover Annex XII of the Energy Efficiency Directive 2012/27/EU part (b)(iii) to ensure that "The overall process to become connected to the grid should be no longer than 24 months, bearing in mind what is reasonably practicable and non- discriminatory"

Recommendation	DETI Update (May 2013)	DETI Update (November 2013
24. The Department of the Environment should commence a consultation exercise on permitted development for business and agricultural installations with a view to bringing forward proposals for permitted development in these sectors.	Response provided by: DoE Further to its consultation on small scale renewable technology permitted development the Department has introduced permitted development rights for a range of micro-generation renewable technologies which will apply to all non-domestic buildings including business and agriculture. The permitted development rights came in to operation on 30 April 2013 (S.R. 2013 No. 96) and include solar panels, ground and water source heat pumps, biomass fuel stores and boiler housing. In addition the Department consulted on the provision of permitted development rights for anaerobic digesters on agricultural units as part of its consultation on agricultural buildings permitted development. The consultation closed on 18 January 2013. The Environment Committee considered the Department's initial synopsis of responses to the consultation on 14 March 2013 and the Department is presently working on finalising proposals on the way forward.	Response provided by: DoE Further to its consultation on small scale renewable technology permitted development the Department has introduced permitted development rights for a range of micro-generation renewable technologies which will apply to all non-domestic buildings including business and agriculture. The permitted development rights came in to operation on 30 April 2013 (S.R. 2013 No. 96) and include solar panels, ground and water source heat pumps, biomass fuel stores and boiler housing. In addition the Department, following a public consultation on permitted development rights for anaerobic digesters on agricultural units, introduced those permitted development rights on 30 August 2013 through Statutory Rule 2013 No. 210.

Recommendation	DETI Update (May 2013)	DETI (November 2013)
25. The Executive must bring forward a programme to develop the renewable energy potential of public buildings. This should include targets and time-scales for substantially increasing the deployment of renewable energy right across the public sector.	Response provided by: OFMDFM OFMDFM supports the deployment of renewable energy on the public sector estate, where appropriate economic appraisal, taking full account of sustainable development considerations, supports the proposed investment. DFP reports that, following a pilot project assessing the applicability of renewable technologies to the office estate, it has concluded that "investment in energy efficiency rather than renewables remains the most cost effective means of deploying its constrained capital budget". These findings support the general view of OFMDFM that, investment in energy efficiency measures is capable of delivering cost and carbon savings in a similar way to renewable energy investment, and that individual investment decisions should be made on the basis of the merits of the individual case. Action complete	Response provided by: OFMDFM Nothing to add to update provided in May 2013.

Recommendation	DETI Update (May 2013)	DETI (November 2013)
25. **(CONT'D)**	**The Committee sought further information following its meeting on 30 May 2013 – an update was requested on the progress on public buildings. DFP responded as follows;** DFP manages the office estate which represents approximately 7% of the public sector estate (measured by running costs). DFP can therefore comment in respect of DFP's management of these buildings but not in relation to the other 93% of the government estate. Following the assessment of a number of renewable technologies, our view is that investment in energy efficiency projects remains the most cost-effective means of reducing both costs and emissions in the office estate. The applicability of renewable technologies is assessed on a case by case basis as capital projects are approved. At this time, DFP has no plans for a substantial roll-out of renewable technologies though recently investments have been made in low-energy lighting conversions and building energy management hardware/software. Significant investment is planned in the incoming years in further low-energy lighting systems and high efficiency heating systems.	

STRATEGIC ENERGY FRAMEWORK 2010 - IMPLEMENTATION PLAN/PROGRESS - September 2013

Overarching Targets:

40% of electricity consumption from renewable sources by 2020

PfG 2011-15 - Targets

2012/13	2013/14	2014/15
12%	15%	20%

10% renewable heat by 2020

PfG 2011-15 - Targets

2012/13	2013/14	2014/15
2%	3%	4%

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 1	Ensure relevant European Union Directives are transposed and implemented to develop regional markets and promote continued market liberalisation in accordance with the European Union vision for greater transparency and efficiency within electricity and gas markets.	Ongoing work to 2020, 10-year development plans for regional and EU-wide networks.	NIAUR, Energy industry, CCNI, DECC, Ofgem, CER, DCENR, TSOs, NG	Make Regulations to amend the Licence Modification and Appeals process. Make legislation to create electricity distribution exemptions regime, and attach conditions to exemptions. Further research into SEM legislative requirements (see below). Ongoing monitoring of practical implementation by the Department and the Utility Regulator.	Further research into SEM legislative requirements. Ongoing monitoring of practical implementation by the Department and the Utility Regulator.		The Department completed transposition of the IME3 Electricity and Gas Directives in April 2013, in line with the timetable previously notified to the EU Commission. Completing transposition involved the making of several pieces of legislation by the Department, and new / amended electricity and gas licence conditions by the Utility Regulator, as well as administrative actions. Additional legislation will be made by April 2014 to review the electricity and gas licence modification arrangements and a further consultation on the draft legislation is planned to commence later this year. Legislative provision has been made to ensure IME3 compliance in the interim period. DECC notified the Department in September that the EU Commission had confirmed that the infraction cases against the UK in relation to the IME3 Electricity and Gas Directives had been closed. Remaining IME2 compliance issue for gas to be confirmed by Ofgem, otherwise other IME2 gas and electricity compliance issues agreed.
SEF 2	Ensure the Single Electricity Market continues to encourage investment and is flexible enough to meet changing generation and demand patterns, with the aim of securing the lowest possible wholesale electricity price.	Ongoing, in co-operation with NIAUR and the energy industry	NIAUR, SEM Committee, Generators, Energy industry	Work with NIAUR/NIE to consider suitable grid strengthening project(s) to support renewablw generation. If suitable project(s) identified, agree Letter of Offer with NIE and complete designation processes with ERDF Managing Authority.	Finalise State Aid Paper discussions with Commission Conduct Economic Appraisal on NIE proposals Complete DETI Casework, Ministerial and DFP approvals Develop Project Governance arrangements (including Gateway Review assessment)	Deliver Grid Strengthening programme of works	Grid strengthening proposals under active consideration with NIE and NIAUR. Draft State Aid paper prepared and with European Support Unit for feedback. ESU discussions with Commission have clarified project likely to be viewed positively, with funding of up to €50 million potentially available under next ERDF Programme.
SEF 3	Promote the longer term integration of the Single Electricity Market within a British Isles and European wholesale electricity market.	Ongoing. Support work of the Regulators on short and medium term links between SEM and BETTA to advance longer term 2020 10-year development plans for regional and EU-wide networks.	EC, DECC, DCENR, NIAUR, SEM Committee, Generators, FUI Group / Energy industry	Consider legislative implications of adoption of Common Target Model. Continue engagement with DCENR and RAs on High Level Design. Monitor practical implementation by both RAs of governance arrangements.	Consider legislative implications of adoption of Common Target Model. Continue engagement with DCENR and Ras on development of a High Level Design to be completed by Quarter 3 2014. Monitor practical implemetation by both Ras of governance arrangements.	Commence Legislative considerations to ensure implementation of New Market arrangements by end of 2016.	Monitoring progress against SEM Committee Market Integration Project Plan and EU timetable for Internal Market by 2014. Following meeting with EC on 27 June 2011 achieved an extension for island systems (i.e. SEM) to 2016 for Capacity Allocation and Congestion Management (CACM) and Electricity Target Model for EU-wide price coupling and access to cross border transmission via markets. Agreement with Regulator on template-based reporting arrangment to give consideration to NI implications of Market and Technical Codes. Appointment by SEM Committee of market design consultants and initiation of High Level Design phase of project
SEF 4	Ensure there is transparency in the setting of electricity and gas retail prices.	Participate in annual electricity and gas tariff review process.	NIAUR, Energy industry, CCNI	Participate in tariff review discussions with NIAUR, energy companies and Consumer Council and update the Minister on developments.	Participation in 2014/15 electricity and gas tariff reviews.	Participation in future electricity and gas tariff reviews	DETI participated in the 2013 tariff reviews which saw electricity tariffs increase by 17.8%, Airtrcity gas tariffs increase by 8.7%, and firmus energy tariffs increase by 14.4%.
SEF 5	Put in place legislation to establish arrangements for efficient cross border regulation and management of transmission and trading of gas.	Enact by end 2011	DCENR, NIAUR, CER, gas industry	Take CAG legislation through Assembly process, subject to cost/ benefit considerations by Irish Regulator CER, and agreement on legistaltive requirements with DCENR.	Consider how compliance with EU Gas Regulation requirements will deliver main aspects of CAG, and work towards EU Target Market for gas	Complete EU Gas Regulation compliance, with a view to delivering principal aspects of CAG.	DETI completed 2nd draft CAG Bill and draft CAG MoU, and awaiting DCENR to complete work on their draft Bill. CAG was put on hold (both north and south) to allow completion of IME2 gas compliance and further work by Regulators on single balancing zone and costs with reports expected by June 2013. New work on target model for EU Internal Market by 2014 will also affect timetable for the Bill and the work needed to be compliant may shape the approach to CAG. The Utility Regulator has recently consulted on implementation of the EU Gas Regulation, which will deliver important aspects of CAG. Both Departments and Regulators considering implications of Balancing Zone study, and CER Cost Benefit Analysis.

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 6	Encourage more companies to enter the gas and electricity supply markets, particularly the domestic market, through continued market liberalisation.	Ongoing	NIAUR, Energy industry, CCNI	Meet and receive updates from energy suppliers, and in co-operation with the Utility Regulator continue to monitor competition levels.	Meet and receive updates from energy suppliers, and in co-operation with the Utility Regulator continue to monitor competition levels.	Meet and receive updates from energy suppliers, and in co-operation with the Utility Regulator continue to monitor competition levels.	Firmus Energy entered the Greater Belfast domestic gas market in November 2010 and continues to offer customers discounts against Airtricity Supply Ltd (formerly Phoenix Supply) gas prices. Firmus Energy now has around 40,000 gas supply customers in Greater Belfast.Airtricity Supply Ltd now also has a gas supply licence for the 10 towns licensed area outside Greater Belfast which is open to competition iro large I&C customers from October 2012. Airtricity entered the NI domestic electricity market in June 2010 with discounts of up to 14% below Power NI, and now has around 146,000 domestic and 17,000 business customers. Budget Energy - electricity supplier has also been increasing its market share. As at 31 March its share of the domestic market is estimated at 21,000 customers. Electric Ireland entered the domestic electricity supply market in October 2011. Utility Regulator now reports five active suppliers for domestic electricity customers and eight active suppliers to I&C sector.
SEF 7	Help create conditions which more readily facilitate customer switching.	Ongoing in co-operation with NIAUR and the gas industry	NIAUR, Energy industry, CCNI				**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved.**
SEF8	Liaise with NIAUR to ensure there are incentives to increase gas connections and increase gas uptake in existing and future licensed areas.	Ongoing consideration within the Gas Strategic Development Group (GSDG)	NIAUR, Energy industry, CCNI	Monitor progress in relation to new gas connections secured.	Gas companies price controls will continue to include incentives for connections.	Gas companies price controls will continue to include incentives for connections.	NI Consumer Council produced a series of energy leaflets including for consumers wishing to switch to gas. Gas connections are incentivised through the individual companys' regulated price controls and updates on connections and network roll-out are provided to DETI by the gas companies. Phoenix has connected around 160,000 customers to gas in Greater Belfast. Firmus Energy has been exceeding their connection targets, with almost 20,000 customers now connected in their 10 towns licensed area, and also supply around 40,000 consumers in the Greater Belfast gas market.
SEF9	Encourage extension of the natural gas network, where it is technically possible and economically feasible, to enhance diversity of fuel supply and customer choice, and bring about reductions in CO2 emissions, as part of a low carbon energy strategy.	Completion of gas network extension study in Spring 2010, and development of a natural gas development strategy by end of March 2011.	NIAUR, Energy industry, CCNI	DETI to make updated Gas Licence Applications Regulations in Autumn 2013, and NIAUR to award licences for new gas areas as early in 2014 as possible.	New gas licensee(s) to prepare detailed gas network design, seek planning approval, and agreement on wayleaves. DETI to prepare grant Letter of Offer to licensee.	Construction of new high pressure gas pipelines to commence, followed by provision of local gas distribution networks, and connection of new gas customers.	NIAUR consultation on 16 May 2012 on gas extension licensing issues. Draft Outline Business Case (OBC) on gas network extension provided in July 2012 and final report completed in September 2012. DETI Casework Committee meeting held on 25th September 2012 to discuss funding issues and paper susequently submitted to DFP for consideration. NI Executive approval on 10th January 2013 of up to £32.5m subvention for extension of gas network to West and North-West. State Aid paper provided to Brussels in March 2013 and Strategic Environmental Assessment discussed with DOE,and an EQIA is being prepared. On 3 April 2013, the Utility Regulator issued its consultation on the licence process for gas extension to the West and North-West. DETI has consulted on proposed changes to the Gas Applications Regulations over summer 2013.
SEF 10	Support the development of a range of renewable technologies to ensure the most cost-effective and reliable mix of generation which maximises Northern Ireland's sustainable energy resources. (NB note that this is linked with SEF Actions 15, 25, 28 & 29.)	Ongoing to 2020	Energy Industry, CCNI, Universities, NIAUR, Invest NI. Linked with SEF Actions 15, 25, 28 & 29.	Consult on proposed small scale FIT mechanism including tariffs. Consult on and introduce changes to the Northern Ireland Renewables Obligation linked to biomass sustainability and support levels for large scale solar PV through the Renewables Obligation Order (NI) 2014. Commence review of small scale ROC levels in NIRO.	Consult on any proposed changes to small scale ROC levels (wind, solar PV, hydro, anaerobic digestion) for introduction in 2015. Introduce small scale FIT powers in DETI Energy Bill. Continue to develop the small scale FIT.	Introduce any required changes to small scale ROC levels in April 2015. Introduce a small scale FIT before the NIRO's closure in 2017.	The draft On Shore Renewable Electricity Strategic Action Plan is currently being finalised following the public consultation and the Appropriate Assessment. On completion of this work the Plan will be submitted to the Executive in June 2013 for its approval to publish. Minister announced on 22 May 2012 that NIRO will close to new generation in 2017, introduction of FIT CfD and small scale FIT. DETI undetook two consultations in 2011 and 2012 on ROC banding changes for introduction in 2013 which were introduced in the Renewables Obligation (Amendment) Order (NI) 2013. A study undertaken in the first half of 2013 considered the issues associated with introducing a small scale FIT similar to that in GB. That work has concluded that a GB FIT would work in the NI albeit with some differences to reflect the different energy market in NI. Consultation to be developed once further detail on required differences to GB FIT are clarified.
SEF 11	Implement European Union Directives and Regulations in a timely and pragmatic manner in order to promote and enhance regional energy infrastructure and security of gas supply. (See also SEF 1)	Ongoing in relation to IME3 with a transposition target date of March 2011	NIAUR, Energy industry, CCNI, DECC	Complete process for making and laying of Section 2(2) Regulations for outstanding IME3 issues including energy Licence Modification arrangements, Electricity Distribution, and other outstanding issues including LNG. Provide responses to EC via DECC in London.	DETI working with the Utility Regulator and energy industry to ensure continued progress towards compliance with the IME3 Gas and Electricity Regulations.	DETI working with the Utility Regulator and energy industry to ensure continued progress towards compliance with the IME3 Gas and Electricity Regulations.	DETI Regulations for transposition of the majority of IME3 provisions were laid at the Assembly on 23 March 2011 and came into operation on 15 April 2011. IME3 implementation progress is being monitored through regular meetings with the Utility Regulator, given their important role in relation to licence modifications, unbundling certification, and enhanced responsibilities under IME3. As noted above under SEF 1, additional work was required across a number of issues to complete transposition and the Department has been working, in conjunction with the Utility Regulator, towards implementation of the additional legislative requirements (some of which are subject to Executive approval) by April 2013. On 24th January 2013 the Commission published notice of its intention to refer the UK to the European Court of Justice in relation to the Electricity and Gas Directives. Three pieces of legislation to transpose the remaining legislative requirements of IME3 were made on 28 March and come into effect in April 2013 in line with the timeframe notified to the Commission. Additional licence conditions are due to be notified to the Commission, also by the end of April 2013. Work on transposing the Energy Efficiency Directive has now begun - Energy Division working with DECC, UR to scope the requirements, and plan route to compliance. UK-wide consultation on Article 8 closed. NI consultation on Articles 9-11 electricity and gas billing and metering in progress.

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 12	Work with other NI Departments, and partners in DECC and the Scottish and Irish Governments to achieve an efficient and coordinated regional approach to planning for electricity, gas and oil emergencies.	Agree an initial protocol by March 2012	DECC, DCENR, CER, NIAUR, Ofgem, gas and electricity industry	n/a			**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved**
SEF 13	Stimulate and encourage investment in research for underground energy storage, including natural gas storage.	Ongoing through DETI Energy Storage Study completed in Spring 2010.	BGS/GSNI, NIAUR, Energy industry	Co-operation with gas storage developers, Crown Estate, NIAUR, DECC, and DCENR in respect of facilitating private sector development of gas storage in NI. Also assist with taking forward any legislative amendments via the DETI Energy Bill	Delivery of gas storage aspects of the DETI Energy Bill through the Assembly legislative process for primary legislation. Continue to work with gas storage developers, consenting bodies, DOE, and Crown Estate in relation to Islandmagee Storage project.	Continue to monitor progress on developer's plans to provide a gas storage facility in east Antrim.	Continued liaison with Islandmagee Storage re gas storage developments in East Antrim. Crown Estate confirmed on 27 June 2012 that it accepts DETI & DOE's respective legal interpretations in relation to the MDA, Planning Order, HSE and MACAA issues for the Larne Lough project. DETI also taking forward some amendments to the Gas Order as part of the new Energy Bill to ensure appropriate legislative cover for future gas storage projects in NI. The Utility Regulator approved a gas storage licence for Islandmagee Storage on 18 October 2012, with DOE granting planning approval to facilitate the project on the same date. Work ongoing by DOE in respect of the necessary Marine licence for the Larne Lough project, and with Crown Estate and the developers in respect of this.
SEF 14	Work with NIAUR to encourage investment in an appropriate level of conventional power generation to support higher levels of renewable electricity generation.	Ongoing	NIAUR, Generators, Energy industry	Meet generators and SONI at least annually to review development plans and security of supply issues.In co-operation with the Utility Regulator, provide an update paper on electricity security of supply. Hold a Winter Outlook meeting with SONI in Autumn 2013.	Continue to liaise with the Utility Regulator, system operator SONI, and generators in relation to generation capacity and overall security of electricity supply.	Continue to liaise with the Utility Regulator, system operator SONI, and generators in relation to generation capacity and overall security of electricity supply.	Discussions through year with CBI/generators on DETI engagement with HM Treasury to secure CPF exemption in NI and notification to both parties on successful conclusion of these discussions Discussion with DOE in September 2011 and March 2012 in relation to impacts on generators of EU Industrial Emissions Directive. Met ESBI Coolkeeragh in February 2012. Also discussions with the Utility Regulator, ESNI ,AES, and SONI regarding winter security of supply. Discussions ongoing with SONI and NIAUR since December 2012 re generation capacity in NI.Joint Utility Regulator/ DETI paper on security of supply issued 12 June 2013.
SEF 15	Work with NIAUR, NIE and SONI to explore the need for provision of up to 300MW of biomass power generation, with focus on Landbank sites.	Within 5 years	Utility Regulator, power generators	Continue to liase with the Utility Regulator in relation to NIE Landbank and potential for additional generation at new sites, including potential for biomass generation.	Continue to liase with the Utility Regulator in relation to NIE Landbank and potential for additional generation at new sites, including potential for biomass generation.	Continue to liase with the Utility Regulator in relation to NIE Landbank and potential for additional generation at new sites, including potential for biomass generation.	Landbank sites advertised by NIE LB on 26 March 2013. 3 sites are lease only options (Belfast West, Kilroot and Coolkeeragh). The 2 other sites are for sale or lease (Camlough, Lisahally Tank Site). Requests For Proposals will close on 19 June 2013 and NIE LB will use the summer to assess the responses. NIE LB expected to submit a shortlist for consideration by the Utility Regulator Board late-August 2013. The UR Board will consider the options with a view to decisions before the end of 2013.

Goal 3 - Enhancing Sustainability							
Action No. & RAG Status	**Objective**	**Timeframe**	**Stakeholders (Govt & External)**	**Milestones 2013/14**	**Milestones 2014/15**	**Milestones 2015 and Beyond**	**Progress to end September 2013**
SEF 16	Contribute to the 1% year on year energy saving targets identified in the United Kingdom's National Energy Efficiency Action Plan by working with other Departments who have responsibility for energy efficiency activities and other key stakeholders, such as the Consumer Council and Northern Ireland Energy Agency.	Ongoing until 2016	Invest NI, DFP, DARD, DSD, DoE , OFMDFM, CT, EST , NIEA, GND, CCNI,	Dependent on requirements of EED.			**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved**
SEF 17	Consider increasing end user efficiency through a Carbon Emissions Reduction Target style supplier obligation.	By December 2011	NIAUR, CCNI , DSD, Invest NI , Energy Suppliers	Introduce primary powers for obligation via Energy Bill.	Introduce primary powers for obligation via Energy Bill.	Develop detail of the obligation and introduce via secondary legislation.	The Energy Efficiency measure was included in the policy consultation on the Energy Bill. The Committee was consulted in November 2012. Final policy was approved by the Executive on 7 February 2013. Consideration has been completed therefore **objective has been achieved.** Complex issues in relation to the obligation and other policy areas, as well as delays in progressing issues raised with DSO have delayed progress slightly in relation to legislative implementation.
SEF 18	Work with other Departments and key players to develop a cohesive, Executive endorsed, framework for sustainable energy messaging in Northern Ireland.	By September 2010	DOE, DSD, NIHE, OFMDFM, DRD, DARD, DFP, EST, CT, NIE, Phoenix, Firmus, Airtricity, CCNI etc.	By March 2014 continue to develop the 'Energywise' brand (along with other departments) through its use in Division's advertising eg RHI and infrastructure projects.			**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved**.
SEF 19	Optimise the work of the Energy Services Agreement Forum to support energy efficiency. (Linked to SEF 17)	By December 2011	Energy suppliers and Energy supply trade associations who have a Voluntary Agreement with DETI.	Continue to monitor outworking of phase 2 VoluntaryAgreements.	Work with ESAF members to ensure implementation of phase 2 VAs in year including increased contribution by 1% year on year.	Work with ESAF members to ensure implementation of phase 2 VAs in year including increased contribution by 1% year on year. Consider phasing out of VAs if obligation is coming into force.	Phase 2 voluntary agreements signed by ESAF members in year. Bilateral meetings to monitor performance of voluntary agreements completed in year. Terms of Reference for ESAF reviewed and revised version approved by members. Results for 2012/13 submitted to DETI by members.
SEF 20	Work with the Northern Ireland Authority for Utility Regulation to develop a cost effective smart metering solution for Northern Ireland.	By December 2011	CCNI, NIE, Energy Industry, Consumers	Consultation timetable on rollout is subject to NIAUR timeframe.	Ultility Regulator to Consult on Roll out 2014 - DETI to subsequently conduct a Privacy Impact Assessment	Work with Regulator and sector on implmentation arrangements	2012/13 Milestones achieved - Minister announced an electricity only smart metering rollout for Northern Ireland in July 2012. Equality Impact Assessment and Regulatory Impact Assessment complete and published on DETI website. NIAUR will consult on the operational nature of the rollout in 2014. Initial engagement with DECC on privacy statement considerations commenced July 2013
SEF 21	Encourage greater scope for CHP in Northern Ireland.	Ongoing	Industry, Invest NI, DETI and other Departments as needed	DOE to work with DEFRA and DECC on transposition of Article 14 (5) et al of Energy Efficiency Directive. DETI to assess requirements of 14(10) and consider if existing CHPGO regulations are compliant. Work with other departments and bodies (DARD, Invest etc) to ensure any CHP incentives or grants are	Finalise regulations to implement CHP requirements of EED with DECC (if NI agreement received). DOE to finalise its NI regulations on CBA for CHP.	Contribute to UK-wide assessment of CHP potential.	DETI has worked with DECC and DOE to scope the requirements of Article 14 of the Directive and is working to ensure compliance by required dates. Agreed UK-wide assessment of CHP potential with DECC - planned for 2015 as required by the Directive.
SEF 22	Work with appropriate Matrix panels and their sectoral bodies to ensure sustainable energy research is correctly targeted and mindful of wider strategic goals.	Ongoing	Industry, Invest NI, DETI and other Departments as needed	n/a			**As per the SEF Implementation Plan Update to the ETI Committee at March 2013 - Objective has been achieved**

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 23	Provide appropriate support for industry to increase its productivity through the deployment of sustainable energy technologies.	By March 2015	Invest NI	Continued delivery of the approved programme of sustainable development support for industry.	Continued delivery of the approved programme of sustainable development support for industry.	Continued delivery of the approved programme of sustainable development support for industry.	Since the Ministerial Approval for the delivery of support for industry through the "Sustainable Productivity Programme" (SPP) was received in July 2012, Invest NI has continued to deliver the SPP's full range of activities. These activities include an interest free energy efficiency loan scheme, a capital grant scheme for water and/or materials savings projects, industrial symbiosis services, free audits/surveys to identify resource efficiency projects, free technical consultancy to help businesses take resource efficiency projects forward and a range of one-to-many events and activities. Where appropriate the deployment of sustainable energy (renewable and energy efficiency) technologies will be embraced within these activities.
SEF 24	Consult and, if necessary, legislate on the Department's and the Northern Ireland Authority for Utility Regulation's statutory duties so that sustainability is given a higher priority in relation to other duties.	2012/13 Legislative Programme	NIAUR, CCNI, energy industry, wider society	To have progressed the Energy Bill through the Assembly stages	To have progressed the Energy Bill through the Assembly stages and have enacted by 2015.		The consultation on the Energy Bill included proposals to amend the duties and obligations of DETI and the Regulator. The Executive approved the final policy at its meeting on 7 February 2013. Instructions have been passed to the Office of Legislative Council to draft the Bill.
SEF 25	Ensure that support mechanisms for renewable electricity are tailored and appropriate to Northern Ireland's needs, within the context of the wider wholesale electricity market (i.e. NIRO).	By 2017	Renewable energy stakeholders, NIAUR, CCNI, wider society	Complete smallscale FIT analysis and issue consultation mid 2013. Consult on proposed small scale FIT mechanism including tariffs. Consult on and introduce changes to the Northern Ireland Renewables Obligation linked to biomass sustainability and support levels for large scale solar PV through the Renewables Obliagtion Order (NI) 2014. Commence review of small scale ROC levels in NIRO.	Consult on any propsoed changes to small scale ROC levels (wind, solar PV, hydro, anaerobic digestion) for introduction in 2015. Introduce small scale FIT powers in DETI Energy Bill. Continue to develop the small scale FIT.	Introduce any required changes to small scale ROC levels in April 2015. Introduce a small scale FIT before the NIRO's closure in 2017.	Minister announced on 22 May 2012 that NIRO will close to new generation in 2017, introduction of FIT CfD and small scale FIT. DETI undertook two consultations in 2011 and 2012 on ROC banding changes which were introduced in the Renewables Obligation (Amendment) Order (NI) 2013. A study undertaken in the first half of 2013 considered the issues associated with introducing a small scale FIT similar to that in GB. That work has concluded that a GB FIT would work in NI albeit with some differences to reflect the different energy market in NI. LCM approval for EMR aspects of DECC Energy Bill received by Assembly on 11 February 2013. DETI hosted a seminar on 9 September for large scale generators as part of DECC's consultation on the EMR Delivery Plan and draft strike prices.
SEF 26	Work with developers, planners and those responsible for environmental consents to ensure that the need for renewable energy to address the environmental impacts of climate change is recognised, that good quality applications are made and that clear, consistent and proportionate procedures are in place for the consenting of renewable installations.	Ongoing	DOE, NIEA, renewable stakeholders.	DOE to consider results of Communities and Renewable Energy study and consider whether best practice guidance is appropriate.	Formulate draft action plan (along with DOE and DARD), consult on the action plan, finalise recommendations and gain Executive approval. Commence implementation. Review effectiveness of MoU with DOE	Continue implementation of recommendations in action plan and review as appropriate. Review effectiveness of MoU with DOE.	The Planning and Renewable Energy sub-group has been being progressed a number of issues including: implications of the Planning Act 2011, implementation of the RED, development of a MoU between DETI and DOE relating to planning, marine licensing and consent applications, communication with the sector regarding planning applications, community benefit guidance and consideration of environmental guidance. The MoU was finalised and signed off at Permanent Secretary level on 19 June 2013. The report on Communities and Renewable Energy is complete and was published on 8 October 2013.The Departments 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 plan.
SEF 27	Ensure that relevant Northern Ireland Departments transpose and implement the requirements of the European Union Renewable Energy Directive.	By December 2010	Renewable energy stakeholders, relevant NI departments, NIAUR, DECC and Ofgem.	n/a			**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved.**
SEF 28	Implement the Offshore Renewable Energy Strategic Action Plan 2010-2020	Through to 2020, with appropriate reviews.	OREF, The Crown Estate, Renewable Energy industry, Invest NI, other marine sectors and environmental NGOs	Introduce new offshore renewable legislation by March 2015	Executive Approval and drafting of Bill completed by March 2015.	Bill scheduled to be introduced in 2015.	DETI's Offshore Renewable Energy Strategic Action Plan 2012-2020 was published in April 2012 and provided the framework within which The Crown Estate (TCE) announced development rights for one offshore wind and two tidal projects within the first NI Offshore Renewable Energy Leasing Round on 10 October 2012. Work continues on range of ORESAP actions. DETI consulted from February to April 2013 on policy proposals for a new Offshore Renewable Energy Bill. Work is now ongoing to finalise the policy before seeking Executive Approval to commence drafting the Bill. It is anticipated that the Bill will be introduced to the Assembly in 2015.

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 29	Work with other relevant Departments in the implementation of the first Bioenergy Action Plan over the period to 2015 and any subsequent plans to promote the ongoing sustainable development of bioenergy.	By 31 March 2015, with appropriate reviews.	Bioenergy Inter-departmental Group, Renewable energy sector, NIAUR.	By March 2014 continue to monitor the Bioenergy Action Plan on a regular basis and consider any additional actions necessary to promote the development of bioenergy.	By March 2015 continue to monitor the Bioenergy Action plan and consider any additional actions necessary to promote the development of Bioenergy. Consider the need for a new Bioenergy Action Plan.		Bioenergy Sub group has now been incorporated into a new Renewable Heat Strategy Group with representatives from all departments. This group met for the first time on 18 October 2011 and monitored progress against the action plan. Group continues to meet on a bi-annual basis to monitor actions against the plan. Next meeting scheduled for January 2014 (see also SEF 33).
SEF 30	Promote and raise awareness of supply chain opportunities in sustainable energy technologies both locally and further afield.	Ongoing	Invest NI	Continued delivery of the approved programme of sustainable development support for industry	Continued delivery of the approved programme of sustainable development support for industry	Continued delivery of the approved programme of sustainable development support for industry	Promotion and awareness of supply chain opportunities in sustainable energy technologies continues with the main focus to access opportunities in the Wind, Marine, and Bioenergy Sectors in NI. Invest NI is continuing to meet and develop relations with the successful offshore wind and marine developers for UK, Irish, Scottish and Northern Ireland waters and further engagement is planned to develop local supply chains in association with Councils. Supply chains associated with the new DONG Energy logistics facility at Belfast Harbour are now completed for the West of Dodden Sands contract with an estimate of £3m awarded to NI companies. 12 companies attended Renewable UK Global Offshore Wind in Manchester in June and the Kilkeel Offshore Energy Services Network had an initial launch on 19 June. The SENSE Energy storage network are presently finalising their proposals for the end of November. Business development in the sustainable energy sector is also being supported by LED and Interreg funding through the Councils to help SME's and micro SME's to access the various opportunities. Contracts have now been awarded for the SEED region, Belfast, Lisburn, Moyle, Coleraine and Larne Councils. Interreg funded REN-NET and Smart EcoHub programme has been launched with Donegal and Dundalk Councils taking the lead.
SEF 31	Support the growth of suitable manufacturing or tradeable service companies operating in the sustainable energy field.	Ongoing	Invest NI	N/A	N/A	N/A	Invest NI will monitor the support provided to companies in the sustainable energy sector but do not anticipate that investment milestones will be set. In period April 2012- March 2013, a total investment of £563k was made in renewable business development projects which Invest NI assisted with £180k of grant. In addition a further £129k was invested in R&D; these projects were assisted with £48k of grant. In period April 2013 - September 2013, a total investment of £411k was made in renewable business development projects which Invest NI assisted with £129k of grant. In addition, a further £19k was invested in R&D; assisted with £11k of grant.
SEF 32	Consider how best to encourage new entrants into the renewable heat market.	By December 2011	Heat industry, CCNI, DARD, DOE, DSD, DFP, NIAUR, Invest NI	By end 2013 introduce Phase 2 of the NI RHI which will cover non domestic installations and additional technologies.	By end September 2014 have Phase 2 of the RHI fully operational. By end March 2015 carry out review of the RHI.	Further development of the RHI if required.	NI RHI Consultation closed on 3 October 2011. In light of responses received, the consultants needed to carry out some further analysis to inform the final policy position; this work was completed in February 2012 but resulted in some slippage in the timetable. An application for EU State Aid approval was submitted in December 2011 with an addendum (with updating bandings and tariffs) submitted in February 2012. The final scheme was approved by the EU in June 2012. Secondary legislation was passed in the Assembly on 22 October 2012 and the scheme launched on 1 Nov 2012. Phase 2 is currently under development. A public consultation commenced in July 2013 and closed 14 October 2013. The final policy is now being developed with a view to commencing the domestic scheme in Spring 2014 and extending the non-domestic scheme as soon as State Aid approval is received.
SEF 33	Publish a Renewable Heat Route Map by March 2011 setting out key actions to achieve a 10% contribution from renewable heat by 2020.	By March 2011	Heat industry, CCNI, DARD, DOE, DSD, DFP, NIAUR, Invest NI	Work with the Renewable Heat Strategy Group to further develop a Renewable Heat Route Map.	Work with the Renewable Heat Strategy Group to further develop a Renewable Heat Route Map.	Work with the Renewable Heat Strategy Group to further develop a Renewable Heat Route Map.	For a Route Map to be developed it has been necessary to first engage with relevant departments to identify key cross-departmental actions to support the 10% renewable heat target (against current position of 1.7%), this proposal was detailed in the July 2011 RHI consultation. A cross-departmental Renewable Heat Strategy Group has been established and has agreed the Terms of Reference; the group will work on the heat map once the RHI is in place. The Route Map will set out actions required to support the RHI and the achievement of the 10% target. The group is due to meet again in Jan 2014 (also SEF 29).[Note: as agreed with the Minister, the RHI is the top priority under this Action and work is underway on Phase 2 of this initiative.
SEF 34	Promote opportunities for switching to lower carbon fuels where it is cost effective to do so. (Links to SEF 9, 25, 29, 33).	Ongoing	NIAUR, Gas industry, CCNI	Liaise with energy industry and NIAUR re licencing and related issues to extend the gas network to new areas of NI. Liaise with DFP in respect of funding issues for gas network extension. Engage with the Utility Regulator to help deliver gas network extension.	New gas licensee(s) to prepare detailed gas network design, seek planning approval, and agreement on wayleaves. DETI to prepare grant Letter of Offer to licensee.	Construction of new high pressure gas pipelines to commence, followed by provision of local gas distribution networks, and connection of new gas customers.	Proprosals to extend the availability of natural gas to further towns in the West of NI and in East Down being progressed - Outline Business Case (OBC) completed in September 2012. In January 2013 the NI Executive approved up to £32.5m for gas network extension . A licence competition will be taken forward by the Utility Regulator in late 2013, with construction of new gas networks expected to commence during 2015. DETI has consulted on proposed changes to the Gas Applications Regulations over Summer 2013.
SEF 35	Work with other relevant government Departments to manage the impact of the increase in the uptake of renewable heat and associated demand for renewable fuels.	Ongoing	Heat industry, CCNI, DARD, DOE, DSD, DFP, NIAUR, Invest NI	Work on an ongoing basis with other departments through the Renewable Heat Strategy Group.	Work on an ongoing basis with other departments through the Renewable Heat Strategy Group	Work on an ongoing basis with other departments through the Renewable Heat Strategy Group	A cross-departmental Renewable Heat Strategy Group has met to consider the key actions to support DETI's work on renewable heat and to ensure that related policies are consistent and complimentary. This group may also wish to engage formally with external stakeholders. This work will be further progressed once the RHI is fully in place.

Goal 4 - Developing our Energy Infrastructure

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 36	Ensure that electricity grid development plans are future proofed to facilitate a more decarbonised energy mix beyond 2020.	Up to 2020, with periodic reviews	Energy Industry, CCNI, Universities, NIAUR	Work with NIAUR/NIE to consider suitable grid strengthening project(s) to support renewable generation. If suitable project(s) identified, agree Letter of Offer with NIE and complete designation processes with ERDF Managing Authority.	Finalise State Aid Paper discussions with Commission Conduct Economic Appraisal on NIE proposals Complete DETI Casework, Ministerial and DFP approvals Develop Project Governance arrangements (including Gateway Review assessment)	Deliver Grid Strengthening programme of works	Discussion with DOE in September 2011 and March 2012 in relation to impacts on generators of EU Industrial Emissions Directive. Met ESBI Coolkeeragh in February 2012. Also discussion with the Utility Regulator, PPB, and AES in relation to SEMC proposals for revised Generator Transmission Use of System Charges during Summer 2011, and liaison regarding winter security of supply. Grid strengthening proposals under active consideration with NIE and NIAUR. Draft State Aid paper prepared and with European Support Unit for feedback. ESU discussions with Commission have clarified project likely to be viewed positively, with funding of up to €50 million potentially available under next ERDF Programme.
SEF 37	Ensure co-operation between the Utility Regulator, NIE and SONI to deliver new electricity grid infrastructure.	Ongoing	NIAUR, NIE, SONI, Generators, Energy industry	As per SEF 36 above.	Secure State aid approvals - Draft SA paper issued to Commission. Commence and complete Cost Benefit Analysis. Secure funding stream under ERDF.	Secure UR approvals for specific Grid Strengthening infrastructure projects as proposed by NI. Accept Letter of Offer under the new ERDF funded Jobs and Employability NI Programme 2014-2020	Grid strengthening proposals under2007-2013 Sustainable and Competiveness Programme terminated as NIE unable to identify suitable project(s) for completion for 2014/15 year. discussions have been progressed with DETI European Support Unit and Finance Branches to identify funding opportunities under ERDF 2014-2020 programme. On confirmation of funding position discussions with NIE and Regulator will be reactivated. Initial scoping discussions have taken place on proposed projects with UR and NIE during August .
SEF 38	Complete a Strategic Environmental Assessment and associated Strategic Action Plan by June 2011 in relation to land based renewable electricity generation and associated grid infrastructure for onshore and offshore generation.	On shore renewable Strategic Action Plan covers the period 2012- 2020	Energy Industry, Universities, NIAUR, environmental NGOs	Continue to progress implementation of actions in the OREAP	Continue to progress implementation of actions in the OREAP	Continue to progress implementation of actions in the OREAP	Following completion of the Strategic Environmental Assessment and Appropriate Assessment of the draft Onshore Renewable Energy Action Plan 2013-2020, it has now been finalised and was submitted to the Executive at the start of October 2013 seeking approval to publish.
SEF 39	Support construction and commissioning of the new North-South electricity interconnector by 2013-14.	Agree procedures for handling wayleaves for strategic projects that meet the needs of landowners and developers, by end 2010.	NIE, SONI, EirGrid, DOE, PAC, Scottish Government	Monitor revised procedures and manage wayleaves contract	Liaise with DOE Strategic Planning Division and, as appropriate, Planning Appeals Committee on revised NIE proposals Continue to present case for delivery of Interconnector in Minister's briefing and other fora as appropriate	Liaise with DOE Strategic Planning Division and, as appropriate, Planning Appeals Committee on revised NIE proposals Continue to present case for delivery of Interconnector in Minister's briefing and other fora as appropriate	NIE have submitted a consolidated ES which was re-advertised by the DOE on 8 September. PAC inquiry adjourned and is not expected to resume until mid 2014 at earliest. EirGrid have publiished "preferred route" option and will submit planning application to An Bord Peanala for final decision in due course. Three contractors now in place to provide wayleave service. Also Revised wayleave/tree cutting procedures implemented which should expedite any applications for necessary wayleaves for N/S interconnector. Ongoing liaision with DOE, DCENR, NIE as required
SEF 40	Work with stakeholders to ensure a strategic fit with smart grid initiatives and the efficient use of energy by all consumers.	Ongoing	SG Ireland, Grid owner and TSOs, NIAUR	NIAUR to consult on smart meter rollout - Spring 2014. SEF 20 also refers	Determine nature of Smart Meter rollout	Work with Regulator and sector to deliver smart metering rollout	DETI met with SGI and Invest NI agreed that NIAUR would liaise with NIE (& SGI) about submitting a funding proposal to NIAUR for a smart grid pilot. Proposal for smart grid trial rejected by the Regulator. Minister announced on electricity only smart meters roll out for Northern Ireland in July 2012.The Utility Regulator has flagged delay in delivering the consultation due to additional priority work resulting in commencing consultation Autumn 2014 , DETI continues to push for resolution to this issue
SEF 41	Work with regional partners to develop a supportive policy, regulatory and consent environment for commercial offshore grid investment.	Ongoing	EC, DECC, DCENR, Scottish Government, BIC, NIAUR, CER, Ofgem, TSOs, industry	Monitor ISLES2 industry project proposals	ISLES2 Project underway	Complete ISLES2 project under Letter of Offer arrangements	Work with DECC and DCENR to associate ISLES with EU North Seas Grid Initiative completed. All approvals for ISLES-2 project proposal secured by end March 2013. Letter of Offer signed off 29 July 2013. Project commenced August 2013.

Action No. & RAG Status	Objective	Timeframe	Stakeholders (Govt & External)	Milestones 2013/14	Milestones 2014/15	Milestones 2015 and Beyond	Progress to end September 2013
SEF 42	Extend the availability of natural gas as a lower carbon fuel, displacing more polluting fossil fuels, thus providing environmental benefits and enhancing fuel choice whether it is economically viable to do so, and where not, maximise other alternatives such as renewable heat and/or biomass.	Ongoing	NIAUR, Energy industry, CCNI	NIAUR to award licences for new gas areas by end 2013/ early 2014.	New gas licensee(s) to prepare detailed gas network design, seek planning approval, and agreement on wayleaves. DETI to prepare grant Letter of Offer to licensee.		NIAUR discussion paper issued for consultation on 16 May 2012 on gas extension licensing issues. Draft Outline Business Case (OBC) on gas network extension provided in July 2012, and finalised in September 2012. DETI Casework Committee meeting held on 25th September to discuss funding issues and paper submitted to DFP for consideration in early October. A paper was provided to the NI Executive in December 2012 and on 10th January 2013 the Executive approved up to £32.5m support for extension of gas network to West and North-West. A State aid notification has been made to Brussels, and on 3 April 2013 the Utility Regulator will issue a consultation on the proposed gas licence competition, with the aim of awarding a licence by end of 2013/ early 2014. New gas networks may also offer possibilities for use of biogas.
SEF 43	Work with the Strategic Investment Board to develop an energy model for Northern Ireland that will help prioritise and facilitate policy planning and investment decisions by all the Northern Ireland Departments about energy proposals, taking into account the financial constraints facing government spending.	Ongoing		n/a			**As per SEF Implementation Plan Update to ETI Committee at March 2013 - Objective has been achieved.**

Annex D

ADDITIONAL REPORT ON AMBER RATED ACTIONS

SEF Action No. 5

SEF Objective

Put in place legislation to establish arrangements for efficient cross border regulation and management of transmission and trading of gas.

2012/13 Milestones

Agree Memorandum of Understanding and draft legislation with Department of Communication, Energy and Natural Resources, Dublin.

Purpose

To provide for single operation and regulation of the two wholesale gas transmission networks in Northern Ireland (NI) and the Republic of Ireland (RoI), set in context of EU Internal Market in Gas. It is proposed that parallel NI and RoI Bills will be put in place to include for common duties and responsibilities for Departments, Regulators and a joint regulatory oversight committee. This will be a small enabling Bill and its contents are devolved matters but will require formal NSMC clearance due to its extra-territorial nature. This has been discussed with, and will be arranged through, OFMDFM and NSMC Secretariat.

Progress

80% of the Northern Ireland Bill was drafted in September 2011. Work has paused in both jurisdictions to facilitate the two regulators in considering the costs associated with a single balancing point, and the Republic of Ireland regulator to review its cost benefit analysis. The Regulators were also directed to give priority to complete urgent IME2 related compliance work before the summer of 2012, which was not finalised until February 2013. Both studies have been completed and findings are being considered by the respective Departments and Regulators.

New work on the target model for the European Union Internal Market by 2014 will also affect the timetable for a Bill, and the work needed to be compliant may shape the approach to Common Arrangements for Gas.

1

Annex D

SEF Action No 33

SEF Objective

Publish a Renewable Heat Route Map by March 2011 setting out key actions to achieve a 10% contribution from renewable heat by 2020.

2012-13 Milestones

Working with the Renewable Heat Strategy Group to further develop a Renewable Heat Route Map.

Progress

The Renewable Heat Route Map will identify all the additional actions required in support of the RHI to maximise the potential of Renewable Heat. The development of the map is to be taken forward by the Renewable Heat Strategy Group and was discussed at the last two meetings of the group. However, while members of the group had a number of suggestions it became clear that the bulk of the work was going to fall on Renewable Heat Branch.

It is not possible, at this stage, to take this work forward at the same time as developing the RHI. Therefore the work has been postponed, with agreement of the Minister, until the significant work required to develop the RHI is completed. (Note: Phase I of RHI has been developed and is fully operational; Phase II development is proceeding well and should be operational by mid 2014). However, the group continues to meet so that all departments are kept aware of progress on the RHI development and to ensure that the final RHI policy addresses cross departmental issues. The next meeting is scheduled for January 2014.

2

Letter from DETI re Wind Energy

Department of
Enterprise, Trade and Investment
www.detini.gov.uk

Energy Division
Netherleigh
Massey Avenue
Belfast
BT1 4NN
Your ref: ENV 534

cc. Jim McManus

Mr Neil Sedgewick
Clerical Supervisor
Environment Committee Office
Room 247
Parliament Buildings
Ballymiscaw
Stormont
BT4 3XX

11 December 2013

Dear Neil

Thank you for your letter of 19 November 2013 to David McCune on behalf of the Committee for the Environment requesting the percentage of renewable energy in Northern Ireland generated by wind turbines.

The Department of Enterprise, Trade and Investment receives monthly renewable electricity figures from Northern Ireland Electricity which includes a breakdown by technology.

Table 1 below details the total amount of electricity generated from renewables over the past 12 months (as of end October 2013) and the onshore wind contribution.

Table1: Total electricity generated from renewables over the 12 months to end October 2013

	Megawatt hours (MWh)	Percentage contribution
Total electricity distributed	8,160,229	
Total electricity generated from renewables	1,266,789	15.5%
Total electricity generated from wind	1,175,660	14.4%

I trust this addresses your query.

Yours sincerely

Michael Harris
Energy Division

DETI letter re Wind Turbines on departmental and or ALB land

CENTRAL MANAGEMENT BRANCH

Department for Regional Development
www.drdni.gov.uk

Room 413c
Clarence Court
10-18 Adelaide Street
Belfast BT2 8GB

Telephone: (028 905) 41140
Facsimile: (028 905) 40064
Email: alan.doherty@drdni.gov.uk

Your reference: DALO 20C/3/2013
Our reference: SUB49/2014

22 January 2014

Paul Carlisle
Clerk to the Committee for Regional Development
Committee Office
Room 254
Parliament Buildings
BELFAST
BT4 3XX

Dear Paul

DALO 20C/3/2013 - Committee for the Environment Inquiry into Wind Energy

Thank you for your letter, dated 9 January 2014, in which you asked that the Department indicate whether any existing wind turbines/farms are currently located on departmental and/or ALB land.

I can confirm that there are no existing wind turbines/farms currently located on departmental and/or ALB land.

I also note the Committee's intention to express their opposition to wind farms being sited on departmental/ALB land located in Areas of Outstanding Natural Beauty to the DOE Committee Inquiry.

This letter is fully disclosable under FOI.

Yours sincerely

ALAN DOHERTY
Departmental Assembly Liaison Officer

1

ETI Cttee re DETI Onshore Renewable Energy Action Plan

Northern Ireland Assembly

Committee for the Environment
Room 375
Parliament Buildings

Tel: +44 (0)28 9052 1614

To: **Sheila Mawhinney**
Clerk to the Committee for the Environment

From: **Jim McManus**
Clerk to the Committee for Enterprise, Trade and Investment

Date: **22 January 2014**

Subject: **Onshore Renewable Energy Action Plan (OREAP)**

At its meeting on 16 January 2014, the Committee for Enterprise, Trade and Investment considered a written briefing regarding Onshore Renewable Energy Action Plan (OREAP).

Members agreed to forward the written briefing to the Committee for the Environment for information.

.

Jim McManus
Clerk
Committee for Enterprise, Trade and Investment

AECOM Environment DETI November 2013

Strategic Environmental Assessment (SEA) of the Onshore Renewable Electricity Action Plan (OREAP) for Northern Ireland

Post Adoption Statement

Department of Enterprise, Trade and Investment (DETI)
November 2013

Table of Contents

1 Introduction

1.1 Introduction

This SEA Post Adoption Statement has been prepared on behalf of the Department of Enterprise, Trade and Investment (DETI) as part of the Strategic Environmental Assessment (SEA) of the Onshore Renewable Electricity Action Plan (OREAP) for Northern Ireland (NI). This document provides a summary of the responses received from consultation on the draft OREAP and Environmental Report; explains how the key findings from the SEA and responses from consultation have been taken into account in the preparation of the final OREAP; and includes proposals for monitoring the implementation of the OREAP.

1.2 Onshore Renewable Electricity Action Plan (OREAP)

The overall aim of the OREAP, which was published in November 2013[1] , is to optimise the amount of renewable electricity generated from onshore renewable sources in order to enhance diversity and security of supply, reduce carbon emissions, contribute to the 40% renewable electricity target by 2020 set out in the Strategic Energy Framework (SEF) and beyond, and develop business and employment opportunities for NI companies.

In terms of how the 40% target may be delivered, the Department is of the opinion that the target can only be market led and technology neutral within the context of Northern Ireland's resources. The market i.e. developers and investors, must decide what technologies are best suited within the policy framework that DETI has set out through the SEF, this Action Plan and other plans. It is however appropriate that the Department considers at this strategic level the potential impact on both the environment and the cost to consumer. In line with the target of 40% of electricity consumption to come from renewable sources by 2020, the OREAP and associated SEA examined the environmental impacts of low and high megawatt (MW) scenarios for different types of generation technology.

The technologies assessed were:

- Onshore wind;
- Biomass; and
- Other:
  - small scale wind;
  - hydroelectric schemes ;
  - solar photovoltaic; and
  - geothermal.

The low and high scenarios in MW for these technologies are set out in Table 1.1.

Table 1.1: Generation Scenarios (for Operational Development)

	Low Range	High Range
Onshore Wind	800MW to 1000MW[2]	1000MW to 1200MW
Biomass	30MW to 100MW	100MW to 300MW

[1] www.onshorerenewablesni.co.uk

[2] With respect to wind, as of September 2011 approximately 900MW had been consented in Northern Ireland. The Low scenario for wind can therefore be considered to be a do minimum scenario.

Other	30MW to 100MW	100MW to 200MW

**Offshore generation was not assessed in this OREAP as it was considered in a separate SEA of the Offshore Renewable Energy Strategic Action Plan2012-2020.*

The OREAP is a non-spatial high level Plan which does not set targets for development (e.g. the levels of MW) to be delivered by each technology. Neither does it designate areas/ locations for development nor does it identify exclusion areas. The above scenarios are, therefore, neither predictions nor preferences – they simply provide the basis for a comparative evaluation of the likely environmental effects of a range of possible outcomes of the OREAP.

The OREAP relates only to onshore or terrestrial renewable electricity, not offshore renewable energy or traditional generation. While the OREAP and the SEA make reference at a high level to possible in combination effects of future generation with the potential associated grid upgrades at the strategic level, it does not outline any grid strengthening plans in any detail. This is a matter for NIE which, in conjunction with SONI, and the independent NI Utility Regulator is responsible for taking forward detailed grid development programmes through the Regulatory Price Control process..

The OREAP recognises that there are a small number of key actions to take forward the recommendations from the SEA to support the overall objective for onshore renewable electricity of the OREAP. These actions are summarised in Section 3.4 below.

1.3 Consultation

A Scoping Report was issued on 2nd June 2010 as part of the formal consultation process on the scope of the SEA and was circulated to a wide range of organisations and stakeholders. It was published on the NI Onshore Renewable Electricity SEA website**Error! Hyperlink reference not valid.** (www.onshorerenewablesni.co.uk) for wider consultation and a Scoping Seminar was held in June 2010. The workshop was attended by approximately 50 people, including representatives of environmental organisations, regulators and developers. The purpose of the workshop was to seek the opinions of stakeholders regarding the proposed SEA scope. It also provided an opportunity for people to highlight issues they wished to be addressed by the Action Plan.

The SEA Environmental Report was issued with the Draft OREAP on 24th of October 2011. The two documents were made available on the NI Onshore Renewable Electricity SEA website for a 12 week consultation period. In addition, a consultation workshop was held in Belfast on 9 December 2011 to seek views on the draft plan and the Environmental Report. The format of the workshop included presentations on the OREAP by DETI, the SEA process and key findings from the SEA by AECOM, and by NIE on grid development, followed by a questions and answers session.

Since then, there have also been discussions/ meetings with key stakeholders and the Project Steering Group (see Section 3.2 below) as the overall SEA process has progressed.

1.4 Habitat Regulations Assessment (HRA)

In addition to the SEA, a Habitats Regulations Appraisal (HRA) (required under The Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended)) has been undertaken of the draft OREAP. The HRA enabled DETI, as the Competent Authority, to make an Appropriate Assessment (AA) as to whether there would be any adverse effect on the integrity of a European/Ramsar site arising from the implementation of the OREAP. This work was carried out from March 2012 to April 2013[3].

Whilst it is not the purpose of the Post Adoption Statement to include the results of the HRA, an integrated approach to the HRA mitigation and the SEA mitigation was used. The HRA considered the mitigation identified in the SEA Environmental Report and refined it for HRA purposes. The refined mitigation was then reconsidered in the draft OREAP resulting in final proposals for mitigation presented in Table 3.1 below and in the OREAP.

[3] http://www.detini.gov.uk/deti-energy-publications

1.5 SEA Post Adoption Statement Requirements

In order to satisfy the requirements of Directive 2001/42/EC 'Assessment of Certain Plans and Programmes' (SEA Directive) and the Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004 the Responsible Authority (DETI) is required to produce an SEA Post Adoption Statement. The SEA Post Adoption Statement must be produced as soon as is reasonably practicable after the adoption of the plan.

With regard to providing information, the Responsible Authority must inform the Consultation Authority of the adoption of the plan (OREAP) and send a copy, as adopted, along with the SEA Post Adoption Statement. Part IV Section 15 (4) of the SEA Regulations requires the SEA Post Adoption Statement to include:

(a) how environmental considerations have been integrated into the plan or programme;

(b) how the environmental report has been taken into account;

(c) how the opinions expressed in response to the invitations mentioned in regulation 12 have been taken into account;

(d) how the results of any consultations entered into under regulation 13(4) have been taken into account;

(e) the reasons for choosing the plan or programme as adopted, in the light of the other reasonable alternatives dealt with; and

(f) the measures that are to be taken to monitor the significant environmental effects of the implementation of the plan or programme.

1.6 Structure of SEA Post Adoption Statement

The SEA Post Adoption Statement is structured to summarise all the information required by the SEA Regulations as described in Section 1.5 above.

- **Chapter 1:** Introduction
- **Chapter 2:** Consultation
- **Chapter 3**: Incorporating the Findings from the SEA into OREAP
- **Chapter 4:** Consideration of Alternatives
- **Chapter 5:** Monitoring Framework

2 Consultation

2.1 Introduction

The purpose of this chapter is to address the following requirement of the SEA Regulations:

> *(c) how the opinions expressed in response to the invitations mentioned in regulation 12 have been taken into account;* (i.e. consultation on the Environmental Report) ; and
>
> *(d) how the results of any consultations entered into under regulation 13(4) have been taken into account;* (i.e. Transboundary consultations).

2.2 Consultees

The draft OREAP and Environmental Report were subject to a 12 week consultation period. The following organisations/groups/stakeholders provided written responses on the draft Onshore Renewable Electricity Action Plan (OREAP) and the Environmental Report:

- Action Renewables
- ABO Wind
- Ards Borough Council
- Bell Architects
- Bord Gais Energy
- Cookstown District Council
- Gaelelectric
- DARD Forest Service
- DOE Northern Ireland Environment Agency
- EirGrid
- Environmental Protection Agency (EPA) (Ireland)
- Fermanagh Trust
- Green Party
- Mountaineering Ireland
- Northern Ireland Electricity (NIE)
- Northern Ireland Pollution Group (NIPG)
- Northern Ireland Renewables Industry Group (NIRIG)
- RES
- Royal Society for the Protection of Birds (RSPB)
- SSE Renewables
- TCI Renewable
- Ulster Farmers Union (UFU)
- Ulster Hang Gliding & Paragliding Club

The comments from these organisations are grouped together and summarised by topic in Tables 2.1 and 2.2 below. A response to each comment is provided.

2.3 Response to Consultation on the Draft OREAP

Table 2.1 provides a summary of the main comments received on the draft OREAP and how these comments have been taken into consideration and reflected in the finalised version of the OREAP.

Table 2.1 Summary of Comments on the OREAP

Topic	Summary of Comments Received	Response
General Responses to the OREAP		
General , Chapters 1-3	• Support and welcome for an action plan for onshore renewables for the 2011-2020 period. • The development of the OREAP is timely and positively reflects DETI's determination to meet the 2020 renewable target. • Improvements in grid infrastructure are required to support the future development of renewable energy in NI. • It is vital that our planning and infrastructure and development look beyond the 2020 targets and continue to seek ways to reduce reliance on fossil fuel generation going forward. • We agree that if NI is to meet its targets, the barriers to deployment must be minimised. DETI must recognise that current barriers include long planning delays due to serious objections to the few developments proposal within or affecting internationally designated sites or species. This could be avoided with spatial planning. • Broadly in favour of the OREAP, should it mean the pursuit and achievement of a secure and efficient grid, incorporating renewable energy (small and large scales) and producing electricity which benefits the local economy. However, more consideration should be given to smaller scale generators when the strengthening of the grid is considered. • Market approach supported. • Question the adequacy of a market led approach to renewable achieving the 40% renewable electricity target, given the market's inability to adequately assess the development of renewable electricity beyond the 40% target and over the longer term. Indeed, we question the extent to which the Government has actually taken a neutral market led approach, given that different levels of ROCs are awarded to different forms of renewable electricity. • The Department should review and balance the cost implications of offshore power generation, using large scale wind farms off the coast, as opposed to large scale and cumulative developments onshore. This should consider impacts on local communities. • The aim to achieve a 40% renewable share of electricity generation by 2020 is extremely challenging and will place considerable additional costs on the consumer. • The Government is entirely focused on achieving its 40% renewable electricity target through the application of supply side policies and has not afforded sufficient consideration to measures of energy efficiency in order to reduce total levels of consumption.	• The support for the OREAP is noted and DETI will continue to work with the sector, key stakeholders and local communities to progress the actions which will facilitate a range of onshore and offshore technologies to be brought forward by the private sector to meet renewable electricity targets at least impact to the environment and at least cost to the consumer. • DETI is currently taking forward work on a 2050 Vision for energy supply and demand in Northern Ireland – it will consider electricity, heat and transport and fossil fuel and renewable generation. This work was published in October 2013 and will inform further post 2020 thinking. • While small scale generation may contribute to wider policy objectives, it can often be more expensive than larger scale technologies. These cost differences could suggest that, if there is a concern regarding meeting targets at least cost, there is a strong case for supporting larger scale technologies which can make more significant contributions. • Differing levels of support are to assist increased deployment of a broader range of currently less well developed and hence more expensive renewable technologies but it is still for the private sector to come forward with projects. • DOE has noted significant progress has been made in the number and speed of consideration of renewable planning applications over the last 18 months or so. • The 40% renewable electricity target is technology neutral and both on and offshore opportunities are being taken forward by the private sector – including the 600MW offshore wind project off the South Down coast. All renewable energy projects need to take into account their impact on local communities, both positive and negative, as part of their Environmental Impact Assessment. • DETI is currently undertaking work to consider the relationship between communities and the development of renewable energy projects; how communities can engage with developers and participate and /or benefit from renewable energy developments. This study was published in October 2013 and DETI, DOE and DARD are considering possible actions from this work. • At the more strategic level, DETI plan to commence a socio-economic analysis of renewable energy in 2013-2014. The aim will be to provide an analysis of the economic and social

Topic	Summary of Comments Received	Response
		benefits and impacts associated with the development of renewable energy. • The focus of the OREAP is on the sustainable generation of renewable electricity. Energy efficiency actions to reduce levels of electricity consumption, which will make renewable targets easier to meet, are the subject of other Government Plans.
Answers to Consultation Questions in Chapter 4		
4.6.2 – Biomass Q: Do you think that a review of local biomass production studies is necessary in Northern Ireland to ensure that research and knowledge are up to date?	• There have already been various governmental assessments of biomass and bioenergy potential, including by DARD. We suggest research money should be used to garner information on what biomass is produced and used at present. • We do not think a review of renewable heat in local biomass production studies is required. What is required is an Action Plan, together with DARD, to increase the volume of biomass produced in NI. • Further consideration should be given to biomass generation from waste streams. • A review would ensure that the weight of uptake is not dominated by the larger scale generators at the expense of smaller scale on farm biomass projects, thereby ensuring conacre prices remain reflective and not artificially inflated by the speculative demand for biomass crops. • This would assist in making informed decisions regarding biomass' potential contribution to both further diversifying NI's power generation fuel mix and the deployment of NI. The undertaking of any research to determine extent/quantities of biomass, needs to in the first instance recognise that wood fibre for biomass is a subset of overall wood fibre availability. The extent to which a proportion of the overall wood fibre is available for biomass will be heavily influenced by the competing market forces for wood fibre and relative values of wood fibre in each of these markets. • Agree that the production of biomass has the potential to displace crop production and increase the prices of basic foodstuffs for the poorest people in the world. We believe that such a situation needs to be avoided at all costs and, as such, we would caution against the development of electricity generation biomass plants which are dependent on the importation of bio-crops. • 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.	• The ER estimated that there was some 7.5 MW of biomass generated electricity (mainly from wood pellets CHP and landfill gas). In April 2013, biomass generating stations, accredited for ROC purposes, totalled just under 22 MW, made up as follows -7.75MW biomass; 2.3MW AD and 11.75MW Landfill Gas. There are still no large scale biomass plants but DETI is aware of plans by a number of companies to establish electricity generating stations using a variety of resources such as imported wood and recycled wood. • DETI has considered the consultation responses, the status of biomass related renewable electricity projects, the ongoing DARD activity and, on balance, does not propose to undertake a review of biomass for renewable electricity generation at this stage. • DARD supports the work of the Agri-Food Strategy Board in their development of a strategy for growth in the agri-food sector. DARD does not see a significant impact on local food production as a result of biomass energy crops based on current levels. A research project is underway to examine this issue which is due to report in 2013. • An independent review of the DARD Renewable Energy Action Plan (REAP) has been completed and will be published shortly. DARD is currently reviewing the report and its position going forward and future support mechanisms. • Current DARD Forestry policy is to increase forest area to 12% of the land area primarily through conversion of agricultural land to woodland, which in itself is creation of biomass potential, if wood biomass is considered to be the best end use. Again the resulting effect on agricultural food production is likely to be small, as most forest expansion is likely to take place on land with lower agricultural potential. • Biomass in the form of sawmill co-products (wood chips, sawdust and wood pellets) produced by the Northern Ireland forestry processing/sawmilling industry already contributes

Topic	Summary of Comments Received	Response
		approx 95% of total wood fibre (excluding recycled wood fibre) consumed locally and used for an energy end use, however, overwhelmingly for heat rather than electricity. DARD Forest Service estimated that in 2012/13 this equated to approx 260,000 tonnes of biomass, derived from forest in NI, Republic of Ireland and GB. Proportionately, approx 15,000 tonnes of biomass from SRC willow was used. Therefore, it is likely that for some time the major proportion of wood fibre available for biomass will continue to be produced from conventional forests and would, in the main, be used within the renewable heat sector rather than renewable electricity.
4.8.1 Onshore Wind - Action 1 Q: Do you agree that capacity studies are necessary / would be useful for onshore wind developers?	• Further capacity studies are unnecessary on the basis that they have already been carried out (reference to 2009 SPG on Wind Energy and Landscapes). • The assessment of potential cumulative effects for all topics at the project level currently works well. • A third layer of guidance on top of PPS18 and EIA requirements would likely ensure that onshore development enters the dispersal phase – with a negative environmental impact at a regional level. • Capacity Studies would delay investment, foster greater uncertainty and could delay the achievement of the 2020 targets. • Concern over the lack of clarity in terms of methodologies, deliverable timescales, costs and responsibilities to carry out, complete and publish such studies. Concern over the extent to which the studies would be helpful. • The undertaking of detailed and regionally specific capacity studies is welcomed and should be progressed as a priority. • Capacity studies have the potential to be useful to landowners, planners and developers. • In the absence of additional strategic regional management controls the identified mitigation measures are essential to ensure that growth is delivered and managed in a sustainable way which minimises adverse effects on the environment. • Capacity studies should be linked to a spatial planning element, establishing exclusion zones and setting out areas where development can be encouraged. • Capacity studies should include transboundary impacts. • Any further assessment must give due cognizance to the significant impact further onshore wind will have in those communities and regions which have already been subjected to significant development. • The supplementary planning guidance for PPS 18 focuses predominantly on landscape and visual impact from wind farm proposals-- the suggested	• The OREAP is not a spatial plan and does not designate areas/ locations for development or identify exclusion areas. It does not set targets for developments (e.g. MW levels) that have to be delivered for each technology. • DETI and DOE have, in light of the consultee feedback, reviewed the proposals for the capacity studies and, on balance, DETI does not consider that further landscape studies would add value at this juncture. It is considered that, at this stage, the existing PPS 18 and SPG and the DOE/ NIEA requirement for landscape studies as part of the project level EIA work (e.g. up to 30KM for landscape/ visual impacts) adequately address the issue and provide sufficient safeguards. DOE/ NIEA consider that judgements on cumulative impacts must be made on a case by case basis. • Such considerations will also take impact on local communities into account. • DOE intends to bring forward work on a single Strategic Planing Policy Statement (SPPS) in time for the transfer of certain planning functions to councils in 2015. The SPPS will be a strategic, simpler and shorter statement of policy, setting out the core principles that the new local authorities should observe in undertaking their planning functions. The SPPS will consolidate existing policy provisions (including strategic policy in relation to renewable energy currently contained within PPS18) It is intended that existing operational provisions of PPS18 and associated guidance will remain in place until such times as councils bring forward appropriate operational policies within local area plans. • As regards the potential studies on ecology and bird migration, it is considered that some further consideration of these issues would add value. DOE/ NIEA will review existing

Topic	Summary of Comments Received	Response
	regional guidance could address the full range of environmental topics and important factors, including cumulative impacts with the grid and transboundary impacts. • The ER has identified a number of significant data gaps that are required to de addressed to help assess whether or not the deployment of additional renewable energy developments will have significant regional environmental impacts. The ER has indicated that these capacity studies are focused specifically on the receptors identified in the SEA where there is a potential for significant adverse cumulative effects to occur once development exceeds a certain level.	NI, UK and international data/ studies/ research into the impacts of wind farms on biodiversity, including birds, bats and habitats. In light of the outcome of this review to be completed by March 2014, DOE/ NIEA will consider the need and scope for any further work at regional level. • The planned review by DOE/NIEA on biodiversity, including birds, bats and habitats will address the receptors where there is a potential for cumulative effects and where data gaps exist. The review will help increase certainty and enable DOE/NIEA to consider the scope and need for further work.
Q: If yes, which body is best placed to complete these studies? Q: Who should fund these studies?	• Although NIEA would welcome the development of such studies, NIEA would be concerned if the OREAP was utilized to indicate or infer a commitment that NIEA will complete or fund these studies. NIEA has limited resources for undertaking and funding research. • Given the lack of an independent environmental protection agency in NI, the NIEA would be best placed to complete these studies. • DOE are best placed to complete these studies. • The capacity studies would need a project lead, probably from DETI, but to be successful would need meaningful input from DOE NEIA, DOE Planning, industry, NGOs. DOE Minister's Planning Advisory Forum may be appropriate forum. • The proposed capacity studies could be undertaken by a combination of statutory bodies, non-governmental organisations, local authorities, specialist expertise etc. The use of GIS should be considered. • The costs of the capacity studies can be minimised as various stakeholders already hold much of the information required. Should be funded by Govt as in public interest and required to comply with European Directives. • These studies are not required as they would be very costly to carry out and the benefits would not outweigh existing policy.	• As noted above, DOE/ NIEA will take forward and report on actions with regard to consideration of landscape and biodiversity, including birds, bats and habitats,
4.8.1 – Onshore Wind - Action 2 Q: Do you think only onshore wind needs to be monitored?	• All renewables require monitoring for compliance with renewable targets, but not with a view to creating further restrictions due to environmental impacts. Would this monitoring stop when the scenarios are reached? • No, monitoring is needed for onshore wind specifically. • Monitoring for onshore wind could translate into continuously updated spatial guidance for onshore wind developments, which would undermine onshore wind development, and go against the criteria based approach for cumulative impact set out within PPS18.	• DETI and DOE already work together through the Planning and Renewable Energy sub-group of the Sustainable Energy Inter Departmental Working Group (SEIDWG) and, in order to ensure better monitoring of renewable energy deployment and to identify any cumulative effects of such developments, a key action of the sub group will be to seek an annual update from DOE Planning throughout the life of the OREAP on renewable energy deployment to include number/ size / location of applications received, those approved and

Topic	Summary of Comments Received	Response
	• Agree that onshore wind needs to be monitored. • Onshore wind needs to be monitored both the amount and location of development (to record against energy targets and cumulative impact) and the impacts of development (e.g. habitat/species loss etc). • Environmental monitoring should relate to the key environmental effects of all aspects of onshore renewable energy (not just wind).	rejected and total planned installed capacity. • This monitoring framework will be important as deployment rates increase, particularly of onshore wind, and will also include consideration of key cumulative effects as identified in the Environmental Report. This will assist the identification of potential significant adverse effects before they occur and will inform the ongoing consenting of individual development by DOE. The first report will be made by March 2014. • The environmental monitoring of the implementation of the OREAP is a requirement of the SEA Directive. The SEA and the HRA have identified specific project level monitoring and DETI will work with DOE, in its lead environmental and planning role, to ensure that the SEA, EIA and HRA Directives are met.
Q: Which body/ Governmental Department is best placed to undertake this monitoring?	• DETI should undertake monitoring for targets, DOE for environmental impacts. • DETI should undertake the monitoring. • DOE should undertake the monitoring. • The monitoring framework should link with existing national monitoring programmes where possible.	• As above response.
Q: Do you think there is a need for an upper threshold to be introduced for onshore wind cluster development? Q: If yes, should the limits be cluster specific?	• No, onshore wind farms will be key to delivery of 2020 target and any thresholds may compromise DETI's ability to deliver its 2020 target. • Thresholds may jeopardise investor confidence in the market. • Final decisions on acceptability of impacts should be made on a project basis. • The imposition of thresholds may add cost to the consumer. • Imposing an upper threshold on onshore wind cluster 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. • A universal threshold for individual wind clusters would be contrary to the existing criteria based approach for cumulative impact. • If a narrow strategic direction that imposes thresholds on particular technologies is set within the action plan, cost to the consumer in particular, will be increased. • Given that the plan is non-spatial, it seems anachronous to suggest cluster thresholds in the absence of context (e.g. biodiversity etc). We support a spatial plan.	• DETI and DOE do not propose the introduction of any upper threshold for any technology or for any location but DOE will continue to assess planning applications, in particular onshore wind applications, and any potential cumulative impact, on a case by case basis.

Topic	Summary of Comments Received	Response
	• Yes. The proposed capacity studies should inform the establishment of thresholds for wind cluster development. The limits should be spatially specific and should reflect the outcome of the proposed capacity studies.	
4.8.3 - Electricity Grid – Action 3 Q: Do you agree that grid development is essential to developing renewable energy sources? If so, who should pay for this grid development?	• Strong support for grid upgrades, which are considered essential. • Costs should be optimised through efficient planning and timely construction. • Costs must be balanced against the benefits of the developments which will deliver benefits to customers in the form of lower carbon emission costs, lower constraint costs, diversified fuel supply and better quality of supply. • It would be appropriate for DETI to prioritise delivery of the network in the short term so that the performance of the system can be maximised in the medium to long term. • A critical piece of grid infrastructure for renewable is the completion of the Tyrone- Cavan Interconnector. This project should receive the highest priority. • It is imperative that the grid is suitable to receive power generation from localised anaerobic digesters and small scale wind generators. • The 11kV network is not designed to facilitate small scale renewables. • The degree to which grid extending/upgrading is carried out to the supply locations will determine the extent of exploitation of renewable electricity. It is also important to address the timescale of development. • There is a need for an integrated approach to grid and renewable energy development on a cross-border basis. • We would urge the Assembly to which the Utility Regulator reports to ensure that the Regulator acts promptly in its decision making processes concerning NIE's plans for grid upgrade. • We believe that the current charging methodology is fair for both generators and demand customers. • An effective methodology for the shallow connection of renewable to the grid is critical so that the earliest projects in a cluster are not over burdened by the cost of cluster assets. • There is no requirement to review the charging methodology for deep reinforcement works at this stage. • Encourage the Department to investigate ways to ensure that the cost of financing of the grid development is borne by the wealthiest in society and the largest consumers of electricity.	• The strong support for grid development is noted. • The further development and strengthening of the grid is required to ensure ongoing integrity, efficiency and security of operation of the system, not just to support the development of renewable projects. • The independent Utility Regulator is responsible for the timing and scale of grid development in Northern Ireland and has to balance the need for investment against cost to the consumer. • Up to 800MW of onshore wind can be accommodated by the grid in the short/ medium term (up to 2017) but further reinforcement of the 275KV network is required to meet the 2020 target of 40%. • NIE as grid owner has been developing plans for the strengthening of the grid and this is likely to occur in the West/ North-West where the majority of new renewable generation is expected to be located. • In February 2013, the Utility Regulator approved £30M investment by NIE to facilitate renewable generation in the North and West of Northern Ireland. This investment is part of NIE's £44M Medium Term Plan and the balance has been approved in principle. • Upgrading of the grid is likely to be carried out over a number of years to 2020 and beyond on a phased basis, subject to the conclusion of the current Price Control (RP5) process that is being undertaken by the Utility Regulator. • Both Government and Regulatory policy is supportive of the proposed second Interconnector between NI and ROI which is critical to supporting the development of renewable powers generation and allowing the SEM to work more efficiently by removing market constraints, as well as improving security of supply on the island of Ireland.

Topic	Summary of Comments Received	Response
		• Grid strengthening plans will require the necessary approvals, including environmental consideration and planning consent. Given the scale of the planned work, it is assumed that the majority of the infrastructure improvements will be achieved by overhead line construction, although the use of underground cable will be examined as an alternative where overhead line technology cannot be successfully deployed. • Communication with stakeholders will be a key part of any grid strategy and DETI is working closely with NIE to ensure that a robust communications plan is put in place.
Q: Is there a necessity for the Utility Regulator to consider longer term planning than the current five year price control period?	• Strong support for the Utility Regulator taking a longer term consideration for approving grid development. • Having a 5 year price review does not provide the certainty required by the System Operators to credibly develop infrastructure of this scale. • Renewable generators require some level of certainty that the grid will be developed to accommodate their projects after the 5-10 year period require to achieve consent for both a windfarm and shallow connection assets. • There may be benefits for a longer term, more dynamic approach, which does not fix potential returns on a per megawatt basis over long term projects	• Noted.
Q: Do you agree with the range of actions identified to take forward within the draft OREAP? If not, please state why and let us know how you would amend the actions or propose new additional ones to help deliver the OREAP?	• Actions 1 and 2 are not needed; site specific environmental assessments should be given priority and further studies are not required. • Actions 1 and 2 should be amended as follows – DETI will work to produce projected patterns of deployment for onshore renewable electricity capacity in NI and monitor this deployment to identify any corrective actions required in the SEAP. • Action 2 should contain a time frame for the development of a monitoring framework and the completion of the capacity studies. • Actions 1 and 2 should be amended to include reference to transboundary effects. • Add "DOE" to action 3 re grid and include an all-Ireland element to reflect SEM. • Support for Actions 4 and 5. • Suggest that Action 5 should be reworded "Where it is not possible to ascertain the proposal will not adversely affect the integrity of a Natura 2000 site, the project can only proceed if there are no alternative solutions (including do nothing and alternative location options) and where there is an imperative reason of overriding public interest meeting European Commission criteria. • We would like to see an action point addressing biomass. • Consideration should be given to inclusion of an action to promoting	• As noted above, in light of the consultation comments, the actions from the draft OREAP have been revised and further actions to support the deployment of onshore renewable projects have been set out in Chapter 5 of the OREAP. • The OREAP relates to the sustainable development of renewable electricity in Northern Ireland and, where appropriate e.g. through the SEA / EIA and HRA processes, transboundary issues are considered. • As noted above, DARD is undertaking a review of its Renewable Energy Action Plan and will consider the need for any particular biomass related actions within that Plan. • The wording used in the OREAP for requirement for HRA has been agreed with NIEA.

Topic	Summary of Comments Received	Response
	ongoing cross-border collaboration.	
Q: On the basis of the assessments carried out in the ER, do you agree with the overall results and proposed mitigation measures?	• We are broadly content with the strategic environmental assessment. • Generally the identified effects of onshore wind tend to lean toward the negative without any emphasis placed on the benefits such as positive effects on habitats and species from active habitat management; positive effects on air quality from displacement of greenhouse gases; and positive effect on recreation and tourism from increased access. Some respondents believed that this positive effect could be significant. • 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. Do not agree with the mitigation measures. • Spatial planning is necessary. Relying on the market alone is likely to lead to lengthy delays and potentially wasted time/resource. Public frustration may increase, and there will be increased pressure on internationally important biodiversity. • In essence the envisaged plan level mitigation forms a basis for monitoring the market led approach to renewable energy development and to identify the potential for regional significant environmental effects before they occur. • In the absence of additional strategic regional management controls consider that the identified mitigation measures are essential to ensure that growth is delivered and managed in a sustainable way which minimises adverse effects on the environment. • If communities are to be subjected to further large scale and significant wind farm developments, then suitable and appropriate recompense should be incorporated within the planning and development framework, to in some way mitigate the long term impact this may have on that local community. The Department may wish to give consideration to the merits of incorporating a mitigation programme of this nature.	• The SEA considers both positive and negative effects. Positive effects for onshore wind noted include habitat restoration (7.2.2.2) recreation and tourism effects from onshore wind farms (7.2.6.2), climate (7.2.10.2). It was not determined that this impact was considered significant. • It is not clear how potential effects on the environment will be amplified by strategic level mitigation. Mitigation at the strategic level is required by the SEA Directive, conducted as good practice, and plays a complementary role to project level mitigation. • In light of the consultation feedback and the completion of the HRA, the mitigation measures have been reviewed by DETI and DOE and included in the OREAP. • As noted above, the OREAP notes work on the monitoring of onshore renewable projects to be undertaken by DOE/ NIEA. • DETI and DOE have been undertaking a study to consider the relationship between communities and the development of renewable energy; how communities can engage with developers and participate and /or benefit from renewable energy developments. This study was published in October 2013 and DETI, DOE and DARD are considering possible actions from this work.
OREAP Chapter 5 Do you consider that the strategic economic benefit of renewable electricity production has been identified?	• Section 5.2 refers to the increased use of coal, gas and oil power in the Republic of Ireland and implications for NI re the setting of the carbon floor price in the UK. This should be explained and clarified/justified. • The document has broadly identified the strategic economic benefits but has also reported heavily on negative connotations such as consumer cost implications, major infrastructure investment needed, infrastructure required on the ground, negative impacts on tourism. The document does not concentrate on the positivity of these investments for Northern Ireland's future. • There could be greater positivity on job creation, investment in the economy, security of supply.	• The Carbon Price Floor tax has been developed as part of the UK Government's EMR programme with the aim of helping the UK meet binding EU targets on carbon emissions. It was developed for the GB market but analysis commissioned by DETI indicated unintended consequences if applied to the Single Electricity Market such as adverse environmental, security of supply and competitiveness impacts as well as increased prices for consumers. In light of this work, HM Treasury announced in March 2013 that NI would be exempt from this tax which comes into operation across the rest of the UK on 1 April 2013.

Topic	Summary of Comments Received	Response
	• The cost to the public if developments are put in the wrong places has not been assessed. It would be useful to know the value of habitats, species and landscape (inherently, and to people for ecosystem services) and potential infraction costs. This would set the financial imperative and support for getting the location and development of renewable energy right the first time without damage to our environment. • A number of strategic economic benefits of renewable electricity production have been overlooked. These include the impact on tourism of continued use of traditional fossil fuel oil and gas production in NI when compared to the development of renewable energy sources, indeed the move towards renewable energy will facilitate the traditional image of N. Ireland as a green, clean destination; the cost to the NI economy if carbon emissions are not constrained and climate change continues unabated. ; likely reduction in our exports as a result of constraints to global economic activity, an increase in flooding inland, crop failure, a reduction in fish stocks and the costs associated with climate change migration. • A further benefit from renewable electricity generation is that the initial capital investments often results in long term returns and increases the multiplier effect in the local economy, as consumption for foreign fossil fuel energy sources is reduced. • The document omits the opportunities which exist to export renewable electricity to continental European markets.	• Positive economic impacts of renewable energy on security and diversity of supply, carbon savings, wider economic opportunities, including tourism benefits have been set out in Chapter 1. • As noted above, DETI plan to commence a socio- economic analysis of renewable energy in 2013-2014. The aim will be to provide an analysis of the economic and social benefits and impacts associated with the development of renewable energy. • This Plan covers the period up to 2020 which focuses on the 40% renewable electricity target. The export of renewable electricity and wider EU market trading is not expected to occur until the end of the decade. • DETI is represented on the UK/ROI Steering Group looking at Renewable Energy Trading and continues to work with the NI Utility Regulator on EU Market Integration.
Chapter 6 Q: Do you agree with the reporting, monitoring and evaluation proposals? If not, please state why and what alternatives you would propose?	• We are broadly content with the proposed monitoring framework. • Overall energy mix should be monitored to ensure that assumptions made in the ER are correct. • Yes but proposals will need further refining once capacity studies have been carried out. • Will the monitoring framework also be used to help reviews of the OREAP or other high level government to assess whether a more managed approach to onshore renewable energy developments is required to ensure that renewable energy targets are met without having significant environmental effects? Use of the framework would be beneficial. For example, management measures could include identifying targets or limits for development; or designating locations for development or exclusion. .	• The monitoring and reporting by DOE to SEIDWG of renewable energy deployment and cumulative effects is noted above and set out in Chapter 5 of the OREAP. • Chapter 6 notes the overall reporting, monitoring and evaluation plan for OREAP. The OREAP will be reviewed in 2016. The review will include progress against all actions and against the 2015 Programme for Government targets and will consider any further intermediate targets from 2016 to 2020. • It will also consider the outcomes of the DOE/ NIEA project monitoring, the need for any corrective actions or change of direction and consideration of the potential need to review any aspects of strategic level findings and recommendations of the SEA or HRA in light of emerging developments. • There will be a further review/ post project evaluation of the OREAP post 2020.
SEA Scenarios and Technologies. Comments on the effects of technologies are provided in Table 2.2 below.		
Onshore Wind	• Scenario (MW) for onshore wind is lower than others previously identified (ARUP 2009, SONI reports).	• The scenarios are aimed at achieving the 40% target of 1400 -1800MW and it was not considered appropriate to have a

Topic	Summary of Comments Received	Response
	• What is the rationale for keeping the onshore figure so low given that the other technologies must be delivered at the high range to meet the 2020 target? • Onshore high scenario may be met before 2020. • Scenarios do not take account of export potential. • Agreement that onshore wind will remain the most cost effective and technically acceptable method of generating renewable electricity in NI through 2020. • The great reliance place on wind energy between 800 and 1200 MW will put pressure on the landscape.	scenario in which onshore wind accounted for all of the 40%. That would not promote the diversity in renewable energy to which the DETI is committed. In addition, offshore technologies will also contribute to the 40% target. • As stated in 4.2 of the draft OREAP, it is unlikely that the lower end of the low range scenario for each technology would achieve the 40% target with onshore generation alone. The high range of the low scenario, including offshore, would meet the target at 1800MW. However it should be appreciated that the scenarios are neither predictions, preferences, thresholds nor targets; they have been developed to enable the completion of the SEA.
Biomass	• One of the stated aims of the Sustainability Criteria is the creation of a level playing field across the UK but do not believe this is the case. A one size fits all cannot be taken when a region such as NI has many differing variables. Calls for a regional approach to Sustainability Criteria with NI working out how to apply these criteria to NI's circumstances. • Section 4.6.2 of the draft OREAP "Belfast West has been identified as a potential site for a (up to) 300MW biomass- fuelled electricity generation station" is very specific and aimed at one developer. Suggest language is made more general. • Note that it is important to ensure that biomass is sourced as sustainably as possible. The whole of the supply chain must be assessed to ensure the carbon footprint meets the standards set out in Article 17 of the Renewable Energy Directive (2009/28/EC). • Do not agree with the comment that food v fuel should be a concern in NI. Understand that DARD is reviewing its policy in this area and it is likely that the focus will be on producing the product which yields most profit. • The increase in levels of afforestation in NI over the last 30 years are alarmingly low.	• DECC consulted on proposals to enhance biomass sustainability criteria for electricity generation from biomass under the Renewables Obligation in October 2012. In drawing local stakeholders' attention to this consultation, DETI noted that it was not proposing to differ on these proposals with regard to NI/ the NIRO as not aware of any significant NI difference that would require a different approach but through the consultation sought views to confirm this or provide evidence - based rationale for a different approach. It is expected that DECC will publish its response to this consultation during summer 2013. • As noted above, DARD does not see a significant impact on food production as a result of biomass energy crops based on current levels. A research project is underway to examine the issue of food v fuel and is due to conclude in 2013. The research findings will be considered at this point. • SEA did not consider a specific site or development for any technologies. Table 8.3 of the SEA Environmental Report notes that the high range of biomass (100MW to 300MW) could be achieved with 1 to 3 large scale plants, or 5 to 6 medium to small scale plants. Smaller scale plants will also contribute. • Current Government Forestry policy is to increase the forest area to 12% of the land area primarily through the conversion of agricultural land to woodland, which is in itself is creation of biomass potential, if this is considered to be the best use of this woodland resource. • The Private Woodland Inventory of Northern Ireland 1975-1979 (Forest Service) identified the forest area of public and private woodland as 62,000 hectares or 5% of land area. The current preliminary woodland register of public and private

Topic	Summary of Comments Received	Response
		woodland published on the DARD website identifies 106,000 hectares of woodland or 8% of land area. Between 1975 and 2013, therefore, the area of woodland has increased by 44,000 hectares or 70% of the 1975 figure. • It is also noted that the expansion of sustainably managed forests can produce environmental and biodiversity gains and has potential to produce wood biomass.
Other	• More consideration should be given to small scale development. • There are already over 800 individual turbines in the planning system; 600 are stated in Table 8.4. • The draft OREAP notes "solar PV has very significant deployment potential by 2030 but with very high capital costs". "These findings are key and reflect what is already happening in Northern Ireland". This is not considered realistic as there is at present no solar in NI. What is the basis for this presumption?	• All relevant onshore renewable energy technologies, including small scale were considered. The scenarios are estimates of possible uptake only, for the purposes of the strategic environmental assessment. • It is acknowledged that the market and project applications are changing and thus information can easily become out of date. The approach used in the SEA seeks to incorporate this flexibility. Changing details such as this do not change the outcome of the overall assessment. • The statements on PV are derived from discussions with the industry and a review of PV developments across the UK as a whole. • DECC launched a UK wide Solar PV Strategy consultation October 2013.
Grid	• Clarify statement in Section 4.6.1, page 21, OREAP "There is a potential for increased likelihood of significant adverse effects occurring where development is dispersed into new areas, in particular areas where there would be a requirement to provide new grid infrastructure or substantial reinforcements in new areas". • Section 3.2 states that significant upgrading is required on the network in the west of the province. It would be remiss to focus purely on the west as there are generation proposals through the province. • As far as grid and interconnection is concerned, the emphasis is steered towards larger scale renewable to the detriment of smaller scale renewables. • Development work of this nature may take substantially longer to put in place. • Support for Tyrone- Cavan Interconnector. • Support for statement on underground versus overhead development. • Table 6.9; tower heights for the Tyrone - Cavan Interconnector range from 25m to 42m, not 28m as stated. • Page 109 in the ER, Planned Grid Developments, first paragraph second sentence ref to 680MW (DCENR 2007) you should check this and confirm correct? • Page 117, Section 9.2.1.2 Add an additional sentence to the end of the	• Connection proposals will be required for all generation. The nature of these proposals will depend on the specifics of the proposed generation. A possible lack of grid in new locations means that connection proposals in combination with generation proposals, could have a significant adverse effect. This effect would have to be determined at the project level when details are known. This statement is not meant to be prohibitive of development. • The requirement for grid upgrade includes not just the location of generation but the location and condition of the grid- there is less grid infrastructure in the west so more upgrading will likely be needed there. • The SEA has considered grid implications at a strategic level for both large and smaller scale renewable. • The changes noted for table 6.9, page 109 and page 117 in the ER do not affect the assessment results given the scale of the assessment. • Eirgrid and SONI continue to work closely together in relation to grid connectivity issues across the island of Ireland, onshore and offshore.

Topic	Summary of Comments Received	Response
	second paragraph as follows; It should be recognised that major transmission. • The Offshore Renewable Energy Plan for the Republic of Ireland, when finalised, should be taken into account in the context of grid connectivity and cumulative effects. • Grid connectivity is critical and should be considered in any regional level plans or guidance.	
Compressed Air Energy Storage (CAES)	• The proposal for a CAES facility which produces electricity was put forward for inclusion in the OREAP; this project is anticipated to be in operation within the lifetime of the OREAP. Capacity is estimated to be in the order of 134- 270 MW. The CAES would likely be located in East Antrim, and particularly south and south east of Larne, due to the unique geology in this location.	• The draft OREAP and the SEA do not prescribe technologies but focus on a range of onshore renewable energy technologies currently deployed. • The environmental impacts of any CAES project will be considered through an EIA.

2.4 Response to Consultation on the SEA Environmental Report

A summary of the main responses received on the SEA Environmental Report and how these responses have been taken into consideration is provided in Table 2.2.

Table 2.2 Summary of Comments on the SEA Environmental Report

Topic	Summary of Comments Received	Response
SEA Methodology		
SEA topics	• Request for geology to be considered in the SEA. • There is no SEA topic for loss of amenity? • Request for community impacts to be considered in the SEA. • Why is air quality not explicitly mentioned as a topic in its own right, as opposed to being part of the Population and Human Health Topic, particularly given the potential effects of biomass emissions on air quality?	• The SEA topics are set out in the SEA Directive and implementing legislation. These are: Biodiversity, Population, Human Health, Flora, Fauna, Soil, Water, Air, Climatic Factors, Material Assets, Cultural Heritage including Archaeological and Architectural Heritage, Landscape and the interrelationship of these topics. None of these topics were scoped out of the assessment. • The SEA considered "water, soil, sediment"; this included geology and geomorphology as noted in Table 5.4 of the ER. The language "water, soil" is taken from the SEA Directive, which has no separate requirement for "geology". • Consideration of "Amenity "is not specifically required. However impact to "population" or ""human health" can include amenity impacts. • As stated in the SEA scoping report and Environmental Report (1.3.2; 5.4.7.1), a socio-economic assessment (which could include community impacts) is not required under the SEA Directive/Regulations and was not conducted. • An action has been included within OREAP to commence a socio-economic analysis of renewable energy in 2013-2014, subject to the availability of resources. • Air is addressed within the topic of "Population and Human Health" and this did not reduce the level of attention paid to this topic. Effects of biomass emissions on air quality are also considered. It is not proposed to re-structure the ER to present this information in a different manner as this will not change the outcome of the overall strategic level assessment. See also further section below on " Effects on Air Quality "
Designated Sites	• Stated opposition to further wind farm development within all Areas of Outstanding Natural Beauty, the Giant's Causeway World Heritage Site and the Marble Arch Caves Global Geopark. • Concern over apparent informal blanket ban on potential small scale wind turbine sites in proximity to ASSIs/World Heritage sites.	• Potential Impacts to designated sites have been considered in the SEA and an HRA has also been carried out with project level mitigation measures identified. • The OREAP is a non-spatial plan and accordingly the SEA is also non-spatial. No "ban" on development in any location has been proposed.
Objectives of the	• Request for clarification on the SEA's role in "informing project	• SEA is an environmental assessment at plan level which

Topic	Summary of Comments Received	Response
SEA	level decision making".	complements and can assist the EIA at project level.
Impact Terminology	• Inconsistency in language "significant adverse effects", "significant effects", "Potential adverse effects and "significant cumulative effects".	• These terms are defined in section 5.4.8 Assessment Criteria of the Environmental Report. They are technical environmental assessment terms, each with its own meaning. The requirement for an assessment of these types of effects comes from the SEA Directive and Regulations. • Where used in the OREAP these terms are taken from the SEA and have been used in the SEA sense. • "Effects" and "impacts" have been used interchangeably in the SEA.
SEA Policy Context		
Policy Context	P15 Table 3.2 : • Inclusion of PPC Regulations (would particularly affect biomass) • Inclusion of F-gas and ODS regulations (may therefore be of relevance in ground source heat pumps)	• The requirement for an IPPC license for biomass installations is noted in 6.3.5 of the ER and in Appendix A. Table 3.2 is non-exhaustive. • The F gas and ODS regulations are referenced in Table 3.2
SEA Baseline Data		
Tourism and Recreation	• Concern over inclusion of interim results of NITB survey on Public Attitudes, before complete study has been published. • A number of further studies on attitudes to wind farms and tourism were put forward. • Air sports (hand gliding and paragliding) not considered.	• The SEA scoping report set out proposed baseline data source and it was considered useful to include this particular study. • No detailed recreational data sets were considered-- given the high, strategic level of the plan and lack of spatial aspect it was not considered appropriate. Impacts to specific recreational activities, such as air sports, would be assessed at the project level.
Ecology	• We recommend the addition of breeding curlew in section 8.6.1.2, • The Biodiversity Assessment (Appendix B) makes reference to potential transboundary impacts. Consideration should be given to the following: ecological designations; water features in the relevant catchment areas and potential effects (particularly accidental release of contaminants, sediments (mudslides/peat slides), increased surface water run off; landscape character areas and designations; plans, programmes and policies in RoI; potential for transboundary cumulative effects (developments on both sides of the border).	• Curlew were one of the many species considered in the assessment. Not all species considered in the assessment were mentioned specifically in section 8.6.1.2, which is a summary of results. • The biodiversity assessment considered the datasets put forward. The Environmental Report is a summary of the assessment and not all datasets are reported in the summaries.
Outcomes of SEA: Effects		
Effects on Ecology	Onshore wind • Request that the following is removed from potential effects of onshore wind: "Ecology in particular areas of upland bog/peat and	• Effects on upland bog/peat, and effects on birds in terms of habitat loss, displacement, and risk of collision are all potential effects of

Topic	Summary of Comments Received	Response
	effects on birds in terms of habitat loss and displacements from breeding areas and increased risk of collision on migration route" • The potential for habitat restorations is given as a positive impact. This is true, but to date there have been few good examples of habitat restoration either on or offsite. • Effects on peat can be widespread and an increasing amount is known about this. • The main effects on biodiversity of certain bird species and peat habitats as well as bats are appropriate here. Biomass The consideration of potential operational effects of biomass is insufficient regarding habitat/species damage. The planting of biomass crops can do much more than reduce foraging opportunities. It can also remove breeding opportunities, cause the loss of other ecologically important habitats, and increase the likelihood of predation by providing cover. • We do agree that appropriately managed biomass fuel sources can give biodiversity benefits. • Some crops (willow, timber) do affect ground water levels and hydrology if planted in certain areas (blanket bog, peat soils etc). • A limitation on the assessment of biomass is that no indication is given of the amount of land required for native biomass to be a serious option.	onshore wind farms and are correctly included in the Environmental Report. • Habitat restoration may require a timescale of some years to show positive effects, but it is true that positive effects arising from restoration have yet to make a significant contribution to stated aims. • Peat slides have occurred as a result of bad engineering practice, but lessons have been learnt from these events, and should be a major consideration at the design stage. • The main potential impacts on birds are displacement from breeding/foraging areas, reduced availability of prey in windfarms, barrier effects to movement of some birds, increased accessibility for terrestrial predators/scavengers and collision of birds with rotors. Potential impacts on peat habitats are increased instability of the peat mass, localised desiccation/saturation of peat, with adverse impacts on vegetation communities, loss of habitat, particularly as a result of track building, increased grazing, nutrient inputs with increased accessibility. • The assessment in the ER focussed on AD, biomass from grown fuels and from waste and considered characteristics and potential generic effects from these sources and estimated that there was about 7.5MW of biomass electricity generated from these sources. The potential scenarios considered low range (30- 100MW) and high range (100 -300MW). Although there is potential for significant effects in terms of land take for biomass crops due to the quantities that might be needed to operate large scale biomass plants (up to 300MW) DETI noted in the ER that it did not believe this is feasible in Northern Ireland as it raised food v fuel issues. • The ER assessment was also informed by DARD's policy position that it did not advocate taking crops out of the mainstream food production to support an energy market. It was considered that it was unlikely that potential adverse effects would occur in Northern Ireland. The assessment therefore focused primarily on the potential impacts and a range of mitigation measures were identified to address any issues

Topic	Summary of Comments Received	Response
	Other • Effects of single wind turbines can be high if located in an area hosting more than 10% of the curlew population. Table 8.8 gives effects as Low to Medium for the high scenario.	associated with smaller rather than large scale planting (Chapter 8 of the ER). • Since the early 1990s Government forest expansion policy has been revisited from time to time to reflect a better understanding of the effects of tree planting on ecosystems, the importance of conserving peat and breeding wader habitats, protecting water bodies from eutrification and soil movement and protecting and improving the quality of ancient woodland habitats. Some forests are protected from timber production because of their biodiversity interest, such as wooded nature reserves and riparian woodland. • Experience also shows that extensive areas of exotic forest expansion provided suitable habitat for scheduled species such as hen harrier and merlin. The UK Forestry Standard is the reference standard for sustainable forest management in N Ireland and is supported by a series of guidelines which address different elements of sustainable forest management. These are: biodiversity, climate change, historic environment, landscape, people, soil and water. Both expansion and management of existing forest take into account good forestry practices outlined in the Standard and are the framework for the exercise of regulatory powers of the forest authority in payment of forestry grants. • It is also noted that the expansion of sustainably managed forests can produce environmental and biodiversity gains and has potential to produce wood biomass. • It has only become apparent very recently that the curlew population of Northern Ireland has declined rapidly and catastrophically, but the likely population total is as yet unknown. However, it is unlikely that a single turbine will be within 800m (a commonly quoted distance within which there may be a significant decrease in curlew population density) of 10% of the curlew population. There is also emerging evidence that the responses of curlews to the presence of turbines varies considerably between sites, and perhaps individually.
Effects on Tourism and Recreation	• Effects on recreation do not consider impacts to air sports. This impact is considered to be high.	• Effects on air sports were not explicitly mentioned in the SEA It did however consider impacts to Recreation and Tourism strategically. Air sports were not noted during scoping consultation.

Topic	Summary of Comments Received	Response
	Onshore Wind • Effects on tourism should include more studies which show a positive public attitude to wind farms. • Request that the following is removed from potential effects of onshore wind: "Land Use" • The section on Tourism notes that the negative effect of onshore wind development being dispersed into new area – this could be a potential result of the mitigation measures proposed within the draft OREAP. Clustering onshore wind development will mean that there are inevitably some cumulative landscape and visual impacts, but this is a better outcome than widespread dispersal.	• The significance of the impact to air sports will depend on the specifics of a particular project. A possible long term impact on local residents through the possible loss of an unknown amount of recreational air sports area is not considered to be significant at a strategic level. This could be significant at a project level and that is where such potential impacts are properly addressed. As is noted in the Ulster Hand Gliding and Paragliding Club's consultation response, the design of a specific wind farm can avoid impacts on nearby sites. • The subjective nature of attitudes to wind farms is noted in the SEA. "Not all individuals agree that the presence of wind farms has a negative effect on landscape character and in some cases the presence of wind farms is considered to have positive effects. Furthermore, no evidence is available which demonstrates that effects on landscape character from wind farms results in a reduction in tourism/recreational activity. " (7.2.6.2) • Onshore wind farms can have an effect on land use through the sterilisation of sites as a recreational and tourism resource. While wind farms can be tourism sites in their own right, other uses for these sites other than agricultural use will not be possible.
Effects on community	• Concern that wind farm generation in west of province may have a significant impact on the local community arising from impacts to landscape character and visual amenity, ecology, and recreation and tourism. • Concern that promotion of the growing of biomass crops will out price conventional farming.	• As noted above, DETI is undertaking work into communities and renewable energy benefits. This study was published in October 2013 and DETI, DOE and DARD are considering possible actions from this work. • Pricing implications of the growth of biomass fuels are outwith the scope of SEA but the environmental implications of biomass growth have been considered.
Noise Effects	• Cumulative noise impacts of clustering are not assessed in the SEA. • Suggest that cumulative noise impacts are best overcome utilising strategic area planning. Wind farm proposals within predefined areas could have reduced noise limits applied, given the potential for additional wind farms in the locality. • Reference to DTI publication ETSU-R-97 - 'The Assessment and Rating of Noise from Windfarms' (ETSU) should be referred to as guidance. • Table 8.6 - Wind assessment matrix gives the Noise and	• Noise effects are discussed in Section 7 dealing with generic effects. Table 8.6 notes that "it is difficult to assess the overall potential significance of effects associated with noise and vibration at a strategic level. " We agree that there is a potential for two or more wind farms (or individual wind turbines) to have 'in combination effects'. The circumstances under which this could occur would need the wind farms to be in very close proximity, and depend on their scale and specific topographical and wind conditions (direct and speed). The cumulative effects can therefore only be determined at a project level. • There is uncertainty as to whether this will be more likely at the

Topic	Summary of Comments Received	Response
	vibration - High generation scenario as 'low'. Could this be low-medium (depending on size / scale of wind generation project)?	high generation scenario, as it will depend wholly on specifics of individual locations. • The OREAP does not provide spatial policy commitment for any impact. • The ETSU-R-97 was originally published in 1996 and has been used to quantify noise impacts in relation to windfarms. In the instances where multiple wind farms are proposed, ETSU-R-97 notes the developer should use the background noise levels without the contribution of any existing wind farm as its baseline, so the cumulative impact of both existing and proposed wind farms can be adequately assessed for noise nuisance. • It also proposes noise condition under which wind farms should be assessed and the conditions under which "simplified noise conditions" may be suitable. • The conditions mentioned in the OREAP would result in increased amplitude modulation of aerodynamic noise (AM). ETSU-R-97 does not include guidance on how to measure or predict this condition. Further information has been gathered from NANR 277, Windfarm Noise Complaint Methodology. NANR 277 provides a framework for complaint investigation and identifies AM as a main complaint component.
Effects on landscape	• Clarify statement Section 4.6.1 page 21 (OREAP) "in all locations there will be a limit on the total amount (MW) of onshore wind farm developments that can be accommodated before significant cumulative effects start to occur". • Request for removal of statement "there is potential for significant adverse cumulative effects to occur once development reaches a certain level in these clusters" as it is unclear what the term "certain level" means. • Page 101 of the Environmental Report states "the aim of the capacity studies would be to determine how much more development could be accommodated in both existing areas of development and other locations in Northern Ireland"... the section then states "there may be a requirement to identify alternative areas for development (e.g. new areas) where a small amount of development could be accommodated in order to reduce pressure on landscapes and areas already affected by wind development". It seems that clustering of development is being	• The SEA team has determined that there will be significant adverse cumulative effects on landscape at some level arising from onshore wind development in both the cluster and dispersed scenarios. However, what this level is not known, as the OREAP does not dictate locations or technologies. Thus it is a "certain level", which is itself unknown. • Neither clustering nor dispersal is promoted by the OREAP or the SEA. A distinction was made in the SEA between clustering and dispersal and their potential impacts to allow for environmental assessment and consideration of appropriate mitigation measures.

Topic	Summary of Comments Received	Response
	encouraged on one hand and new locations on the other and this is very confusing.	
Effects on Air Quality	• Request cumulative effects arising from the transportation of fuel for biomass plants not be included in the OREAP as this will be dealt with on a project specific basis; considered to negatively impact the large scale biomass sector. • It should be noted in 7.3.7.2 that the burning of waste will require a PPC permit. This section should also take into account local / nearby air quality issues and the potential (interactive) effects of biomass combustion activities. • Why is there no mention of air quality effects from emissions during operation of the biomass plant in 8.6.2.3? • Table 8.7 should contain Air quality as a discrete topic. Further information to consider includes nature of biomass; and capacity of plant, local air quality / background levels of air pollutants. Could be low-medium significance. • Air quality should be a discrete topic in Table 8.5	• Regulation 11(3), (4), Schedule 2 of the 2004 Northern Ireland SEA Regulations, item 6, requires a consideration of likely significant effects, including specifically cumulative effects. For this reason the cumulative effects arising from the transportation of fuel for biomass plants has been considered in the SEA and this was therefore noted in the draft OREAP. • The conclusions of the Environmental Report (Page 114) notes that most effects associated with biomass developments are project specific and identifies that a proposal to import fuels for a large scale plant would need to look at carbon costs associated with the transportation of fuels in terms of the overall performance of the development and total CO_2 offsets. • Required permits and policy compliance are not discussed in this section. • Impacts on local air quality are considered in 7.3.7.2 under the second heading “Air quality - adverse localised and regional effects on air quality from biomass combustion.” • The operational effects of biomass plants are assessed in 7.3.7.2. Given the level of biomass proposed under the OREAP scenarios, significant regional cumulative impacts are unlikely. More detail was given on transport related emissions as this is considered to be of greater likelihood of strategic significant impact. • As Table 8.7 states impacts on population and human health from biomass, including those on air quality, are considered project/site specific and not strategic. This is considered to be a low significance. The nature of biomass and capacity of plant, local air quality / background levels of air pollutants are site/project specific considerations.
Effects of Other Technologies	• Cumulative impacts of small scale generation and large scale generation can be significant. Of particular note are noise and landscape impacts. • Cumulative impacts of other technologies should be considered in 7.4; concerns over potentially cumulative effects to birds over single wind turbines, over dewatering related to hydro schemes, and impacts	• Cumulative impacts are considered in Section 8.6.3, which includes consideration of cumulative impacts of other technologies. This assessment is strategic as it is based on the level of detail in the Plan. • It is agreed that the regional and global effects of emissions are not dependant on local conditions at the source of emission. Local effects will however be dependent on this. Given the scale of

Topic	Summary of Comments Received	Response
	to the Water Framework Directive. • 7.4.7.2. Leakage of gases from geothermal installations—there are further serious environmental consequences if the gases in question are fluorinated greenhouse gases or ozone depleting substances. Environmental effects of emissions of these gases do not '…[depend] on…pattern of dispersion in relation to prevailing wind directions and proximity of the development to sensitive receptors.' since the adverse effects of these gases are global, and not local, in nature.	geothermal development proposed within the timeframe of the Plan, these impacts are not considered likely to be significant.
Effects of Grid	• Swan/Goose flightlines may be an issue for offshore grid connections. • 7.5.6.1 Vibrations e.g. during construction could affect historic / built environment.	• Noted. These considerations do not affect the outcome of the assessment.
Assessment of Alternatives	• The lack of a spatial elements means that the requirement to assess reasonable alternatives has not been met.	• The SEA Regulations require (Part 3 12(1) (2) (b) "reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme". The alternatives considered in the draft OREAP meet this requirement.
Cumulative Impacts	• The lack of a spatial element means that cumulative impacts cannot be assessed.	• Cumulative impacts have been assessed on the basis of the assumptions (clustering/dispersal etc) which have been set out in the Plan. Given the high level nature of the Plan there is an acknowledged uncertainty about cumulative impacts (5.6 and 8.5 of the ER). The mitigation measures in the final OREAP seek to increase knowledge and reduce this uncertainty.
Outcomes of SEA: Mitigation		
Recreation and Tourism	• Mitigation for Recreation and Tourism does not contain a reference to air sports.	• This comment is noted. Potential effects on air sports are considered to be a site specific issue that is best dealt with through consultation and site design on a project-by-project basis. The recommended Project Level Mitigation for Recreation and Tourism does include the need to 'Identify and avoid popular recreational areas where possible' during the site selection and site design stages.
Air	• Table 9.1. Consultation is with NIEA or the appropriate district council, depending on the capacity of the plant / the nature of the fuel used, and therefore under what part of the PPC regime the plant is permitted.	▪ Noted. Table 9.1 states "Consultation with the relevant authority for example NIEA to obtain permit."

Topic	Summary of Comments Received	Response
Small Scale Wind	• Scale wind developments could have significant impacts in landscape character and should be included in the monitoring and associated capacity studies due to their potential to contribute to regional scale cumulative impacts.	• Small scale wind was considered in the landscape assessment undertaken as part of the SEA and will be incorporated within the planned DOE/NIEA monitoring programme.
Reporting of mitigation	• There may be merit in distinguishing in the SEA and in the OREAP between mitigation measures linked to specific adverse environmental effects identified in the environmental assessment and key strategic level recommendations/actions proposed in the SEA.	• The overall reporting framework is set out in Chapter 6 of the final OREAP.
Actions 3 and 4	• The ER is not clear to what significant environmental effects the mitigation measures Actions 3 and Action 4 (grid development and linkages between the onshore and offshore renewable energy plans) relate . We assume these measures are required to ensure that positive climate change effects are achieved.	• These mitigation measures will ensure positive climate change effects are achieved and reduce the likelihood for negative interactive effects.
Outcomes of SEA: Monitoring		
Monitoring	• . • EirGrid work on Evidence-based Environmental Studies of Existing Transmission Projects may be of use for monitoring. • Habitat and species mitigation measures and offsetting should be paid for by the industry, but a spatial plan of suitable mitigation/enhancement could make this more cost effective by combining effort. For example, a habitat/species fund could direct developer contributions into agreed and centrally managed restoration or enhancement projects. • Consideration should be given to defining how cumulative effects will be monitored/evaluated and the criteria to determine when preventative/remedial action is required in the event of potential for significant adverse effects. • The monitoring framework should include transboundary effects and be expanded to include time frames, responsible authority, monitoring and reporting requirements, and where possible criteria to prompt remedial action. Monitoring should link with existing national monitoring programmes. • There would be merits in confirming when the OREAP will be reviewed (interim or full), including a commitment to fulfilling the requirements of the SEA and Habitats Directive and the findings of the Capacity Studies in future versions of the OREAP.	As noted above, Chapter 6 of the OREAP sets out overall reporting , monitoring and evaluation framework and these comments will be considered as appropriate. While it is not possible to say at this stage how the OREAP monitoring could potentially be linked to the new Biodiversity Strategy, the point is noted. The new Strategy is, however, likely to contain complementary direction to facilitate measures to create prosperity and well being in NI through environment and heritage excellence.

Topic	Summary of Comments Received	Response
	• Additional overarching monitoring is required in the monitoring framework (Table 10.1) to review all of the action points in combination to ensure that growth is delivered and managed in a sustainable way. • Monitoring can be linked to the new Biodiversity Strategy.	
HRA		
HRA	• Clarification should be given on the time frame and status for the HRA. • The findings including recommendations, mitigation measures and any proposed monitoring requirements of the HRA should be reflected in the relevant section of the SEA ER and final OREAP. • The findings of the HRA should be taken into account in the proposed Ecological Capacity Studies. • The HRA should include transboundary effects.	An HRA has been completed and published and its findings and recommendations have been included within the final OREAP. http://www.detini.gov.uk/deti-energy-publications

2.5 Transboundary Consultation

As part of the consultation process, key representative and stakeholders in transboundary locations were also invited to comment on the findings from the SEA and the content of the Draft OREAP. This included consultation with the Environmental Protection Agency (EPA), the organisation dealing with overarching consultation on SEA in the Republic of Ireland. The EPA provided a detailed response in relation to transboundary planning and environmental matters including potential effects on the environment (including Natura Sites) and the proposed mitigation measures/Actions. Responses to their comments are incorporated within Table 2.1 and Table 2.2.

3 Incorporating the Findings from the SEA into the OREAP

3.1 Introduction

The following Section provides an overview of how the findings of the SEA were used to inform the preparation of the Final OREAP. The purpose of this chapter is to address the following requirement of the SEA Regulations:

(a) how environmental considerations have been integrated into the plan or programme; and

(b) how the environmental report has been taken into account.

The SEA informed the preparation of the OREAP in a number of ways:

- Input from the Project Steering Group liaison and consultation;
- Integration of the SEA (and HRA) process into the preparation of the OREAP including joint consultation activities.
- Inclusion of the key findings from the SEA in the OREAP including 'Actions' to avoid, reduce or remedy any likely significant effects identified as part of the SEA.

Each of these is discussed below.

3.2 SEA Project Steering Group

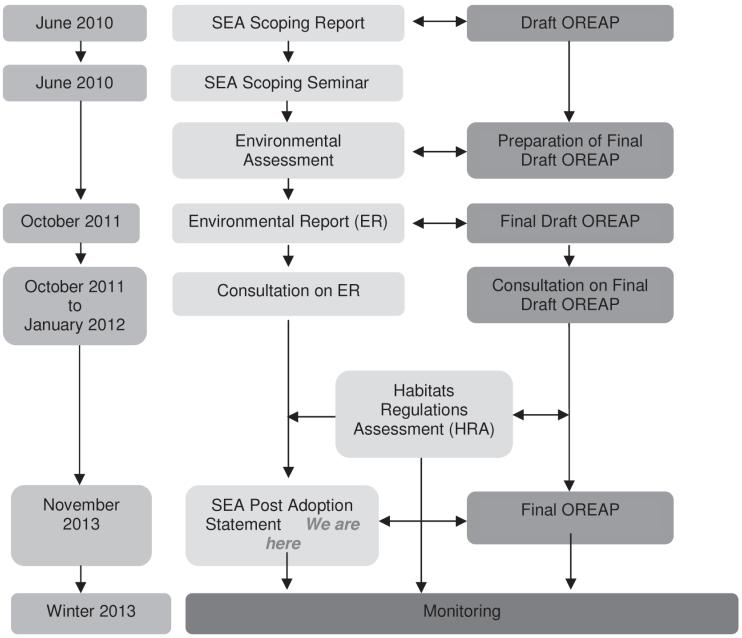
The SEA was guided by a Project Steering Group led by DETI and comprising key organisations and NI Departments including the Northern Ireland Environment Agency, DOE Planning, the Department of Agriculture and Rural Development, the Department for Regional Development, the NI Utility Regulator, NIE, SONI and the Northern Ireland Renewables Industry Group.

The Project Steering Group was established to oversee the SEA work and enabled an important co-ordinated approach to the development of the OREAP. Meetings were at key milestones to review the progress of the SEA and provide support and guidance to achieve the objectives of the SEA. Project Steering Group members considered and approved the final OREAP for publication.

3.3 Integration of the SEA Process and the Preparation of the OREAP

The SEA was carried out in parallel to the preparation of the OREAP as illustrated in Figure 3.1 below. The link to the HRA is also identified. Consultation was conducted at a number of stages using a number of methods including a dedicated website, a Scoping Workshop, a Project Steering Group (see section 3.2 above) and a 12 week consultation period on the Plan and Environmental Report. The responses to the consultation are summarised in Section 2 above.

Figure 3.1: Relationship between the SEA and Preparation of the OREAP



3.4 How Environmental Consideration and the Results of Assessment Set Out in the Environmental Report were Taken into Account in the Plan

The identification of environmental effects in the Environmental Report provided the basis for the development of both Plan and Project level mitigation measures (referred to as Actions in the OREAP). In light of the consultation feedback, DETI, in consultation with DOE, has reviewed the recommendations and mitigation measures from the Environmental Report and the HRA. Table 3.1 below lists the mitigation measures recommended in the Environmental Report together with the Actions set out in the final OREAP to addresses these recommendations.

Table 3.1 Environmental Report Mitigation Recommendations and OREAP Action

Mitigation Recommended in the Environmental Report	Actions Incorporated into the OREAP
Consider more detailed "capacity studies" to be undertaken at a regional level / area specific level, to provide more specific guidance and address data gaps on where future developments should be located and to feed into the ongoing monitoring of potential significant effects. The studies proposed were a landscape capacity study, an ecological study and a bird migration study.	DETI and DOE have, in light of the consultee feedback, reviewed the proposals for the capacity studies and, on balance, DETI does not consider that further landscape studies would add value at this juncture. It is considered that, at this stage, the existing PPS 18 and SPG and the DOE/ NIEA requirement for landscape studies as part of the project level EIA work (e.g. up to 30KM for landscape/ visual impacts) adequately address the issue and provide sufficient safeguards. DOE/ NIEA consider that judgements on cumulative impacts must be made on a case by case basis. ACTION 1 DOE/ NIEA will review existing NI, UK and international data/studies/research into the impacts of wind farms on biodiversity, including birds, bats and habitats. In light of the outcome of this review, to be completed by March 2014, DOE/NIEA will consider the need and scope for any further work at regional level.
Develop a continuous monitoring framework or programme where the key potential cumulative effects are reviewed on a regular basis (every 18-24 months). The aim of the monitoring programme is to review development on a continuous basis to identify potential significant adverse effects before they occur.	ACTION 2 DETI and DOE already work together through the Planning and Renewable Energy sub-group of the SEIDWG and a key action for the sub group will be to seek an annual monitoring update from DOE Planning throughout the life of the OREAP on renewable energy deployment to include number/size /location of applications received, those approved and rejected and total planned installed capacity. This will be cross referenced with actual deployment levels. This monitoring framework will be important as deployment rates increase, particularly of onshore wind, and will also include consideration of key cumulative effects identified in the ER and in the HRA. This will assist the identification of potential significant adverse effects before they occur and will inform the ongoing consenting of individual developments by DOE. The first report will be made by March 2014.
Develop an appropriate policy framework to enable ongoing development of the grid including specific proposals for the upgrading and reinforcement of the transmission and distribution network.	ACTION 3 The NI Utility Regulator will continue to work with NIE, SONI and DETI to facilitate the development of a future proofed grid to handle the increasing levels of renewable electricity generated on and offshore to 2020 and beyond
Ensure coordination and consistency between the delivery of the OREAP and the ORESAP to maximise the amount of electricity from renewable sources.	ACTION 4 - DETI will ensure co-ordination and consistency between the delivery of the onshore and offshore action plans to maximise the amount of renewable electricity and will, subject to the availability of resources, commence a socio-economic analysis of renewable energy in 2013-2014.
Compliance by renewable energy projects with the EU Environmental Impact Assessment and Habitats Directives. A range of project level mitigation measures were identified in the ER which would need to be considered developers at individual project level.	ACTION 5- DETI will work with DOE, in its lead planning role, to ensure onshore renewable energy projects comply with the EIA and HRA Directives.

With respect to Action 5, Table 3.2 provides a summary of the key mitigation measures that may be appropriate for specific project developments. In addition, Table 3.3 identifies additional project level mitigation measures relating to

Natura sites identified as part of the HRA of the OREAP. The HRA also identified data and knowledge gaps and project level monitoring requirements to address uncertainty associated with effects on Natura Sites (Table 3.4).

The mitigation measures identified in the SEA and the HRA processes currently represent good practice and will form the basis of any consideration of what measures / surveys etc that will need to be carried out at project level in due course. With ongoing development of onshore renewables and an increasing understanding of potential impacts, it may be that current best practice is superseded. DETI and DOE will wish to ensure that the most relevant and appropriate measures, set out in the conditions of the consent issued to the project developer, are used to ensure the ultimate aim of avoiding/reducing any potential impact on the environment.

Table 3.2: Project Level Mitigation Measures

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Consultation				
All topics	All	C O D	▪ Consult with NIEA upon project inception to gain data to inform site selection and project design. ▪ Use NIEA data to inform environmental statement production.	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Landscape				
Effects on landscape character/resource	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive areas and considering landscape setting ▪ Adhere to principles in UK wind farm guidance documents in particular to Wind Energy Development in Northern Ireland's Landscapes - Supplementary Planning Guidance to PPS 18[4]. ▪ Appropriate selection of development scale, design, colour, material and lighting	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Effects on designations	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive areas and considering landscape setting ▪ Adhere to principles in UK wind farm guidance documents in particular to Wind Energy Development in Northern Ireland's Landscapes - Supplementary Planning Guidance to PPS 18. ▪ Appropriate selection of development scale, design, colour, material and lighting	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Effects on visual amenity	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive areas and considering landscape setting ▪ Adhere to principles in UK wind farm guidance documents in particular to Wind Energy Development in Northern Ireland's Landscapes - Supplementary Planning Guidance to PPS 18. ▪ Appropriate selection of development scale, design, colour, material and lighting.	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Ecology and Biodiversity				
Direct habitat loss, damage or modification	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive sites/species where possible ▪ Avoid locations where there is a demonstrable peat slide risk. ▪ Use of Best Practical Environmental Option (BPEO) for plant access, positioning and operation during installation works. ▪ Implement fencing and buffer zones to restrict access by construction/de-commissioning machinery/activities to sensitive qualifying habitats and species. ▪ Any work which may destroy or affect a sensitive species and habitat must be discussed with NIEA.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance

4- ***PPS18***: Renewable Energy; ***Wind Energy Development in Northern Ireland's Landscapes*** - Supplementary Planning Guidance to PPS 18; ***Guidance on the Cumulative Effects of Windfarms***, Scottish Natural Heritage (Version 2 revised April 2005); ***Guidelines on Environmental Impacts of Wind farms and Small Scale Hydro Electric Schemes***, Scottish Natural Heritage, 2001; ***Visual Assessment of Windfarms Best Practice***, University of Newcastle (2002). Scottish Natural Heritage Commissioned Report F01AA303A; ***Visual Representation of Windfarms Good Practice Guidance***, horner + maclennan and Envision, prepared for Scottish Natural Heritage, Scottish Renewable energy Forum and Scottish Society of Directors of Planning, (2006 Report F03 AA 308/2); and ***Siting and Designing Windfarms in the Landscape***, Version 1, Scottish Natural Heritage 2009.

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Disturbance to species	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive sites/species where possible. ▪ Avoid habitat removal during sensitive seasons (i.e. breeding). ▪ Site-specific surveys at project level to identify the presence of key feeding and breeding areas to aid site selection. ▪ Implement fencing and buffer zones to restrict access to sensitive areas to reduce disturbance (noise and visual) to wintering, breeding and passage birds during construction and operation. ▪ Use directional lighting on operational infrastructure and avoid light spillage	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation
Displacement of species	Wind Biomass Other Grid	C O D	▪ Careful site selection avoiding sensitive sites/species where possible. ▪ Avoid siting wind turbines and hydroelectric turbines within known breeding, feeding and/or migration routes of fish and birds. ▪ Provision of fish passages and fish fences where appropriate for hydroelectric schemes. ▪ Implement fencing and buffer zones to prevent protected species gaining entry into construction sites and operational infrastructure. ▪ Provide compensatory habitat/nestboxes/bat boxes as appropriate for displaced species.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation
Changes to hydrology	Wind Biomass Other	C O D	▪ Implementation of measures to control the generation of sediment-laden runoff ▪ Obtain abstraction licence from the relevant authority. ▪ Maintain gross site hydrology, particularly where active peat is present.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation
Changes in water quality	Wind Biomass Other	C D	▪ Avoid the siting of OREAP infrastructure adjacent to water features if possible. ▪ Assess potential for ecological change at coolant water discharge/inflow locations. ▪ Avoid work on or near the banks, or in the channel, of any watercourses wherever possible. ▪ Obtain necessary licences ▪ Implement good site practice such as Pollution Prevention Guidelines ▪ Inspect machinery before use and regularly during their use. ▪ Use drip trays under vehicles and plant where appropriate ▪ Spill kits readily available and the formulation of an emergency plan in the event of a spillage.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation
Physical damage to species (collision risk)	Wind Other Grid	O	▪ Design development for minimal impact. ▪ Appropriate siting of developments (away from sensitive areas) – e.g. migration routes, feeding, breeding areas. ▪ Alignment of turbines in rows parallel to the main migratory direction. ▪ Provide sufficient distance between wind farms for migration. ▪ Shut-down of turbines at night with bad weather/visibility and high migration intensity or during sensitive periods of qualifying features. Maximise device visibility.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project operation

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Barotrauma (bats)	Wind	O	▪ Bat surveys to determine potential for bats to be present in the area.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project operation
Emissions to Air	Biomass Other	O	▪ Appropriate design of OREAP infrastructure may reduce chemical emissions from biomass plants and landfill gas sites. ▪ Review of local air quality and pollutant modelling should be undertaken when detailed design is finalised and project level mitigation can be implemented to reduce emissions. ▪ Implement scrubbers within chimney stacks to reduce release of chemical emissions into atmosphere. ▪ Consultation with the relevant authority for example NIEA to obtain permit. ▪ Apply construction related mitigation measures including solid hoardings, water spray curtains and covering exposed materials to reduce the transfer of dust and air pollutants travelling to sensitive areas during construction.	▪ Project design stage ▪ EIA stage ▪ Installation ▪ Project operation
Accidental Spillage	Biomass Other	O	▪ Spill kits readily available and the formulation of an emergency plan in the event of a spillage.	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation
Invasive Species	Biomass Other	O	▪ Biological screening for invasive species may be required on developments that are sited close to European Sites. ▪ Planting for biofuel feedstocks should avoid being sited within and adjacent to European Sites.	▪ EIA stage ▪ Project operation
Products from Technology	Biomass	O	▪ Appropriate disposal of waste material in specialised landfill sites if required ▪ Consultation with the relevant authority for example NIEA to obtain discharge consents.	▪ EIA stage ▪ Project operation
Water				
Release of sediment	Wind Biomass Other Grid	C D	▪ Obtain a temporary discharge consent (s) and agree with appropriate authority ▪ Implement good site practice such as Pollution Prevention Guidelines such as Environment Agency Pollution Prevention Guideline 1 General Guide to the Prevention of Pollution, Environment Agency Pollution Prevention Guideline 5 Works and Maintenance In or Near Water and Environment Agency Pollution Prevention Guideline 6 Working at Construction and Demolition Sites.	▪ EIA stage ▪ Project installation ▪ Project operation
Disturbance of contaminated sediments	Wind Biomass Other Grid	C D	▪ Avoid development within areas of known sediment contamination ▪ Use installation methods that minimise disturbance of sediments ▪ Risk assessment and contingency planning	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Accidental release of contaminants	Wind Biomass Other Grid	C O D	▪ Use minimum quantities ▪ Design developments for minimum maintenance ▪ Risk assessment and contingency planning ▪ Observe good pollution prevention practices during construction, removal and maintenance ▪ Design of drainage to remove contaminants before discharge ▪ Store chemicals and oils in accordance with relevant legislation and guidance such as Environment Agency Pollution Prevention Guideline 8 Safe Storage and Disposal of Used Oils ▪ Spill kits readily available and the formulation of an emergency plan in the event of a spillage.	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Creation of pollutant pathways	Wind Biomass Other Grid	C D	▪ Where possible, piled foundations should not be located in contaminated areas and appropriate types of pile shall be chosen to restrict downward migration of contaminants. ▪ Piles should be designed in accordance with the EA guidance document ‘Piling and ▪ Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention’. ▪ Placement of suitable bunds e.g. clay around pipes ▪ Placement of bunded hardstanding	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation
Increased surface water run-off	Wind Biomass Other Grid	C O D	▪ Avoid areas susceptible to flooding ▪ Provide adequate water attenuation	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Operation
Pollution of groundwater and surface water	Wind Biomass Other Grid	C O D	▪ Good site management practices should be implemented in accordance with Environment Agency Pollution Prevention Guidelines. ▪ Drainage systems should be designed to prevent pollutants entering water bodies by incorporating measures such as sediment interceptors, attenuation and oil interceptors. ▪ Full decommissioning of tanks and pipelines should be undertaken before demolition ▪ Ensure safe removal of potentially contaminated material to a suitable disposal facility/landfill site. ▪ Avoid the siting of OREAP infrastructure adjacent to water features if possible. ▪ Avoid working in the banks of any watercourses where possible. ▪ Store construction materials appropriately away from watercourses and within bunded areas with isolated drainage systems. ▪ Obtain necessary licences ▪ Inspect machinery before use and regularly during their use. ▪ Use drip trays under vehicles and plant where appropriate ▪ Spill kits readily available and the formulation of an emergency plan in the event of a spillage. ▪ Appropriate drainage design	▪ Site Selection ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Production of waste water	Biomass	O	▪ Obtain discharge consent from appropriate authority. ▪ Incorporate onsite treatment measures	▪ Project design stage ▪ EIA stage ▪ Project operation
Impacts on water bodies	Other Grid	C O D	▪ Site specific geophysical and geotechnical surveys to establish a baseline and inform the impact assessment for individual developments. ▪ Modelling of hydrodynamics and sediment transport. ▪ Assessment and monitoring of water quality.	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Soils				
Erosion of exposed ground	Wind Biomass Other Grid	C D	▪ Good practice construction practice. ▪ Minimise vegetation removal where possible. ▪ Manage ground disturbance or excavations in a phased approach to reduce over exposure of bare ground.	▪ Project installation
Loss of agricultural land	Wind Biomass Other Grid	C O D	▪ Avoid high quality agricultural land ▪ Site developments at field edges	▪ Site selection stage ▪ Project design stage ▪ Project design stage ▪ EIA stage
Effects on peat	Wind	C D	▪ Undertake a comprehensive investigation of the groundwater regime. ▪ Wind farms should be located on suitable non-blanket bog sites or, at a minimum, seek to improve the surrounding environment. ▪ Undertake peat slide risk assessment	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Loss of geological/geomorphological features, including designated sites/features	Wind Biomass Other Grid	C	▪ Avoid geological/ geomorphological features where appropriate or possible. ▪ Where geological features on site – explore options for enhancing features as part of development.	▪ Site selection stage
Accidental release of contaminants	Wind Biomass Other Grid	C O D	▪ Use minimum quantities ▪ Design developments for minimum maintenance ▪ Risk assessment and contingency planning ▪ Observe good pollution prevention practices during construction, removal and maintenance ▪ Design of drainage to remove contaminants before discharge ▪ Store chemicals and oils in accordance with relevant legislation and guidance such as Environment Agency Pollution Prevention Guideline 8 Safe Storage and Disposal of Used Oils ▪ Spill kits readily available and the formulation of an emergency plan in the event of a spillage.	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Soil erosion due to topsoil removal	Biomass	O	▪ Best practice harvesting methods should be used.	▪ Project operation

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Release of contaminants	Other	C O D	▪ Ground investigations should be carried out in order to avoid potential areas of contamination ▪ Good site management practices should be implemented in accordance with Environment Agency Pollution Prevention Guidelines. ▪ Full decommissioning of tanks and pipelines should be undertaken before demolition ▪ Ensure safe removal of potentially contaminated material to a suitable disposal facility/landfill site. ▪ Inspect machinery before use and regularly during their use. ▪ Use drip trays under vehicles and plant where appropriate ▪ Use of spill kits readily and preparation of an emergency plan for spillages. ▪ Potentially contaminated material should be suitability disposed of in a appropriate facility/landfill site.	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Land stability	Other	C O D	▪ Ground investigations should be carried out in order to avoid potential areas of instability. ▪ Development design techniques to minimise ground disturbance.	▪ Site selection stage ▪ Project design stage
Cultural Heritage including Archaeological and Archaeological Heritage				
Physical effects on designated, undesignated and unknown historic and archaeological resources	Wind Biomass Other Grid	C D	▪ Conform to the legislative requirements of the Historic Monuments and Archaeological Objects (NI) Order 1995 and follow the codes of practice published by the National Monument Service ▪ Carry out investigations in preferred locations prior to installation (geophysical surveys, trenching or employ a watching brief during the construction period) ▪ Avoid protected and other sites of interest ▪ Micro siting turbines away from any uncovered archaeological remains,	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation
Visual effects on the setting of designated and undesignated historic sites and features	Wind Biomass Other Grid	COD	▪ Avoid protected and other sites of interest. ▪ Design of landscaping to screen or reduce intrusion on important sites. ▪ Development design to fit more sympathetically into the surrounding landscape.	▪ Site selection stage ▪ Project design stage
Population and Human Health: Recreation and Tourism				
Potential effects on recreational sites and tourist attractions	Wind Biomass other	C O D	▪ Where possible undertake construction at times when disruption to visitors and local people would be minimised. ▪ Avoid key fishing areas (hydro). ▪ Identify and avoid popular recreational areas where possible.	▪ Site selection stage ▪ Project design stage ▪ Project EIA stage
Diversion/redirection of recreational routes (footpaths, cycleways, bridleways)	Wind Biomass other	C D	▪ Identify and avoid popular routes. ▪ Where possible, facilitate safe access.	▪ Site selection stage ▪ Project design stage ▪ Project EIA stage
Diversion or closure of recreational routes (footpaths, cycleways and bridleways):	Wind Biomass other	O	▪ Identify and avoid popular routes. ▪ Provide suitable diversions to routes where possible. ▪ Provide suitable new routes where existing routes are closed permanently.	▪ Site selection stage ▪ Project design stage

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Population and Human Health: Noise, Air Quality, Waste and Transportation				
Noise and vibration	Wind Biomass Other Grid	C O D	▪ Undertaking studies to determine site specific noise effects ▪ Minimise use of high noise emission activities such as drilling ▪ Avoid installation during sensitive periods ▪ Avoid noisy installations in noise sensitive areas ▪ Review and consideration of noise reduction techniques ▪ Fill sound insulation on plant equipment should be used ▪ "soft starting" piling activities / passive acoustic deterrents – gradually increasing noise ▪ Implement construction Code of practice such as BS5228:2009 Part 1 ▪ Equipment should be appropriately located ▪ Appropriate construction techniques should be implemented	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Air quality effects: Nuisance and health effects due to dust emissions and vehicle and plant exhaust emissions	Wind Biomass Other Grid	C D	▪ Good site management practices should be implemented. ▪ Minimise vehicle movements where possible.	▪ EIA stage ▪ Project installation
Waste	Wind Biomass	C O D	▪ Recycle aggregates/materials on site where practical and appropriate. ▪ Implement waste management programmes to reduce the production of waste on site. ▪ Treat waste materials on site where possible to reduce the need for materials to be exported off site.	▪ Project installation ▪ Project operation and maintenance
Traffic and Transport	Wind Biomass Other Grid	C O D	▪ Traffic should be managed during construction ▪ Implement travel plans for site workers. ▪ Shipping and rail should be used for goods deliveries ▪ Access routes to development sites should be assessed to ensure that the movement of large vehicles can be accommodated and suitable routes to the sites avoiding local communities and utilising large, well maintained roads should be used as much as practically possible	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Air quality - adverse localised and regional effects on air quality from biomass combustion	Biomass Other	O	▪ Stack design to reduce emissions ▪ Air Pollution Control Installation to Cut Emissions at Source ▪ Operational Best Practices (Regular Maintenance and Servicing) ▪ Emissions Monitoring	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Odour	Biomass Other	O	▪ Technical design to reduce the emission of odours e.g. emissions controls and emissions monitoring.	▪ Project installation ▪ Project operation and maintenance

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Population and Human Health: Shadow Flicker and EMF				
Shadow flicker	Wind Other	O	▪ Mitigation measures can be incorporated into the operation of the wind farm to reduce the instance of shadow flicker such as planting tree belts between affected dwelling and the turbines, installing blinds at the affected dwellings, or automatic shutting down individual turbines during periods when shadow flicker could theoretically occur.	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Electro and Magnetic Fields (EMF)	Wind Biomass Other grid	O	▪ Cable configuration and orientation can reduce field strength. ▪ Where overhead lines (and cables) installed, identify routes that maximise distances from properties where practical and possible.	▪ Project design stage ▪ EIA stage
Material Assets				
Land use	Wind Biomass Other grid	COD	▪ Consultation with the relevant regulatory body would be required prior to siting of any renewable developments	▪ Site selection stage ▪ Project design stage ▪ Project EIA stage
Mineral Resource/ Aggregates and Forestry	Wind Biomass	COD	▪ Consult with relevant bodies to identify potential areas of mineral and aggregate resource and identify options for development in areas of potential resources.	▪ Site selection stage ▪ Project design stage
Commercial and Residential Property	Wind biomass	COD CD	▪ Consultation with the relevant regulatory body would be required prior to siting of any renewable development ▪	▪ Site selection stage ▪ Project design stage ▪ Project EIA stage
Radar and electromagnetic interference	Wind other	O	▪ When identifying possible sites for development it will be necessary for developers to consult NATS and the CAA to identify whether the proposed development lies within a 'potential to interfere' area or is within any 30km consultation areas applied to airports and other aerodromes. ▪ Consultation is required with a range of telecommunications and other operators to identify where links exist and determine whether a development would interfere with those links. ▪ Ensure wind devices are lit with aviation lights ▪ Consultation with the IAA will be required and the location of wind devices supplied so they can be accurately plotted on the radar and any signals received from that area will not be confused with aeroplanes.	▪ Site selection stage ▪ Project design stage ▪ Project EIA stage ▪ Project installation stage ▪ Project operation
Agriculture	Wind Biomass Other	O	▪ Assessment of agricultural land potential in proposed area of development ▪ Assessment of the socio-economic effects of change in land use from agricultural uses to renewable energy uses.	▪ Site selection stage ▪ Project design stage ▪ EIA stage
Impacts on Communication Links	Wind	O	▪ Carry out assessment of telecommunications links in the proposed area of development. ▪ Consultation with necessary TV and other communications providers to identify essential links and assess potential for effects on these links. ▪ Explore options for changing the layout or configuration of proposed wind farm or siting of individual turbines to reduce potential effects on communications links.	▪ Site selection stage ▪ Project design stage ▪ EIA stage

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Climatic Factors				
Carbon footprint of construction activities	Wind Biomass Other grid	CD	▪ Assessment of CO_2 production as part of the production and transportation of development components/machinery/use of equipment.	▪ Project design stage ▪ EIA stage
Energy use and emissions due to the whole life-cycle of the fuel stream	Wind Biomass	O	▪ Assessment of CO_2 production from operation of the development (mainly biomass) ▪ Assessment of CO_2 production from the transportation of raw fuel sources.	▪ Project design stage ▪ EIA stage
Indirect effects due to changes in land use	Biomass	O	▪ Assessment of emissions from production of biomass crops.	▪ Project design stage

* C = Construction, O = Operation, D = Decommissioning

Table 3.3: Suggested Additional Project Level Mitigation Measures from the HRA

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Direct physical loss, damage or changes to the integrity of the habitat or non-mobile species	All Wind	C	▪ Careful site selection avoiding sites for devices and export cables outside designated areas but which are required for their continuing ecological function. ▪ Dust suppression filters and appropriate wetting of running and work surfaces should be used to prevent masking of vegetation outside construction corridors and mobilisation of nutrients into sensitive habitats ▪ Reduction in turbine numbers to avoid displacement from important foraging areas ▪ Removal of individual turbines that, because of local topographic constraints, have the potential to have adverse effects on individuals of designation species ▪ Redistribution of turbines to avoid construction and operation within significant distances of designation species nest sites	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project design stage
Direct physical damage or alteration of commuting routes of mobile species	Wind Grid	C O D	▪ Preserve commuting corridors for sensitive species in order to maintain ecological continuity of breeding/foraging areas. ▪ Refinement of wind farm configurations to provide alignments that reflect and facilitate the movements of designation species ▪ Abandonment of proposals or parts of proposals that would isolate functional areas of designation species home ranges ▪ Modifications to turbine operating conditions arising from monitoring observations, including turbine cut off under specific conditions to reduce impacts on migrant birds	▪ Site selection stage ▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance

Potential Effect	Technology	Development Phase	Suggested Project Level Mitigation Measures	Timescale
Habitat degradation and loss due to agricultural improvement	Wind	C O D	▪ Enter suitable management agreements with relevant landowners to ensure agricultural practices do not damage European sites; agreements and any associated costs to last the lifetime of the project. ▪ Monitor effects of agricultural practices during and following construction	▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Nesting habitat deterioration due to habitat changes arising from agricultural improvement or changes in stocking level	Wind	C O D	▪ Enter suitable management agreements with relevant landowners to ensure agricultural practices do not damage European sites ▪ Monitor effects of agricultural practices during and following construction	▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Emissions to water	All	C	▪ Land stripping should be done in stages to minimise the potential for concentrated, long-lasting pulses of silt to discharge into watercourses. ▪ Wetland (SuDS) ponds should be used as the preferred means of attenuating any discharge of track-sourced pollutants to watercourses.	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Changes to hydrology	Wind	C O D	▪ Maintain existing drainage patterns in bog and other wetland habitats. ▪ Avoid production of concentrated discharges from site drainage	▪ Project design stage ▪ EIA stage ▪ Project installation ▪ Project operation and maintenance
Biological disturbance	All	C O D	▪ Adopt site vehicle inspection and cleaning methods that isolate wash-off from the surrounding habitats. ▪ Consider control of mammalian predators as part of site management agreements in uplands.	▪ Project installation ▪ Project operation and maintenance

Table 3.4: Suggested Data and Knowledge Gaps and Monitoring Requirements from HRA

Data And Knowledge Gap	Survey Requirements	Monitoring Requirements
This assessment, because it has been carried out at a very strategic level with limited information in some instances, is unable to determine exactly the levels of development (MW) that could be accommodated in current areas of development before significant cumulative adverse effects would start to occur.	Where cumulative impacts on a European site are possible, project-level surveys should assess how increased generation capacity will affect the habitat continuity that is important for maintaining the ecological function of the site. Survey may be required at considerable distances from a proposed site in order to ensure that e.g. foraging potential for designated species is not impaired.	Post-construction monitoring of designation populations of breeding/wintering birds should provide evidence of population trends of relevant designation species/agglomerations relative to national trends.
Displacement effects on hen harrier have not been widely studied and the extent of displacement of breeding birds by wind farms is to some degree conjectural.	Where it is determined that there is not an effect from wind farms on the hen harrier population of a European site, a Before-After-Control-Impact (BACI) project-level survey should nevertheless be carried out, using a suitable reference site, in order to demonstrate the robustness of the determination.	Monitoring should occur in years 1, 2, 3, 5, 10 and 15; after the wind farm becomes operational where major habitat change has not been part of the process, such as in upland wind farm construction.
Variability in feeding areas of breeding seabirds from individual colonies at European sites is poorly documented.	Where relevant, routes taken by foraging seabirds over at least two years should be surveyed in order to assess potential impacts of coastal wind projects or routes for overhead lines emerging from offshore wind farms	Monitoring should occur in years 1, 2, 3, 5, 10 and 15; after the wind farm becomes operational where major habitat change has not been part of the process.
Incomplete counts, geographical coverage in remote areas of wildfowl and waders in larger sites and reduced coverage of non-estuarine habitat, where birds may use European sites at some stage in the annual/tidal cycle.	Project-level surveys to confirm abundance, distribution and behaviour of designation species that could be affected by onshore renewable energy developments including for example commuting routes.	Post-construction monitoring to ensure that developments have not resulted in changes to species behaviour or evidence of displacement resulting from e.g. habitat loss.
Cumulative effects of OREAP technologies on habitats and species in the wider countryside and their application to Natura habitats and species	Survey and monitoring at project level as determined for individual projects.	Results of project level monitoring to be formally presented to DOE Planning Service/ NIEA to feed into an assessment of observed effects on habitats and species of conservation concern as part of the planned monitoring regime noted below at 7.6.2.

4 Consideration of Alternatives

4.1 Introduction

The SEA Regulations states that the Post Adoption Statement should include:

> *(e) the reasons for choosing the plan or programme as adopted, in the light of the other reasonable alternatives dealt with.*

In identifying alternatives to assess through the SEA, the issue of whether alternatives are 'reasonable' or 'realistic' is an essential starting point. Alternatives must be within the scope of the plan and within the requirements of higher-tiered policy to be considered realistic. The scope of the OREAP is defined by the over-arching SEF. Through the SEF the Northern Ireland Executive has adopted a 2020 target of sourcing 40% of electricity consumption from renewable technologies. It sets out a number of actions including the context and need for a diverse energy mix with a range of possible onshore and offshore technologies. Within the framework of the 40% target and the OREAP, some of the possible approaches to alternatives are discussed below, with an explanation of why they were or were not taken forward.

4.1.1 Onshore Vs Offshore

The OREAP relates to onshore renewable electricity generation only and a separate Strategic Action Plan (the ORESAP) has been developed to address generation from offshore wind, wave and tidal resources. The SEF identified the need for a range of renewable energy technologies to increase energy diversity and security, and in the case of offshore renewable energy, to develop the potential economic development opportunities for NI companies associated with this emerging sector. It is not therefore a case of either onshore or offshore developments but recognising that onshore and offshore technologies will both be needed to ensure a balanced energy mix by 2020 and beyond. Consideration of offshore options as part of this SEA was not considered appropriate as the OREAP could not adopt them. Alternatives for the Action Plan therefore relate only to onshore electricity generation.

4.1.2 Technology Options

Similarly, in line with continuing to promote a market-led approach to development, DETI determined that the OREAP should not include a preference for the development of certain technologies over others for example wind vs biomass. Therefore assessing single technology alternatives with differing proportions of development from different technologies would again not influence OREAP or future development preferences. Such options were therefore not considered to be 'reasonable' or 'realistic'. It is clear however that the degree of maturity of technology options is likely to dictate the market response and hence the early need for network infrastructure.

4.1.3 Spatial Options

DETI determined that the OREAP should not include spatial preferences or exclusions; instead applications for development will be considered on a case by case basis as they are at present. This approach represents a continuation of the existing market-led approach to development. It was therefore not useful to describe the effects of development in certain specified and localised areas compared with others, as the OREAP would not take forward a preferred spatial option.

4.1.4 Temporal Options

A number of initial draft options were developed by DETI which were included in the Scoping Report. These initial options were temporal; setting out the predicted levels of generation for wind, biomass and 'other' across a range of dates. Following further consideration and comments through the scoping consultation, these were not carried forward into the environmental assessment and OREAP as they effectively represented one generation scenario progressing over time, rather than a number of alternatives.

4.2 The Preferred Alternative – Generation Scenarios

The OREAP follows a market-led approach to development. The outcome of this approachin terms of exact scale and location of development will therefore be determined by developers who will be influenced by commercial factors, planning policy, consultations, environmental constraints and market conditions.

Predicting exactly how development could proceed therefore was more limited due to the relative lack of specific detail in the OREAP regarding technologies, locations and overall levels of generation. However, in order to address this, a number of different high and low 'generation scenarios" for potential operational development by 2020 were developed, as below, and assessed in the Environmental Report. As noted in Section 1.2 above, with respect to wind approximately 900MW had been consented in Northern Ireland by the time of publication of the ER. The Low scenario for wind can therefore be considered to be a do minimum scenario.

Table 4.1 Generation Scenarios for Operational Capacity

	Low Range	High Range
Onshore Wind	800MW to 1000MW	1000MW to 1200MW
Biomass	30MW to 100MW	100MW to 300MW
Other	30MW to 100MW	100MW to 200MW

5 Monitoring Framework

5.1 Introduction

It is a requirement of the SEA Directive and the Environmental Assessment of Plans and Programmes (Northern Ireland) Regulations 2004 that the responsible authority (in this case DETI) monitors the significant effects of the implementation of the plan or programme for which it has carried out the assessment. Part IV (16) of the Regulations 2004 states that the responsible authority '*shall monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and undertaking appropriate remedial action'*. The following is the proposed framework for monitoring the environmental effects of implementing the OREAP. This is based on the information provided in the Environmental Report and takes into account the consultations responses and the recommendations of the HRA.

The main focus of a monitoring framework is to set out measures that could be used by DETI to monitor the implementation of the OREAP and the effects that it has on the environment. There are two ways in which the effectiveness with which OREAP delivers the plan level mitigation can be monitored:

- Direct monitoring of the individual actions that comprise the **plan level mitigation measures;** and
- **Monitoring for potential significant environmental effects** to the environment through the implementation of OREAP at the later **project stages** over the coming years.

Each of these is discussed below.

5.2 Monitoring of Plan Level Mitigation Measures (Monitoring the Implementation of Actions)

Proposals for Monitoring the OREAP are set out in Chapter 6 of the OREAP:

> *"As regards the strategic level monitoring of the implementation of OREAP, DETI will produce a mid- term report on progress against the planned actions and any revised actions coming forward for the remaining period. This report will be considered by the SEIDWG (Sustainable Energy Interdepartmental Working Group) and will also be forwarded to the (Enterprise, Trade and Investment) ETI Committee and placed on the DETI website."*

Each of the actions has specific deliverables which will need to be achieved in order for the mitigation measures to be effective. The suggested approach to monitoring the plan level mitigation measures is therefore based on carrying out periodic reviews against the timescales for the delivery of the individual actions. Where actions have not been delivered, further reviews will be required to identify reasons why they have not been delivered and the implications that this has on the delivery of individual projects.

Suggested deliverables to be monitored for each of the actions and related timescales for their delivery are presented in Table 5.1.

Table 5.1: Monitoring Framework – Plan Level Mitigation Measures

Action	Deliverables to Monitor	Timescales for completion of action
Action 1DOE/ NIEA to review studies on impact of wind farms on biodiversity	▪ Outcome of the Review, informing consideration of need and scope for any further work at regional level.	**Review to be completed by March 2014.**
Action 2: Monitoring of Onshore Renewable Electricity Projects	▪ Submission by DOE Planning of annual planning monitoring report of onshore renewable electricity projects.	**First report to be submitted by March 2014 and then annually for the life of OREAP to 2020.**
Action 3:Grid Development	▪ NIAUR to work with NIE, SONI and DETI to facilitate the development of a future proofed grid to handle increasing levels of renewable electricity to 2020 and beyond.	**Ongoing consideration of NIE and SONI plans by NIAUR through the Regulatory Price and Price Control processes for the life of the OREAP and beyond.**
Action 4: Coordination between the OREAP and ORESAP	▪ DETI to ensure coordination of the delivery of the OREAP and the ORESAP and ▪ Subject to resources commence a socio-economic analysis of renewable energy.	**Ongoing and analysis to commence in 2013-2014.**
Action 5: Compliance with EU EIA and Habitats Directives	▪ DETI will work with DOE, in its lead planning role, to ensure onshore renewable energy projects comply with the EIA and HRA Directives. ▪ Specific statements to be included in the OREAP illustrating its commitment to requiring all developments taken forward under the OREAP to comply with the EIA Directive and NI Regulations and the Habitats Directive.	**Ongoing Completed; commitments given in the final OREAP.**

5.3 Proposals for Monitoring the Environmental Effects of Implementing the Plan (Project Level Monitoring)

Section 6 of the OREAP outlines its approach to project level monitoring:

> "*As regards the monitoring for potential significant effects through the development of onshore renewable energy projects in due course, the SEA identified the key issues which would need to be addressed at project level along with proposed mitigation measures.*

The monitoring and reporting procedures for individual projects, outlined in Chapter 5 and on which DOE will report to SEIDWG will also feed into the monitoring of cumulative environmental effects as required within the SEA process."

OREAP Action 2 incorporates a commitment within the plan to undertake monitoring. DETI and the DOE already work together through the Planning and Renewable Energy sub-group of the SEIDWG and a key action for the sub group will be to seek an annual monitoring update from DOE Planning Service throughout the life of the OREAP on number/size /location of applications received, those approved and rejected and total planned installed capacity. This will be cross referenced to actual deployment levels. This monitoring framework will be important as deployment rates increase, particularly of onshore wind, and will also include consideration of key cumulative effects identified in the ER and in the HRA. This will assist the identification of potential significant adverse effects before they occur and will inform the ongoing consenting of individual developments by DOE. The first report will be made by March 2014.

Therefore, in addition to monitoring the delivery of the Actions set out in the OREAP it is also necessary to carry out ongoing monitoring of the key receptors (SEA topics) where the assessment identified likely significant adverse effects could occur. However, due to the uncertainties in terms of where future developments will be located and the precise nature of those developments e.g. type of technology and scale of development, the requirements for monitoring presented below are very high level.

Table 5.2: Suggested Monitoring Measures for SEA Topics

SEA Topic	Proposed Measures
Biodiversity Flora and Fauna	Protected sites and species are monitored with regards to their conservation objectives. Any increase in unfavourable/favourable conditions will be monitored in conjunction with the implementation of renewable energy developments as well as any habitat loss/increase.
Landscape and visual	Potential effects of onshore renewable energy developments on landscape character and visual amenity.
Archaeology and Historic Built Environment	Historical sites (monuments listed buildings, archaeological sites etc) should be appropriately documented where they are lost or relocated as a result of the implementation of onshore renewable energy developments.
Water	Water quality will be monitored by the NIEA under the requirements of the Water Framework Directive (WFD). Where the implementation of onshore renewable energy devices will result in modifications to services associated with infrastructure such as sewers or pumping stations further studies should be carried out to ensure these are not impacting on the water quality of water features within Northern Ireland.
Soils	The condition and quality of designated sites of geological importance (ASSIs) is subject to ongoing monitoring. This should be reviewed in conjunction with the implementation of onshore renewable energy developments.
Population and Human Health	Potential effects on noise levels, local air quality, waste and shadow flicker associated with construction activities and the operation of onshore renewable energy projects would need to monitored as projects progress, especially where a number of projects are clustered in the same area/location.
Material Assets	Potential effects on material assets (land use, agricultural land, mineral resources, business / private property, forestry) associated with construction activities and the operation of renewable energy projects would need to monitored.

SEA Topic	Proposed Measures
Climatic Factors	As developments progress, the carbon offset/emissions of various technologies should be monitored in order with regard ensuring developments contribute towards reducing CO_2 emissions. This is of particular importance for biomass developments where the transportation of biomass fuels could potentially lead to increased CO_2 emissions.

5.4 Review of the OREAP

The OREAP will be reviewed in 2016. The review will include progress against all actions identified in the OREAP and against the 2015 Programme for Government targets and will consider any further intermediate targets from 2016 to 2020. It will also consider the outcomes of the DOE monitoring noted above, the need for any corrective action or change of direction and consideration of the potential need to review any aspects of strategic level findings and recommendations of the SEA or AA of the OREAP in light of emerging developments. There will be a further review/post project evaluation of the OREAP post 2020.

ETI Committee Hansard Transcript of the Fermanagh Trust briefing on Wind Energy Developments

Northern Ireland Assembly

Committee for the Environment
Room 375
Parliament Buildings

Tel: +44 (0)28 9052 1614

To: **Sheila Mawhinney**
Clerk to the Committee for the Environment

From: **Jim McManus**
Clerk to the Committee for Enterprise, Trade and Investment

Date: **31 January 2014**

Subject: **Fermanagh Trust - community outcomes from wind energy developments and the benefits of community energy**

At its meeting on 23 January 2014, the Committee for Enterprise, Trade and Investment considered an oral briefing from the Fermanagh Trust regarding community outcomes from wind energy developments and the benefits of community energy.

Members agreed to forward the Official Report to the Committee for the Environment for information.

.

Jim McManus
Clerk
Committee for Enterprise, Trade and Investment

Committee for Enterprise, Trade and Investment

OFFICIAL REPORT (Hansard)

Wind Energy: Briefing by the Fermanagh Trust

23 January 2014

NORTHERN IRELAND ASSEMBLY

Committee for Enterprise, Trade and Investment

Wind Energy: Briefing by the Fermanagh Trust

23 January 2014

Members present for all or part of the proceedings:
Mr Patsy McGlone (Chairperson)
Mr Phil Flanagan (Deputy Chairperson)
Mr Sydney Anderson
Mr Sammy Douglas
Mr Gordon Dunne
Mr Paul Frew
Mr Fearghal McKinney
Mr Mitchel McLaughlin
Mrs Sandra Overend

Witnesses:
Mr Lauri McCusker Fermanagh Trust

The Chairperson: Briefing the Committee today is Mr Lauri McCusker, the director of the Fermanagh Trust. Lauri, you are very welcome to the meeting. Thank you for hosting Phil and me on our visit down to Enniskillen that day. It proved to be useful and informative and, of course, very hospitable, too. I presume that you have been informed about the way in which we work in the Committee. You have up to 10 minutes to present the stuff, and then we will have questions from members. The floor is yours, Lauri.

Mr Lauri McCusker (Fermanagh Trust): Thank you, Chair and Committee, for your invitation. The Fermanagh Trust is a charity. We are interested in supporting and promoting initiatives that lead to social and community development. As a registered charity, we do a number of things. We manage a range of funds, projects and programmes dedicated to strengthening and improving local communities and finding solutions to community needs. We are interested in the whole issue of how communities engage with renewable energy developments, particularly advancing the concept of community energy. That is one productive way forward for communities to address some of the challenges they face.

Communities have a very important role to play. The Department has a very ambitious target of achieving 40% of electricity consumption from renewable sources by 2020 and moving to a low-carbon economy. It is recognised in that commitment that there needs to be changes to the way that we, as a society, generate, buy and distribute our energy.

The Fermanagh Trust is not coming at this from the perspective of lack of knowledge. We have been working with a number of wind farm companies over the past six or seven years, managing funds, advising companies about their roles and liaising with local communities. These experiences prompted us to further explore the issues surrounding how communities can engage specifically with

wind energy. In January 2012, with the support of the Building Change Trust, we published a very extensive research report looking at how developers engage with local communities and how government, local government etc engage in that issue.

The report, launched two years ago next week, includes 11 recommendations for communities, developers, local government, government and different Departments here at the Assembly. Since then, we have had numerous discussions with various stakeholders about how they can advance those recommendations. Hopefully, you will see in the next couple of minutes how some of them have been moved forward.

The Fermanagh Trust is also a member of the Community Energy Coalition, which has been working extensively with the Department of Energy and Climate Change (DECC) in recent months on the production of a community energy strategy that is due to be launched in London on Monday. We are very excited about that initiative.

Why is the role of communities important? Communities have a proven track record. I see from your agenda that the credit union movement will be talking to you later today. That is a movement across society that has actively organised on a voluntary basis to make a real difference to people's lives. There are other community initiatives across the country, be they playgroups, childcare or enterprise centres, where communities have organised themselves to make a real difference.

The Fermanagh Trust wanted to look at the role of social enterprises in the community; so, last year, it surveyed social enterprises in County Fermanagh. Of the 39 social enterprises we connected with, we found that they had created 429 jobs in Fermanagh. These are only the ones that we connected and did research with. So, communities can and do make a difference economically, societally and environmentally.

When it comes to energy, communities are not playing an active role, and there is something missing. So, we looked at good practice elsewhere to see what can be achieved. There are two issues that I really want to address: community benefits and community energy. In the paper that we submitted, you will see that community benefits present an opportunity to contribute to rural development, particularly in respect of wind farms, because the vast majority of those are in rural areas going from Ballymena across Limavady and into, in particular, west Tyrone and Fermanagh.

The relationship between developers and communities has generally been about securing planning permission. Generally, communities are informed about wind farm developments three or four weeks before the planning application is submitted. So, communities are not actively engaged over a long process about the development of significant projects. The research that we completed for the study looked at that and at good practice in how communities are benefiting. One of the issues that we looked at was community benefits.

We found that communities here traditionally have not benefited significantly from community benefit funds. Since we published the report and discussed it with a range of stakeholders, we have seen a number of developments. A number of councils are now producing community benefit protocols. The first ones to do so were Strabane and Omagh district councils. They recently produced their protocol, and the draft went out for consultation towards the end of last year. Fermanagh council has followed suit. Those protocols recommend a community benefit fund of no less than £5,000 per megawatt.

In Northern Ireland, we have the Northern Ireland Renewables Industry Group (NIRIG), which is the voice of the Irish Wind Energy Association and RenewableUK. Last year, NIRIG produced the protocol document, the community commitment protocol, which recommended that a community benefit scheme should receive support equivalent to the value of at least £1,000 per megawatt.

Scottish Renewables, the umbrella group in Scotland, has produced its protocol, which agrees that onshore wind developers in Scotland should deliver community benefit of £5,000 per megawatt, or equivalent, for all new wind farms over 5 megawatts. The difference between Scotland and Northern Ireland, and many of the people involved in the industry or in the same businesses, is the difference between £1,000 and £5,000.

RenewableUK has recently produced a paper, in England only, which says that signatories to the protocol agree to provide community benefit schemes in connection with eligible onshore wind schemes of no less than £5,000 per megawatt. Do not forget that that organisation is part of the voice of NIRIG.

It is interesting to see that movement in the industry and the movement and the protocols being produced in Omagh, Strabane and now Fermanagh. The most recent developments by two of the industry groups are by two of the developers in Northern Ireland, as the paper outlines. Renewable Energy Systems (RES) has announced its scheme of up to £5,000. That is particularly welcome, because it includes a local electricity discount scheme. The most recent announcement was by SSE Airtricity, which has decided to increase its community fund for all newly constructed projects to £5,000 per megawatt. So, there are some interesting developments by a number of the big developers here, following what is happening in Scotland and England.

If you can imagine a 20 megawatt wind farm, then the difference between £1,000 per megawatt and £5,000 per megawatt going into the community is £80,000 a year. If that is index linked with inflation, it will be £100,000 a year, which, in 25 years, will be £2·5 million, compared to £0·5 million. So, at a time when rural communities are facing issues over the rural development programme moneys, the decrease in EU moneys and the challenges they are increasingly facing, think about the difference that this would make in places such as Fermanagh, Strabane, Omagh and Limavady. It is about communities being able to go into a bank and say, "We've got £100,000 guaranteed for the next 25 years. We want to build x, or we want to do the following. Can we get a loan?" Compare that to £0·5 million over 25 years. Community benefits can be extremely significant, and good examples, which I have outlined, do exist in other areas, including Scotland.

The second related, but distinct, theme is community energy, which can be broken down into four strands: reduce, manage, generate and purchase. The emphasis of community energy projects is on local engagement, leadership and control, and project outcomes which benefit local communities. A wide range of community energy projects exist. We have a particularly strong area in the theme of reducing, with respect to energy efficiency and behaviour of change. We have a number of initiatives, such as the warm homes scheme etc, which are backed by government and are trying to deal with that.

We do not have so much development in Northern Ireland around manage, generation or purchase. However, we have been engaging with specific examples of local community energy projects. The Ballymena cluster's wind energy project is very exciting. It is an initiative by Ballymena District Council, which plans to put up four turbines across the Ballymena district that will be owned by the community. Work is also being done by the Cloughmills community action team, the Rathlin development association and the Carntogher community association, looking at community energy. The first energy cooperative, the Drumlin wind energy cooperative, has successfully secured £2·5 million in fundraising to put up a number of turbines in Northern Ireland. So, things are starting to happen that are being driven by local communities, but there is no support mechanism in place for that to happen. Developing community energy is a real challenge. There is not necessarily technical or financial support in place and that is something that we need to look at.

The Scottish Government have a target of producing 500 megawatts of community energy by 2020 and they have put infrastructure in place to help achieve that. That is on the generation side of things. There are 360 community energy projects in Scotland and there are five in Northern Ireland that we have researched.

Other countries have also recognised the importance of community energy. Forty six per cent of all energy produced from renewables in Germany is from community energy initiatives. The Danish Government have legislated that 20% of any wind farm development, for instance, must be offered to the community so that community organisations and individuals can buy in.

As the paper outlines, we have looked at government policy here and in GB. There have been a number of interesting developments. The Committee for Enterprise, Trade and Investment, in conjunction with DOE and DARD, commissioned a piece of work in December 2012 and January 2013. The recommendations from that are outlined in appendix 3 of our paper.

Under the leadership of Minister Alex Attwood, DOE held a planning and community benefit summit in June 2013. That is referred to in our paper. We are still looking forward to seeing how the agreed next steps from that summit are going to be taken forward. Most recently, DARD and the Forest Service appointed a wind farm development manager who has been seconded from the Strategic Investment Board. We are very hopeful that the good practice initiated by Forestry Commission Wales and Forestry Commission Scotland, which involved local communities in the design and development of the utilisation of forest estates, can be followed here.

In our document we outline what we believe is a series of actions that, if considered, could make a real difference in advancing community energy. We need a coherent vision and we need to embed community energy in policy. There is nothing in any of the policy papers that we have looked at. In appendix 4 to our paper, you will see that the different Departments — DETI, DOE, DARD, DSD and OFMDFM — all have a role in this area. We think that, under the Delivering Social Change framework, there is a real opportunity to bring some joined-up thinking.

We know that energy is increasingly going to be a core issue for society in the years to come. How do we get communities involved? How do we ensure that they play a part in solving the issues rather than having solutions imposed on them? Having looked at northern Europe, we can see how that can be achieved. We need to advance policy here and think about the issues. It can be done and it is being done elsewhere. We think that the opportunities and environment exist now to do something positive.

The Chairperson: Thank you very much for that, Lauri. We all know about commitments to renewables and the likes of that, but wind power can become very contentious depending on the area that it is in. I have one particular case in mind, which is a massive development in the Sperrins, the likes of which has not been seen in the North or, perhaps, even on the island, before. How do you feel the balance has to be drawn between what you outline correctly as the community benefit, which some can perceive as being a bribe depending on where it is going, and the flip side, which is the perceived or visual environment and indeed the tourism economy? A massive development — in this instance, 60 huge turbines — could be seen as being a visual blight on the Glenelly valley, an area of tremendous tourist attraction. Do you feel that a balance can be struck, or are we indeed being led to the point where areas should be designated as being turbine free?

Mr McCusker: Let me deal with the issue of bribes. Let us put this to bed. If you look at the UK — Scotland, England, Wales and Northern Ireland — you will see that Northern Ireland has the lowest level of community benefits but the highest level of consent rates for onshore projects. In fact, the UK consent rate for onshore projects varies from 60% in Scotland, which has the highest levels of community benefit, to 80% in Northern Ireland. So, are community benefit funds a bribe? Well, the bribe does not work in Scotland. That is clear.

As an organisation, the Fermanagh Trust is pro-community, not pro- or anti-wind. We need to get a balance. It is difficult. How do you get a balance between achieving those ambitious targets and impacting on communities? The further you go in achieving the targets, the more likely it is that this will impact on communities because it has to get closer — prime sites will become increasingly scarce. The lovely apples at the bottom of the tree are being picked off by developers, who will then have to go into the more challenging areas. It is very challenging.

There is potential under RPA and through the role that local councils will have in planning and, in particular, the community-planning agenda. Councils will be at the heart of planning, and community planning will be an integral part of delivery. Significant questions need to be asked of the new councils about the areas they will designate, or set aside, for potential wind farm development. It is about getting the balance between needs, targets and local community voices.

As I said, the track record here is that consent rates are, largely, very high. We recognise that, in recent years — particularly in the past year — the increasing anti-wind farm movement is establishing itself and is getting organised. However, an awful lot of wind farms — the vast majority — that come through the planning system are still successful. I am not saying that this will definitely solve the situation, but if it is built into RPA, local councils and the community-planning role, that may be one way to deal with local objections and thoughts. Some land needs to be set aside.

The Chairperson: OK. That is grand. Thanks very much for that, Lauri. I will not even ask you to define "community", because one person's community is another person's group of neighbours down the road.

Mr McCusker: Absolutely. There were a few at the community meeting that I was at last night. I agree with you on that.

The Chairperson: A number of members wish to speak.

Mr Dunne: Thanks for your presentation, Lauri. It was very interesting. What happens if you are approached by a group of local people who have formed a community and are opposed to wind turbines in their area? How do you approach that situation?

Mr McCusker: I have been approached.

Mr Dunne: They are probably looking for your support in opposing what is probably a major planning application.

Mr McCusker: We have been approached previously regarding that. Are you talking about a local community?

Mr Dunne: Yes.

Mr McCusker: If there is consensus in a community and it is bona fide — if it is done through the community association, which is bona fide and which holds its AGM — and that group has taken soundings in its community and the members of that group, whether it is a village-based or town-based community group, are objecting to the wind farms, I think we would have a discussion with them. The Fermanagh Trust would not put resources into helping them fight their case. We have not been asked to do that in the past, so it is an issue that we have not faced. If a community is genuinely concerned, and it is shown that that concern has the general support of the broad community in that area, it is right that that community should be able to put its case forward. That is democracy. They would not only engage with the Fermanagh Trust, they would be more likely to engage with politicians from across the political spectrum about that case. That is the forum that they are likely to take it forward in, through the local councillors and MLAs etc.

Mr Dunne: How do you see yourselves on renewables? Are you pro-renewables? Are you promoting renewables as part of —

Mr McCusker: No. We are pro-communities. If a community organisation came to us and said that it was interested in advancing a community energy project and it had the support of a bona fide group or organisation, we would be supportive of that.

Mr Dunne: To step back to the group that is opposed, would you perhaps set up a meeting with the developer of the wind farm, whom you probably know through your activities? Would you set up a meeting with them and try to sell the idea to the local community?

Mr McCusker: No.

Mr Dunne: It is not your role.

Mr McCusker: I do not see our role as selling or not selling.

Mr Dunne: So is your role about getting financial benefits for the local community? Is that really the main part of it?

Mr McCusker: Our role in this theme is trying to ensure that communities and host communities of developments benefit — we are talking about community benefits here — that they are well informed and that they see what good practices exist elsewhere. It is not a relationship where the private sector can come and deal with a community that has not been informed about the opportunities and examples of good practices that exist elsewhere. It is ensuring that communities benefit, if they are interested in benefiting.

Mr Dunne: Have you been successful in Fermanagh? Take the Lack project, which I am familiar with and have driven past. It certainly has quite an impact on the village. How has that fitted in with the local community and what benefits has it got from it? Were you involved in selling that project to the locals?

Mr McCusker: No, we were not involved in selling that project. Our involvement in that project was that we did some work with the developer to help them administer their grants for a number of years. I am delighted that the people who own that wind farm announced before the Committee towards the

end of last year that they were upping their community benefits fund to £5,000 per megawatt. I would love to see them do that retrospectively in Lack, from the approximately £1,000 per megawatt that they currently put into that community, but I do not think that is going to happen. I see part of our role as being to encourage and prod people in the direction of raising their funds from £1,000 to £5,000 per megawatt in that instance.

Mr Dunne: What benefits has Lack got out of it?

Mr McCusker: It would depend on who you talked to in the community and who has been successful in applying for the funds. In the Lack area, we have seen some infrastructure. Some community halls and Orange halls etc have benefited by getting energy efficiency measures put in, new doors, windows, loft insulation and those things. We have seen some sports facilities being developed in the Lack, Ederney and Kesh area. So some funding has got into grass-roots community development initiatives, which is a positive thing.

Mr Frew: Thank you very much, Lauri, for your presentation. It was very informative. I am very aware of the project in Ballymena, which is being led by the community. Over the years, we have seen cynicism and scepticism from the communities about wind farms, which I share. There is a world of difference between a wind farm and a single wind turbine application. There are other ways of having them: a cluster or a community group could have four turbines in strategic places or a large wind farm on the side of a scenic hill, which can have all sorts of repercussions in the community.

The wind farm companies have not clothed themselves in glory up to this point, because, when they submit a planning application, they talk about community benefits and giving a payout to the community. When connected to a planning application, that looks, feels and sounds like a bribe. Should the wind farm companies have a direct bearing on the community fund aspect, or should it be led solely by government laying down the parameters and the rules?

Mr McCusker: Should it be led by government? We could go into energy policy and what drives the wind farm developers to that position and how the planning environment encourages planners to help meet government targets.

Should government have a role in setting targets? We build all our cases on good practice. Good practice comes when government produces guidelines, but, if community benefits are seen as another tax, that process will not be very productive. Government should signpost and encourage what DECC in London, the Scottish Executive and Welsh Assembly Government have done, namely provide good guidance and practice. For example, in Scotland and Wales, through the utilisation of the land bank in the forest estate, a high benchmark has been set for how government sees communities benefiting.

Mr Frew: Surely, if government were setting a standard, a bar or even a restriction on wind farm companies, at least they would all know what they had to aim for and at least the communities would know that bribery is not taking place. That way, people know what the law is and what companies have to do, so it would not be as if they would have to lead us by the nose or bribe us. It would be law that they provide a certain amount of a community fund for a certain time.

Mr McCusker: That has merit. The big Scottish councils have gone down a different road that the likes of Omagh, Strabane and now Fermanagh district councils follow when setting protocols. That needs to be investigated a little bit further on the legislative side.

Mr Frew: It also takes the pressure off the companies because, if they cannot affect the process, they cannot be accused of bribery.

Mr McCusker: That is a valid point.

Mr Frew: I am looking at the Cambridge Community Foundation, which is involved in the Wadlow Wind Farm Community Fund, which is a 26 megawatt wind farm. That supplies the equivalent of 15,000 homes or 29% of the houses in that district. There is an annual payment of £39,000 into a fund. Does that look like good practice or the right amount?

Mr McCusker: No.

Mr Frew: As the question is raised about what community is, what restriction should be put in place as regards miles around a wind farm? Should it be 5 kilometres or 10 kilometres away? If you can see it, should you benefit from it? Also, what community projects should that project fund? Should there be restrictions on what that money should go to, such as home efficiencies or a play group, or should it just be open to the whole community to apply?

Mr McCusker: Before you argue about how the cake is cut up, we need to make sure that the cake is attractive. Sometimes we get into discussions with developers or local communities around that very theme. For me, first of all, it is about making sure that the cake is attractive enough. You can then have very good discussions because there is a big difference between a £5,000 per megawatt fund for a 20 megawatt wind farm and £1,000. You are in a different place if you are talking about £2·5 million or £500,000 over 25 years, and you can do different things.

The question is "What is a community?". If you build a wind farm between Belcoo and Boa, is the community within a six-mile radius? Should it include Belcoo, should it include Boa? It depends on the wind farm, the geography and the connection of people to that place. You cannot put in any of these developments that it has to be a 10-mile radius: that could take it into Enniskillen, and the people of Enniskillen might have absolutely no connection and would never see the wind farm unless they were driving to Donegal or wherever. Circumstances depend on the development and where it is located.

Mr Frew: With that surely come difficulties. You could leave a group out, you could leave a constitutional group out or an area that may well be across the network with regards to the cabling. That still has an impact. How do you ever square that circle and make sure there is fairness?

Mr McCusker: It has to be squared by proper engagement with the communities in that area. You cannot legislate for that because circumstances will change in every development.

Mr McKinney: I would like to take up Paul's theme. I like the concept of community benefit. Too often, some of our multinational profits go out of a pipe from Northern Ireland and into a bank account in London and we do not get to see the benefit. That notwithstanding, there are issues. How do you define a benefiting community in the context of the siting of a wind farm?

Mr McCusker: If you believe that there is a social justice issue for host communities, determining how the community benefits and what that looks like is part of the engagement between a community and a developer.

Mr McKinney: What is the community?

Mr McCusker: In terms of community interest or geographical community?

Mr McKinney: Whatever. Who will benefit? Once you put new doors on the Orange hall or lag it or whatever or the GAA hall or whatever it happens to be — just to be clear and reflect all the communities — and given the vast amounts of money involved, there will be an interest in where the money is going thereafter, so how do you define that benefiting community?

Mr McCusker: I would define it in the same way as government, for instance, delivers its neighbourhood renewal strategy. It goes to the community and says, "We have a pot of money. How do we as a community decide to utilise that pot of money to make a difference in the community? If the pot of money is £1·5 million, what are the priorities in this community and how do we address them using this money?".

Mr McKinney: I will just take up your cake analogy because you said that you needed the cake to be attractive. Before I bake a cake, I need the ingredients and, as 'The Great British Bake Off' shows, even the experts can make a bad cake and at the end of that there is nothing to cut up, it is badly cut up or it does not taste right. The matrix or dynamics have to be sorted out in the first case, so I still have not got the answer. Take Paul's point about whether you benefit from a wind farm if you can see it. If the cables come near you, do you benefit from it? I will get to this in a second, because I just want a definition of the benefiting community first of all, and then we will move on to the money and how it can be best spent. The first point is this: how do we actually get the community defined so that people, over a 20- to 25-year period, are satisfied that they are ultimately getting the best benefit. You

are using two words — community and benefit — and, to me, one is as important as the other. It is important that the benefit is defined as well.

The Chairperson: Can I come in on the back of that? There is a plethora of community groups where I come from and there are a number of halls. Some of those halls may be used part of the time or all of the time; some may be used by one or other section of the community. How would you answer the question that, if you want real community benefit that affects everybody, it is the price of their electricity?

Mr Dunne: That is cross-community.

The Chairperson: That is cross-community; that is total community, with the exception of the person using the tilley lamp.

Mr Mitchel McLaughlin: Our community is quite often very cross.

Mr McCusker: There are many examples of how communities do this, and I will go back to the example. If we take the Callahan wind farm in Fermanagh, which is close to Cashel, Garrison and Belleek but is not close to Derrygonnelly, the community of benefit in that area is Cashel, Garrison and Belleek and the community organisations there. We facilitate that fund, and we have discussions with the community around how they would like to see that fund utilised over time. Our discussions are about what they would like to see in the next five years. Then, on an annual basis, we put in place the way in which that fund will be distributed to meet those objectives. It is about consultation and engaging with the organisations on how the benefits of that wind farm are utilised in that area.

Mr McKinney: Yes, but we still have not defined the benefiting community. You have, in that very specific geographical area, but this is a growing industry. I am not being negative; I am trying to be constructive. As it grows, its footprint will extend, and we need some kind of definition around the benefits. In other words, do you limit them, as mentioned earlier, so that they must be in those areas only? How do we define those things — the benefit and the community? I am not really getting anything specific. How do we get a theme or a plan that allows for this to be rolled out in a general sense so that people can understand how it will benefit them?

Mr McCusker: In some places in Scotland, they have divided the community benefit funds of £5,000, and half of it goes into a regional pot to support community energy initiatives across the region. The other half goes to local communities, and, following community engagement, they use it to benefit local communities and projects. They could be community development projects or energy efficiency projects. In that instance in Scotland, it has been decided that half goes into a regional pot to help put in place funding and packages to develop community energy funds, and the other half goes to local projects. It is up to the local community or the advisory groups that have been set up in those areas to decide how that money will be administered for the benefit of that community, whether it is on energy efficiency, sports development, youth development, senior citizens' groups or whatever. It is up to the advisory groups in those areas to define how they want their community to benefit.

Mr McKinney: I have a further point. How do councils relate to this in the longer term? Do they start to subtract what they would otherwise have provided for the community and, therefore, reduce the community benefit because what they would have funded is not being funded by them? Are there protections to be considered in that case? Has that been thought about?

Mr McCusker: The way in which the community benefit fund will be drawn up and utilised during that period can be built into the memorandum of understanding.

Mr McKinney: Finally, although I am not yet satisfied that the community benefits are defined, will the local community take all decisions around accountability or could wider accountability mechanisms be built in?

Mr McCusker: If the community benefit fund is to come from it, the company has to be happy with how that money is distributed.

Mr McKinney: In sums of the size that we are talking about — in the Scottish model, we are talking about £4·5 million to £5 million — it must surely be more robust than that.

Mr McCusker: I know that funds that have gone into environmental projects in schools have been overseen by the school authorities. The Charity Commission will also have a role if money goes into local charities. So, it depends on where the funds are going and the protection that there is around those organisations.

Mr McKinney: That is what I am talking about; it is around accountability. I am not being negative towards the concept. I would just like to make sure that we will not be asking questions in 10 years' time about where or how money was or was not spent.

Mr McCusker: In the Fermanagh Trust case, where we have been involved in distributing resources, the bona fide organisations are accountable. So, Tom and Harry cannot just apply and get £1,000 or £5,000.

Mr McKinney: That comes back to my point about defining communities.

Mr McCusker: Yes, OK.

The Chairperson: Just getting back to Joe, Tom and Harry, what about my point regarding the reduction of electricity prices?

Mr McCusker: I am not here to speak on behalf of any developers. However what Renewable Energy Systems has done in its local electricity discount scheme is an interesting and exciting initiative. Householders within the radius of the wind farm will benefit from a local electricity discount. That is encouraging, because those in the vicinity can say, "You know what? When that turbine is going round and round, I know that I am benefiting in this house". What is the relationship between the community and those turbines? Well, in that case, the company has agreed that the relationship is that the community will enjoy a discount on electricity.

The Chairperson: To get it in proportion, what is the level of discount?

Mr McCusker: It depends on what RES, as a company, has agreed, and I do not have the papers in front of me —

The Chairperson: That is OK.

Mr McCusker: — but it has announced that its community benefit fund is £2,000 per megawatt. In addition, the local electricity discount scheme will bring its total fund up to £5,000 per megawatt. So I suppose that the size of the discount depends on the number of households in an area and how RES defines the area to benefit from that local scheme.

The Chairperson: I am not imposing anything on you, Lauri, but it would be helpful if you could signpost us to where we can get that information.

Mr McCusker: Absolutely. I will definitely come back to you on that.

Mr Flanagan: Thanks for your presentation. Fermanagh Trust has played a very useful role in this. It has really started a discussion on what is a huge issue. Community benefits in other parts of these islands are at much higher levels than they are here. It is good to see that the argument started by your organisation has helped to address that, because we have seen changes made by some of the developers. However, the Fermanagh Trust has been administering community benefit schemes for a while. To date, what projects have been funded through community benefits from wind farms?

Mr McCusker: Our most recent grants from the Caledon wind farm fund were in December. Approximately 13 projects benefited in that round. They included helping the senior citizens' group in Cashel with equipment and furnishings; environmental initiatives such as organic gardening in four local primary schools; church-based projects in the area; and covering about 40% of the cost of Garrison youth group's summer scheme. So the initiatives differ, but that is what the community in that area wants. They want to make sure that a lot of the groups benefit from the funds. A weighting is given to environmental and energy efficiency initiatives in community buildings etc, but it is not exclusive. All other groups can benefit.

Mr Flanagan: That is using smaller historical funds that have been done at a much lower rate. What future opportunities exist if community benefits are to be paid out at a much more substantial rate? Could you do things much more imaginatively and proactively?

Mr McCusker: The most exciting side of community benefits is where it links to community energy. We have already seen examples in Scotland. One case study is mentioned in the pack in which the community benefits are not necessarily all taken out; they are put into the community buying a share in the wind farm development. Rather than taking out the £2·5 million or £3 million, it is reinvested, and the company opens up the opportunity for the community to get a piece of the action through the annual profits. Those are all models in Scotland. That is where the exciting opportunities lie for linking community benefits to community energy. Communities can start to take a longer-term view of a further income stream. That may not be of interest to all communities. If communities have a £100,000 fund over 25 years, they can discuss things such as spending £100,000 on a play park. They can start gearing up for a community plan in their area and decide how that money can be utilised. If the community needs a venue or a hall or whatever or if it needs to put a new roof on, it can plan out. It is in a much stronger position to plan out how the benefits can be utilised because they can go to the bank and say, "Look it, next year, we will have another £100,000. Will you give us 3·5% interest?" or whatever. They can get things done now through having that sort of high-level agreement in place.

Mr Flanagan: Are there legislative differences between here and Scotland that facilitate that type of community energy?

Mr McCusker: No.

Mr Flanagan: What differences are there? What do we need to do here to move us to that level?

Mr McCusker: You need to make it a priority in your discussions. You need to give the same signpost as the Scottish Executive and councils have given, which is that it is an expectation. You need to follow the leadership that your elected colleagues in Omagh and Strabane across the political parties have shown by producing that protocol. Basically, it is saying to the companies, "Do you know what? If you want to do business in this area, this is the guidance that we are issuing". Very strong leadership has been shown across all the political parties.

DOE etc are waiting to see the community energy strategy, which will be launched in London on Monday by DECC. I encourage you to not wait a year or 18 months to put in place an action plan but to put in place a community energy strategy and action plan here as quickly as it can be achieved. You, as an Executive, could open up the forestry estate. Look at the models of good practice in Scotland and Wales for how you engage communities and how communities benefit. Put that at the core rather than as an add-on at the end. Models of good practice can be followed. We need joined-up thinking. Five or six Departments are involved in the whole community energy area. It needs to be joined up. Maybe that could be done under the Delivering Social Change framework. Community energy offers huge possibilities for us as a society. We need to see a sea change so that it is not something that is done to communities, but something of which they can be part and benefit from it.

Mr Flanagan: What do you think the opportunities are for the proposed development of wind farms on Forestry Service land?

Mr McCusker: Two things happened in Scotland and Wales. First, government set the benchmark by saying that, if private developers were coming onto their land — it is public land — they expected developers to reach a certain benchmark in community benefits. They also said that they were going to free up some of that land and offer it for community ownership models. If you look at the relevant websites, you will see that some of that land is being made available for community ownership models. Community organisations etc are taking up that opportunity.

Mr Flanagan: You mentioned the Delivering Social Change agenda. How do wind farms fit into that?

Mr McCusker: If you look at appendix 4, you will see that I have put down five different Departments that have a role, whether in respect of energy policy, planning, community planning or tackling rural poverty. For instance, the Department of Agriculture and Rural Development has an agenda for tackling rural poverty, part of which is fuel poverty in rural areas. Another part of that Department has

outlined a role for the development of wind farms on Forest Service land. So a Department is saying, "We want to see our land utilised for generation of electricity." However, another part of that Department is saying, "We want to tackle fuel poverty."

Is there a connection between the two? Good practice and good examples show that there is. The connection is community energy and trying to utilise that. It is not all about private sector development going out of the area and income going out of the area. Some of the income can stay in the area to tackle fuel poverty. You can make that link and make clear that some of the income being generated will be utilised to address rural fuel poverty. The Department can look to that as an opportunity and build it into the 40% target that DETI has set.

It can all link in but it needs to be joined up. It is not joined up at the minute. There are a number of initiatives for tackling fuel poverty. There are government targets for energy policy, renewables etc. They are freeing up the Forest Service estate to generate an income stream, which will also allow us to tackle the 40% renewable energy targets. How do you join all that up with fuel poverty and tackling rural fuel poverty? It can be joined up — of course it can — by making sure that communities in that area know that some of the income generated can be utilised to tackle fuel poverty in that area.

Mr Flanagan: The day when me and Patsy were down meeting you in Fermanagh House, we visited Bryson Energy to hear about the warm homes scheme. Is there a role for a scheme like the warm homes scheme to manage some of the money that might come in from community energy schemes?

Mr McCusker: Absolutely. We need to think about utilising the resources and opportunities that we have. The warm homes scheme, and how it will be managed going forward, will be coming up for discussion in the coming months. There is uncertainty over that. Hopefully, that can be clarified in the near future.

We need to make connections between the different strands of government policy. One of those is not only giving advice but putting in place the necessary resources and measures. Does it always have to come from the public purse? In this case, it does not necessarily have to come from the public purse.

The Chairperson: It must not be used as an opt-out for government.

Mr McCusker: Absolutely not. It goes back to the size of the cake, Patsy.

Mr Anderson: Lauri, thank you for coming to the Committee and presenting to us. Some of the things that I wanted to ask about have already been touched on. The thing that has struck me is that you are saying that you are not pro-wind energy or anti-wind energy but pro-community benefit. That is good. I do not think that there is one of us who would not say that we are here to represent our communities. However, there has to be a point in communities not being divided on the subject of wind farms. We have all witnessed and heard quite a bit about division in relation to wind farms. It has been well documented over many months and years.

I was on the Environment Committee for a time, and I had occasion to visit Omagh. On that day, there was a "lockout" — that was the term used — but they said that it was because of ongoing work; we will not debate that. At the meeting in Omagh District Council, I detected — you might have been there yourself —

Mr McCusker: No, I was not.

Mr Anderson: I detected division in communities. Do the wind farm operators and developers hire or rent the land from the small farm holdings? If that is the case — I believe that it is — that would be very attractive for the farming community, especially in the small farming industry, where things are difficult. Does that not create a split between those farmers and other people in the community who are opposed to wind farms per se?

Mr McCusker: Sydney, I will answer that by, first, highlighting a case when a community was opposed. The geographic community in the Knocks in County Fermanagh was opposed to a wind farm. It was not people from Omagh, Strabane or Enniskillen who were opposed it. The community was opposed, and the people worked hard, as a community, to make sure that that wind farm did not go ahead. They were concerned, and they were united. They did not want it to happen, and they

achieved their desired result. After many years of campaigning and fighting the case, it did not happen.

Was that community right to take that case? Well, it was representing the interests of the community and the people who attended their public meetings etc, so of course it was right. That is different from an anti-wind farm lobby that argues the case on the basis that it does not agree with wind farms being built anywhere. Do I agree with lobby groups in that case? They are quite right to state their case and put forward their arguments. In a democracy, they should have that chance. However, it is the local community that will be impacted that must be listened to, whether it supports or is opposed to the wind farm. The wider anti-wind farm lobby is right to put its case across. However, that should not be the factor that determines whether a wind farm is built in the Knocks or not. A lobby group might have interests from a wider geographical area. There is a difference between the case of the Knocks in County Fermanagh and a strong lobby group that maybe covers a 50-mile geographical area or two council areas.

Mr Anderson: I take your point about lobby groups that are totally anti-wind farm, no matter what. A number of members have touched on the issue of community benefits. You need community unity to move forward on this issue for community benefit. Do you see much division caused in communities by the potential benefits for small farmers? I detected something that day. There may be advantages and financial benefits for some people. Is that feeding into the wider community? You think that that is not an issue.

Mr McCusker: No. Part of the reason why such a large percentage of wind farm applications get through is that, generally, neighbours in rural communities do not go up against one another. They and their sons and daughters will potentially be living on the land for generations. Generally, people do not object at a local level. Of course, there are instances when they do.

Mr Anderson: There have certainly been cases where locals have gone up against their neighbours.

Mr McCusker: The evidence from many of the developments that I have seen is that people who come forward with concerns in a localised setting do so with genuine concerns. It is not done unnecessarily. They are concerned about noise, about flicker and other issues. It is very important that the engagement and the planning process take those concerns into account and, using expertise, weighs up the pros and cons. The anti-wind farm movement in the Republic of Ireland is coming to the fore hugely with the developments in the midlands, and a huge number of groups are forming. That trend is going to continue.

I go back to the point about the leadership being given by your political colleagues in the councils in Omagh and Strabane, who have had to deal with this issue head-on. They have done that by saying that they are not opposing wind farm development even though there is a very strong anti-wind farm lobby group that believes that these things are wrong and have put a huge amount of effort into their work. The councils have said that they do not believe that wind farms are wrong but that it is up to local communities, through the planning process, to have their input and, where things are allowed to happen, communities must benefit. They have shown leadership and a fine example of how to take that forward.

Mr Anderson: You talked about the developers and stakeholders working together with communities. Going forward, it is crucial that everyone should work together, but how much work has taken place up to now?

Mr McCusker: It is interesting that you mentioned the Committee's visit to Omagh and the west in November and the lock-out from the wind farm, or whatever it was called.

Mr Anderson: Did I call it a lock-out? I do not think so.

Mr McCusker: You were not able to get access.

Mr Flanagan: Hansard is here, Sydney.

Mr Anderson: I will have to be careful. *[Laughter.]*

Mr McCusker: You were not able to get access. Claims are made sometimes that these sites are tourism sites or educational sites for children. A lot of claims are made about these projects and initiatives. The big challenge is that these things are contentious and will continue to be so. We have very ambitious targets to meet as a society, and all communities have to play a role in that. There is a big role under RPA in community planning for the local councils and the production of local energy plans should be built into that. Structures should be put in place so that we can have these considered conversations and a considered planning process in which communities are involved. I do not know whether that answers your question.

Mr Anderson: It is about engagement. I am not a local government politician any more but I understand the difficulties that they would have in Omagh and Strabane, or anywhere else, in relation to planning for wind farms. I have dealt with the issue of single wind turbines myself and it proved to be difficult, so I understand the bigger issues.

Mr McCusker: May I make one final comment on that?

The Chairperson: Very briefly, because we are pressed for time.

Mr McCusker: Let us say that you put a £70 plus VAT advertisement in a local paper for a wind farm exhibition to inform the community that you are going to put a £30 million project in place that will be in the community for the next 25 years. That is what happens; it happens in Cookstown, Ballymena, Limavady and Omagh. That is the size of the advert. Letters may go to people within a one-mile or two-mile area, but that is the level of engagement. They will put on a four-hour exhibition in the local post office or community hall to show the plans and say that they are putting in an application for planning permission in a couple of weeks' time. That is the level of communication.

Mr Mitchel McLaughlin: Your report on the recommendations seems to operate on the assumption that the five Departments and local councils will continue to have an interest. You have indicated positive examples of local democracy interacting. In the background work on your report, have you identified where community energy was devolved to the local authorities? We have that opportunity, and we have come on to RPA on a couple occasions. Local authorities will have a responsibility for economic development, and, as local authorities, they will have economic development opportunities to access funds, such as European funding, that not even Departments will be able to access. They will have responsibility for community planning. Also, in that context, there is a planned review of the Assembly and the Executive — the numbers of Departments; roles and functions; the number of Ministers; and, interestingly, the number of MLAs. That is a situation in flux, but does it not also present an opportunity? It seems that these issues and the divisions, tensions and dynamics at a local level are best managed at a local level. Should we not consider in this an enhanced role for 11 authorities, devolving that responsibility with agreed protocols? It is not reflected in the recommendations or in the report, as far as I can see, but is it the case elsewhere in Europe or England, Scotland and Wales?

Mr McCusker: The only example of community energy that we can look to in Northern Ireland is the recent work by Ballymena council. That is a fantastic example of a council working with a community. It spotted an opportunity, and it is trying to help resource that. That is a very positive development, and I think that all councils can learn from that model. Before we get down to devolving community energy to 11 councils, it is essential that we have a clear target for community energy. Is that important for the Executive, or is it something that should be largely ignored? If it is important —

Mr Mitchel McLaughlin: It might be easier for the Executive if they were dealing with it in the context of it being among the powers that they are planning to devolve to local government.

Mr McCusker: I look to the likes of Community Energy Scotland and Community Energy Wales. They are resourced to provide infrastructure support, guidance and advice for local communities that are trying to develop their projects. We need that infrastructure support to be put in place. I do not necessarily think at this stage that that should be done in the 11-council model. We are too small. I think that it could be done by one small organisation that is given adequate resources and would have the expertise to help communities. We are not necessarily talking about thousands of initiatives. We are talking about hundreds, if that.

Mr Mitchel McLaughlin: A cocktail of initiatives.

Mr McCusker: Yes. If we can get that infrastructure support right at a regional level, how it links into local authorities should be investigated.

Mr Douglas: Thank you for your presentation, Lauri. My question is an expansion of the Chair's question at the beginning. It relates to the tensions between wind farm development and tourism. You also mentioned the whole notion of what a community is. Have you spoken to the local community? I am sure you have, but I would like an update. Have you spoken to the local community in its widest sense? I am thinking about tourism and all of the tensions and difficulties about wind farm blight in some areas and the likes of bed and breakfasts, shopkeepers, pub owners or hoteliers. They are very much part of a local community, particularly in rural areas.

Mr McCusker: Yes. If you think tensions are bad with wind energy, wait until we get to fracking.

The Chairperson: We are not going there.

Mr McCusker: When a wind farm is going up, there are substantial benefits to the local bed and breakfasts, restaurants, cafes etc. That is also the case every five years, for instance, when there is a major overhaul and a number of people arrive to do that. People can see that, because that means money in their pockets. It is important to recognise that. If the bed and breakfasts in those areas and in rural areas get a full house for five or six months, that is attractive, but they have to balance it. I think it very much depends. There are people who do not necessarily say that it is a good thing or a bad thing; they recognise that there are issues. In some cases, they benefit, and, in some cases, there is a negative impact. So it is not a case of right or wrong. In the round, people have seen the benefits and the negative impact.

The Chairperson: Lauri, that concludes our session. Thank you very much for all the detail that you have provided. It was very useful and engaging. As you probably know, the Environment Committee is conducting an inquiry into wind energy. I do not know when it will start, but it is notifying people that that inquiry will be happening. That could prove useful. You may well get an invitation from that Committee. Thank you very much indeed.

ETI Cttee re London School of Economics Report on impact of wind turbines through house prices

Northern Ireland Assembly

Committee for the Environment
Room 375
Parliament Buildings

Tel: +44 (0)28 9052 1614

To: **Sheila Mawhinney**
Clerk to the Committee for the Environment

From: **Jim McManus**
Clerk to the Committee for Enterprise, Trade and Investment

Date: **11 February 2014**

Subject: **Gone with the wind: valuing the local impacts of wind turbines through house prices**

At its meeting on 6 February 2014, the Committee for Enterprise, Trade and Investment considered the London School of Economics Report: 'Gone with the wind: valuing the local impacts of wind turbines through house prices', and agreed forward to the Committee for the Environment for information.

.

Jim McManus
Clerk
Committee for Enterprise, Trade and Investment

Gone with the wind: valuing the local impacts of wind turbines through house prices [1]

Stephen Gibbons[ab]

November 2013

Preliminary Draft

Key words: Housing prices, environment, infrastructure

JEL codes: R,Q

---

[a] London School of Economics and Spatial Economics Research Centre, London, United Kingdom.
[b] Corresponding author: Stephen Gibbons (email: S.Gibbons@lse.ac.uk).

1 Introduction

Renewable energy technology provides potential global environmental benefits in terms of reduced CO2 emissions and slower depletion of natural energy resources. However, like most power generation and transmission infrastructure, the plant, access services and transmission equipment associated with renewable electricity generation may involve environmental costs. This is particularly so in the case of wind turbine developments, where the sites that are optimal in terms of energy efficiency are typically in rural, coastal and wilderness locations that offer many natural environmental amenities. These natural amenities include the aesthetic appeal of landscape, outdoor recreational opportunities and the existence values of wilderness habitats. In addition, residents local to operational wind turbines have reported health effects related to visual disturbance and noise (e.g. Bakker et al 2012, Farbouda et al 2013).

The UK, like other areas in Europe and parts of the US has seen a rapid expansion in the number of these wind turbine developments since the mid-1990s. Although these 'wind farms' can offer various local community benefits, including shared ownership schemes and the rents to land owners, in the UK, and elsewhere in Europe, wind farm developments have faced significant opposition from local residents and other stakeholders with interests in environmental preservation. This opposition suggests that the environmental costs may be important. This is a controversial issue, given that opinion polls and other surveys generally indicate majority support of around 70% for green energy, including windfarms, (e.g. results from the Eurobarometer survey in European Commission 2006). This contradiction has led to accusations of 'nimbyism' (not in my backyard-ism), on the assumption that it is the same people opposing windfarm developments in practice as supporting them in principle. There is a perhaps less of a contradiction when it is considered that the development of windfarms in rural locations potentially represents a transfer from residents in these communities and users of natural amenities (in the form of loss of

amenities) to the majority of the population who are urban residents (in the form of energy). Other possible explanations for the tension between public support and private opposition to wind energy developments are discussed at length in Bell et al (2007).

This paper provides quantitative evidence on the local benefits and costs of wind farm developments. In the tradition of studies in environmental, public and urban economics, housing costs are used to reveal local preferences for wind farm development in England and Wales. This is feasible in England and Wales because wind farms are increasingly encroaching on rural, semi-rural and even urban residential areas in terms of their proximity and visibility, so the context provides a large sample of housing sales that potentially affected (at the time of writing, around 2.5% of residential postcodes are within 4 km of operational or proposed wind farm developments). Estimation is based on quasi experimental, difference-in-difference based research designs that compare price changes in postcodes close to wind farms when wind farms become operational with postcodes various comparator groups. These comparator groups include: places close to wind farms that became operational in the past, or where they will become operational in the future; places close to wind farms sites that are in the planning process but are not yet operational; places close to where wind farms became operational but where the turbines are hidden by the terrain; and places where wind farm proposals have been withdrawn or refused planning permission. The postcode fixed effects design implies that the analysis is based on repeat sales of the same, or similar housing units within postcode groups (typically 17 houses grouped together).

All these comparisons suggest that operational wind farm developments reduce prices in locations where the turbines are visible, and that the effects are causal. This price reduction is around 5-6% for housing with a visible wind farm of average size (11 turbines) within 2km, falling to 3% within

4km, and to 1% or less by 14km which is at the limit of likely visibility. Evidence from comparisons with places close to wind farms, but where wind farms are less visible suggests that most if not all of these price reductions are directly attributable to turbine visibility.

The remainder of the paper is structured as follows. Section 2 discusses background policy issues and the existing literature on wind farm effects. Section 3 outlines the data used for the analysis. Section 4 describes the empirical strategy and Section 5 the results. Finally, Section 6 concludes.

2 Wind farm policy and the literature on their local effects

In England and Wales, many wind farms are developed, operated and owned by one of a number of major energy generation companies, such as RES, Scottish Power, EDF and E.ON, Ecotricity, Peel Energy, though some are developed as one-off enterprises or agricultural farms. Currently, wind farms are potentially attractive businesses for developers and landowners because the electricity they generate is eligible for Renewables Obligation Certificates, which are issued by the sector regulator (Ofgem) and guarantee a price at premium above the market rate. This premium price is subsidised by a tariff on consumer energy bills. The owners of the land on which a wind farms is constructed and operational will charge a rent to the wind farm operator. Media reports suggest that this rent could amount to about £40,000 per annum per 3 MW turbine (Vidal 2012).

The details of the procedures for on-shore wind farm developments in England and Wales have evolved over time, but the general arrangement is that applications – in common with applications for most other types of development - have to pass through local planning procedures. These procedures are administered by a Local Planning Authority, which is generally the administrative Local Authority, or a National Park Authority. Very small single wind turbines (below the scale covered by the current analysis) can sometimes be constructed at a home, farm or industrial sites within the scope of 'permitted development' that does not require planning permission. The

planning process can take several years from the initial environmental scoping stage to operation, and involves several stages of planning application, environmental impact assessment, community consultation and appeals. [2] Once approved, construction typically takes 6 to 18 months. Large wind farms (over 50 Mw) need approval by central government. Offshore wind farms are also subject to a different process and require approval by a central government body.

Wind farms have potential local economic benefits of various types. Interesting qualitative and descriptive quantitative evidence on the community and local economic development benefits of wind farms in Wales is provided by Mundlay et al (2011). Potential benefits include the use of locally manufactured inputs and local labour, discounted electricity supplies, payments into community funds, sponsorship of local events, environmental enhancement projects, and tourism facilities. They argue that the local economic development effects have been relatively limited, although in many of the communities surveyed (around 21 out of 29 wind farms) payments were made to community trusts and organisations, and these contributions can be quite substantial – at around 500-£5000 per megawatt per annum. Based on these figures, a mid-range estimate of the community funds paid out to affected communities in Wales would be about £21,000 per wind farm per year.

There is an extensive literature on attitudes to wind farm developments, the social and health aspects, and findings from impact assessments and planning appeals. Most existing evidence on preferences is based on surveys of residents' views, stated preference methods and contingent valuation studies and is mixed in its findings. There have been some previous attempts to quantify impacts on house prices in the US. Hoen et al (2011) apply cross-sectional hedonic analysis, based

[2] E.g. Peel Energy http://www.peelenergy.co.uk/ provide indicative project planning timelines for their proposed wind farm developments

on 24 wind farms across US states. Their study is interesting in that it makes the comparison between price effects at places where turbines are visible compared to places where nearby trurbines are non-visible (a technique which is applied later in the current paper) but finds no impacts. For the UK: Sims et al (2007) also conduct a cross-sectional hedonic analysis of 900 property sales, which all postdate construction, near three windfarms in Cornwall. Again this study finds no effects.

Few studies have carried out an analysis using difference-in-difference methods to try to establish the causal impacts of wind farm development. However, such methods have been applied to the valuation of other types of power infrastructure, for example Davis (2011, Restats) who finds negative impacts from US power plants. One study to attempt this, and probably the most comprehensive previous work on the impacts of wind farms on housing prices, is recent work by Hoen at al (2013). Hoen et al look at the effect of 61 wind farms across nine states the US using difference in difference style comparisons and some spatial econometric methods, on a sample of 51276 transactions. There are, however, very few transactions in the areas near the wind farms: only 1198 transactions reported within 1 mile of current or future turbines (p20). Their regressions do not, as far as can be deduced, exploit repeat sales within localised groups below county level and rely on county fixed effects and sets of housing and geographical control variables. The conclusions of the paper are that there is 'no statistical evidence that home values near turbines were affected' by wind turbines, which is true in a literal sense. However, the point estimates indicate quite sizeable negative impacts; it is the fact that the point estimates are imprecise and have big standard errors that makes them statistically insignificant.

In contrast, the current study has 28,951 quarterly, postcode-specific housing price observations over 12 years, each representing one or more housing transactions within 2km of wind farms

(about 1.25 miles). Turbines are potentially visible in 27,854 of these. There is therefore a much greater chance than in previous work of detecting price effects if these are indeed present.

3 Data

Information on wind-farm location (latitude and longitude), characteristics and dates of events was provided by RenewableUK, a not for profit renewable energy trade association (formerly BWEA). This dataset records dates of operation and other events related to their planning history, number of turbines, MW capacity, height of turbines (to tip). The dates in these data relate to the current status of the wind farm development, namely application for planning, approval, withdrawal or refusal, construction and operation. Unfortunately these data do not provide a complete record of the history for a given site, because the dates of events are updated as the planning and construction process progresses. Therefore, for operational sites, the dates of commencement of operation are known, but not the date when planning applications were submitted, approved or construction began. Dates are also given in the data in relation to withdrawal or refusal of planning applications. For the remaining cases of sites which are not as yet either operational, withdrawn or refused planning permission, the date refers to the latest development event – either application, approval, or the start of construction. This limits the scope of investigation of the impact of different events in the planning and operation process, other than for cases where there is a final event recorded i.e. that the wind farm is operational, or a planning has been withdrawn or refused.

A GIS digital elevation model (DEM)[3] based was combined with this wind-farm site and height data to generate 'viewsheds' on 200m grid. These viewsheds were used to differentiate residential

[3] GB SRTM Digital Elevation Model 90m, based on the NASA Shuttle Radar Digital Topography Mission and available from the EDNIA ShareGeo service http://www.sharegeo.ac.uk/handle/10672/5

postcodes (geographical units with approximately 17 houses) into those from which the wind farm is visible, and those from which it is less likely they are visible, using information on the underlying topography of the landscape. These viewsheds provide approximate visibility indicators, both in terms of the 200m geographical resolution of the view sheds (necessary for manageable computation times), and because they are based on wind-farm centroids, not individual turbines. This means that in the case of large wind farms, a turbines may be visible from locations which the procedure classifies as non-visible, given a large wind turbine array can extend over 1km or more. However, the median wind farm development in the data contains only 6 turbines, in which case the errors introduced by basing visibility on site centroids is likely to small. Note the error will in general result in mis-classification of sites from which the turbines are deemed non-visible, given that if the tip of a turbine at the centroid of the site is visible, it is almost certain that at least one turbine is visible. The viewsheds also take no account of intervening buildings, trees and other structures, because Digital Surface Models which take account of such features are not yet available for the whole of England and Wales. As a further refinement, to eliminate cases where visibility was highly ambiguous, I calculated the rate of change of visibility from one 200m grid cell to the next, and dropped postcodes in cells in the top decile of this visibility gradient.

Given the focus of this study on the visual impacts of wind farms in rural areas, a number of single-turbine wind farms in urban areas and industrial zones were excluded from the analysis (around 21 operational turbines are dropped). Land cover estimates were used first to restrict the analysis to wind farms outside zones with continuous urban land cover. Some additional turbines were eliminated on a case-by-basis where the information available in the wind farm data, and reference to web-based maps and information sources, suggested that turbines were on industrial sites within or close to major urban areas. The land cover at the wind farm centroid was obtained

by overlaying the wind farm site data with 25m grid based land cover data (LandCoverMap 2000 from the Centre for Ecology and Hydrology). Land cover was estimated from the modal land cover type in a 250m grid cell enclosing the wind farm centroid. In cases where no mode exists (due to ties), the land cover in the 25 m grid cell enclosing the centroid was used.

Housing transactions data comes from the England and Wales Land Registry 'pricepaid' housing transactions data, from January 2000 to the first quarter of 2012. These data include information on sales price, basic property types – detached, semi-detached, terraced or flat/maisonette – whether the property is new or second-hand, and whether it is sold on freehold or leasehold basis. The housing transactions were geocoded using the address postcode and aggregated to mean values in postcode-by-quarter cells to create an unbalanced panel of postcodes observed at quarterly intervals (with gaps in the series for a postcode when there are no transactions in a given quarter). For a small subset of the data, floor area and other attributes of property sales can be merged from the Nationwide building society transactions data. Demographic characteristics at Output Area (OA) level from the 2001 Census were merged in based on housing transaction postcodes. These additional characteristics are used in some robustness checks which appear later in the empirical results.

Postcode and wind farm visibility data were linked by first forming a panel of postcodes at running quarterly (3 month) intervals over the period January 2000-March 2012. The cumulative number of turbines in the different planning categories, within distance bands of 0-1km, 1-2km, 2-4km, 4-8km and 8-14km of each postcode was then imputed at quarterly intervals by GIS analysis of the information on site and postcode centroids. The 14km limit is set in part to keep the dataset at a manageable size, but also because as the distance to the wind farm increases, the number of other potential coincident and confounding factors increases, making any attempt to identify wind

farm impacts less credible. Existing literature based on field work suggests that large turbines are potentially perceptible up to 20km or more in good visibility conditions, but 10-15km is more typical for casual observer and details of individual turbines are lost by 8km (University of Newcastle 2002). In the next step, the site viewsheds were used to determine whether wind-farm sites are visible or not visible from each postcode in each quarter, again using GIS overlay techniques. Additional GIS analysis with the Digital Elevation Model provided estimates of the elevation, slope and aspect (North, East, South and West in 90 degree intervals) of the terrain at each postcode. These are potentially important control variables, because places with good views of wind farms may have good views generally, be more exposed to wind, or have more favourable aspects, and these factors may have direct effects on housing prices.

Finally, the housing transactions and wind farm visibility data was linked by postcode and quarter to create an end product which is an unbalanced panel of postcode-quarter cells, with information on mean housing prices and characteristics, the cumulative number of visible and non-visible turbines within the distance bands and in each planning category, plus additional variables on terrain and demographics. Note, prices in quarter t are linked to the turbine data at t-1, so although the price data extends to the first quarter of 2012, only wind farm developments up to the last quarter of 2011 are utilised. The next section describes the methods that are applied using these data to estimate the house price effects of wind farm developments.

4 Estimation strategies

The research design involves a number of alternative regression-based 'difference-in-difference' strategies. These strategies all compare the average change in housing prices in areas where wind farms become operational and visible, with the average change in housing prices in some

comparator group. The starting point for these different approaches is the following basic difference-in-difference/fixed effects regression specification:

$$\ln price_{it} = \sum_{k} \beta_k (visible, j_k < dist < k, operational)_{it-1} + x'_{it}\gamma + f(i,t) + \varepsilon_{it} \qquad (1)$$

Here $price_{it}$ is the mean housing transaction price in postcode *i* in quarter *t*. The variable capturing exposure to wind-farm developments is $(visible, j_k < dist < k, operational)_{it-1}$. This is a dummy (1-0) treatment variable, indicating that postcode *i* has at least one visible-operational turbine between j_k and *k* km distance in the previous quarter. This indicator is essentially an interaction between an indicator that turbines are potentially visible from a postcode (*visible*), an indicator that these turbines are within a given distance band (j_k <*dist*<*k*), and a 'post-policy' indicator which indicates that the turbines have been built and become operational (*operational*). The date of operation is taken as the date around which the price effects are expected to bite, because there is no information in the wind farm data on the date when construction started or finished. Since the estimation method exploits differences in average prices between the post-operation and pre-operation periods, the exact timing is not critical, although errors are likely to attenuate estimated price effects. Note, it is not necessary to explicitly control for the separate components (*visible*, j_k <*dist*<*k* and *operational*) because these are going to be subsumed through the specification of geographical and time fixed effects $f(i,t)$ described below.

The coefficient of interest β_k is the average effect of wind farm turbines visible within distance band j_k-*k* on housing prices. The sign of β_k is ambiguous a priori, since it depends on the net effects of preferences for views of wind farms, the impact of noise or visual disturbance – at least for properties very close to the turbines – and other potential local gains or losses such as shares in profits, community grants, or employment related to turbine maintenance and services.

Two versions of the distance specifications in (1) are used in the empirical work. In the first case, separate regressions are estimated for different values of k (1km, 2km, 4km, 8km, 14km) and $j_k = 0$, i.e β_k estimates the effects of visible wind farms within a radius k. The estimation sample is restricted to postcodes within distance k. In the second case, a series of distance bands is used (0 < distance ≤ 1km, 1km < distance ≤ 2km, 2km < distance ≤ 4km, 4km < distance ≤ 8km and 8km < distance ≤ 14km) in a single regression, and the sample is restricted to postcodes within the maximum 14km. These distance thresholds are chosen somewhat arbitrarily in order to give reasonable detailed delineation of the distance decay close to wind farm sites, while allowing for potential impacts up towards the limits of visibility.

Crucially, specification (1) allows for unobserved components which vary over time and space $f(i,t)$, and these are inevitably correlated with the wind farm visibility indicator. This correlation with the geographical effects occurs because wind farms are not randomly assigned across space and postcodes close to wind farms and where turbines are visible may not be comparable to postcodes further away in terms of the other amenities that affect housing process. The correlation with the time effects occurs because the number of wind farms is growing over time, so there is obviously a spurious correlation between any general trends in prices over time and the indicator of wind farm visibility. It is therefore essential to control in a very general way for geographical fixed effects and time trends.

This is done in part by restricting the sample to groups of postcodes that are likely to be comparable to each other in terms of their propensity to have visible wind farm developments close by, and in addition by controlling for postcode fixed effects. Postcode fixed effects are eliminated in (1) using the within-groups estimator (i.e. differences in the variables from postcode-specific means) and common time effects eliminated within the estimation sample using quarter-

specific dummies (i.e. for the 48 quarters spanned by the data). Where applicable, separate sets of year dummies for each distance band, j_k <*dist*<*k*, control for differences in the price trends in these different distance bands. Additional time varying geographical effects are captured by interactions between year dummies, and dummies for categories of postcode elevation (0-25m, 26-50m, 51-100, >100m), slope (0-0.5%, 0.51-1%, 1.01-1.5%, 1.51-2.5%, >2.5%), and aspect (315-45 degrees, 46-135 degrees, 136-225 degrees, 226-316 degrees). These terrain variables are potentially important, because wind farm visibility may depend on the elevation, slope and direction of the land at the postcode location. Vector x'_{it} also includes optional, time varying observable characteristics of the postcode mean property transactions (proportion of each property type, proportion new, proportion freehold) to control for changes in sample composition.

Comparisons can be made with placebo interventions, or other events, using difference-in-difference-in-difference methods, in which the effect visible operational turbines (β_k) is compared with counterfactual effects estimated from treatment indicators corresponding to other wind farm planning and visibility categories. These categories are: turbines that might eventually be visible but are still in the planning process, wind farms that are operational but hidden from the postcode location by the terrain, and turbines that were refused planning permission. These exact details are described in Sections 4.1 to 4.3 below and in the results section.

4.1 Strategy A: Existing and future wind farms as comparator groups

The first and simplest approach applies (1) in a setting which focusses only on postcodes with potentially visible-operational turbines within a given radius, that is postcodes which had visible turbines within a given distance radius at the beginning of the study period, or will have visible turbines within these radii or bands by the end of it. More precisely, a postcode is included in the sample for estimating (1) if it has a visible wind turbine development within the specified radius

before January 2000 or if turbines become visible over the course of the study period from 2000 to 2011. The aim of this sample restriction to postcodes with potentially visible-operational wind farms is to create a group of postcodes, which are similar in respect of: a) being close to sites which are suitable for wind farm developments, and where the planning and construction process has been completed; and b) in terms of the likelihood of turbines being visible from the postcode's geographical location. In this sample of postcodes the treatment indicator equals 1 for at least one quarter over the sample period. A postcode that has, for example, a visible, operational wind farm within 4km opening in the last quarter of 2004 will be included in the sample, but will have $(visible, 0 < dist < k, operational)_{it-1} = 0$ in all quarters up to t corresponding to the first quarter of 2005, and $(visible, 0 < dist < k, operational)_{it-1} = 1$ in all quarters thereafter. Postcodes with at least one visible, operational turbine from the beginning of the study period are included in the sample, but have the indicator $(visible, 0 < dist < k, operational)_{it-1} = 1$ throughout.

Identification of the price effects β_k therefore comes from the difference between the average price change in postcodes associated with the zero-one changes in the treatment indicator at the times wind farms becomes operational, and the average price change in the control postcodes that already have visible wind farms or do not yet have visible wind farms but will do so in the future. Since the estimates control for postcode fixed effects, identification of β_k comes only from postcodes that have transaction observations before and after a wind farm becomes operational, although postcodes that had wind farms visible at the start of the study period in 2000 also form part of the control group. Note that a within-groups estimator, which compares the post-operation average price with the pre-operation average price over the whole sample period, is preferable in this setting to a specification using differences between two time periods, because: a) there is unlikely to be a step-change in prices coincident with wind farm operation, both because price

changes evolve slowly, and because buyers may be aware of the turbines before operation; and b) the panel is unbalanced, with missing quarters (and even years) where there are no price transactions in a given postcode, so working with differences over specific time intervals within postcodes would result in a large reduction in sample size (e.g. a 4 quarter difference can only be observed in postcodes where there happen to be sales observed 4 quarters apart).

Estimation of the distance-band specification version of (1) proceeds in a similar way, but is based on the sample of postcodes which have a visible operational turbine within the maximum 14km radius. Separate treatment indicators $(visible, j_k < dist < k, operational)_{it-1}$ are included in the same regression for each distance band. To control for different time trends in the different distance band groups, these distance band regressions include interactions between year dummies, and dummies indicating that a postcode has a wind farm visible and operational, within a given distance band, in at least one quarter over the study period.

4.2 Strategy B: placebo tests using wind farm developments in the planning process

It is well known that difference-in-difference based research designs suffer from the problem of pre-existing differences in trends between the 'treatment' and 'control' groups. In Strategy A this problem is mitigated by using the same postcodes as both treatment and control groups. Postcodes with existing visible-operational turbines, and postcodes with potentially visible turbines that become visible-operational in the future, provide information on the counterfactual price changes for postcodes in which turbines have just become visible-operational. In principle, this approach should not be sensitive to differences in trends between areas targeted for wind farm developments and those that are not. However, this method may not completely take care of more subtle differential trends in the affected postcodes, e.g. if areas receiving wind farms in earlier years are on different trends from the areas receiving wind farms in later years, and where the

distribution of the start of wind farm operations is not equally distributed over the sample (which it is not, as evident from Figure 1. These differential trends may be picked up by the estimates of the average price changes between the before-operation and after-operation periods. It is infeasible to control directly for these different trends at the postcode level. However, as a general robustness check, I use a difference-in-difference-in-difference approach which compares the effects of visible-operational turbines with 'placebo' price effects from wind farms developments where we would not necessarily expect to find them.

To implement this test I re-estimate specifications of type (1) using additional treatment indicators, based on wind-farms which were or are planned, but have not yet been developed. Similar ideas have been used elsewhere in the assessment of the impacts of various spatial policies (Busso, Gregory and Kline 2013). These specifications are of the form

$$\begin{aligned}\ln price_{it} = &\sum_k \beta_k (visible, j_k < dist < k, operational)_{it-1} \\ &+\sum_k \lambda_k (visible, j_k < dist < k, planning)_{it-1} \\ &+x_{it}'\gamma + f(i,t) + \varepsilon_{it}\end{aligned} \qquad (2)$$

Here, $(visible, j_k < dist < k, planning)_{it-1}$ is an indicator taking the value 1 if a postcode has potentially visible wind turbines within distance k, but the wind farm is in the planning process, and zero otherwise. The estimation sample is restricted to postcodes in which there is a potentially visible-operational wind farm (i.e. a visible-operational turbine in at least one quarter) within distance band *k*, plus postcodes in which there is a potentially visible-planned wind farm in at least one quarter (i.e. a visible-planned turbine in at least one quarter) within distance band *k*. As before, the regressions control for postcode fixed effects, quarterly dummies and (optionally) slope-by-year dummies, elevation-by-year dummies, aspect-by-year dummies and property characteristics. In addition, specification (2) controls for different trends (year dummies) for the groups of

postcodes with current or future visible-operational turbines and/or postcodes with current or future visible-planned turbines in each distance category. The price changes in postcodes with current or future visible-operational turbines, and the postcodes with current or future visible but non-operational turbines thus form the counterfactual for the changes occurring as turbines are built and become operational, as in Strategy A. The price changes in postcodes from which planned wind farms are potentially visible provide an additional counterfactual control group, with which the price changes in postcodes with visible operational turbines can be compared in a difference-in-difference-in-difference estimate. [4]

As before, the multiple distance band specification is estimated on all the postcodes with potentially visible-operational and potentially visible-planned wind farms within 14km, with additional controls for differential trends (separate sets of year dummies) for groups of postcodes with potentially visible-operational and potentially visible-planned wind farms in each distance band.

The purpose of these exercises is to test for the threat from potential pre-existing trends in wind farm-targeted areas, rather than for price effects from wind farms that have entered the planning process. In fact, estimation of the price effects from planning would not be very easy, since operational sites in the data would have been in planning at an earlier stage in the study period, and yet the timing of this is not recorded. The dates recorded in the data are predominantly towards the end of the series. Therefore, given that the date assigned to the start of the wind farm planning stage is not critical for current purposes, I randomly re-allocate the timing of the onset of

[4] The only difference between this set up, and running separate regressions for the group of potentially visible-operational turbines and the group of potentially visible-planned turbines is that the quarterly time trend and the coefficients on property characteristics are constrained to be the same in both groups. The combined regression makes it easier to test for differences in between β_k and λ_k

planning status to quarters over the whole study period, within their original postcodes. This helps put the pattern of planning applications more closely in line with the pattern of the timing of operational turbines, and minimises the risks of detecting causal price effects from entry into the planning process in the estimates of λ_k.[5]

Tests of $\lambda_k = 0$ in equations (3) and (4) provide a placebo test, in that the event of entering planning will not trigger large price effects given that the events have been randomly assigned to quarters. Estimates of $\beta_k - \lambda_k$ also provide difference-in-difference-in-difference estimates which net out any spurious effects associated with non-random targeting of planned wind farm developments.

4.3 Strategy C: effects of visibility from comparison of effects of visible and invisible turbines

A drawback of Strategy B is that the places where wind farms are planned are not usually the same places as those with operational wind farms, so the comparison of β_k and λ_k is based on only partially overlapping geographical areas. A much better alternative is to compare the effects of visible operational wind farms with the effects from wind farm operation on postcodes where the wind farms are hidden from view. The postcodes with non-visible-operational turbines within a given radius of the turbines are likely to be much better comparators to the postcodes within the same radius with visible-operational turbines.

The structure of the regression specifications for these visible-non-visible comparisons is identical to (1) and (2), but the sample now includes the sample of postcodes with potentially visible-operational turbines plus the sample of postcodes which are close to the same set of turbines, but where these are non-visible. Accordingly, specification (3) uses a treatment indicator that is an

[5] There are, in any case, unlikely to be big price impacts from the instigation of a planning application, because the planning process can be lengthy, and the extent of visibility and impact of turbines is unlikely to be fully evident, either to residents or potential home buyers for some time.

interaction of an indicator that there are no visible wind farms (*non-visible*) at the postcode, that the postcode is within a given radius or distance band ($j_k < dist < k$) and the indicator that the turbines are operational (*operational*):

$$\begin{aligned} \ln price_{it} = & \sum_k \beta_k (visible, j_k < dist < k, operational)_{it-1} \\ & + \sum_k \delta_k (non-visible, j_k < dist < k, operational)_{it-1} \\ & + x'_{it}\gamma + f(i,t) + \varepsilon_{it} \end{aligned} \qquad (3)$$

In this setup, the postcodes with non-visible neighbouring operational turbines are potentially exposed to direct effects from the turbine developments. These sign of these effects is theoretically ambiguous, for the same reasons discussed in Section 4.1 for visible operational turbines. However, the difference-in-difference-in-difference estimate of $\beta_k - \delta_k$ can be interpreted as the specific impact of wind farm visibility and thus provides an explicit estimate of the amenity or dis-amenity value of turbine visibility.

4.4 Additional specifications including wind farm size, further robustness tests and other planning events

The set up described above is based around a treatment effect design with a simple 1-0 indicator of turbine visibility and operation, and thus implicitly estimates the effect of wind farms of average size. Clearly, the impacts are likely to differ by wind farm size (number of turbines) and there are likely to be interactions of size with distance, especially if visibility turns out to be an important influence on prices. I therefore estimate additional specifications that look at the interactions between wind farm size and distance, using a similar set up to (1), but with separate indicators for the number of turbines visible and operational at each distance and the number of turbines.

Other planning events in the data such as the refusal and withdrawal of planning applications, approval or the start of construction could be interesting and useful. However, estimation of their

direct effects is limited by the fact there are few such events and/or that 80-100% of these events are stacked in the last 4 years of the data set. More importantly, the full history of planning process is never recorded, so interpretation of the effects of intermediate stages of development would not be straightforward. Estimation of the effects of refusal of planning permission is feasible, given that there is a reasonable spread of these events over the study period, and the potential effects are interesting in their own right. This analysis uses the same set up as equations (3) and (4), but with planning refusal as the key event rather, than the entry into the planning process, and with treatment assigned to the actual date of approval rather than a randomly assigned date.

A number of other robustness checks are carried out to assess sensitivity to local price trends, changing composition of housing sales, and assumptions about the clustering of standard errors. These are described where they arise in the Results section below.

5 Results

Figure 1 shows the historical development of non-urban wind turbines in England and Wales from the mid 1990s to 2011. By the end of 2011, these turbines could provide up to 3200mw of generating capacity, which amounts to sufficient power for about 1.8 million homes (or around 7.7% of the 23.4 million households in England and Wales)[6]. Figure 2 illustrates the evolution of the spatial distribution of these turbine sites between 2000 and 2011. These sites are predominantly in coastal and upland areas in the north, west and east, although are increasingly seen in inland

[6] This figure is estimated from DECC 2013a and DECC 2013b as follows. Total UK electricity output from onshore and offshore wind was 15.5TWh in 2011 (DECC 2013a Table 6.4) from 6500MW total capacity. Scaling down to the capacity of 3200MW in England and Wales, suggests an output of 7.6 TWh from wind farms in England and Wales. Average UK domestic household electricity consumption is 4.2×10^{-6}TWh, based on total domestic electricity consumption of 111.6TWh (DECC2013b, Table 5.1.2), and a figure of 26.4 million households in the UK (2011 Census). Therefore, wind farms in England and Wales could power approximately $7.6/4.2 \times 10^{-6} = 1.8$ million households.

areas in the midland areas of central England. There are very few sites in the south and east of England.

Some basic summary statistics for the operational, non-urban wind farms in the dataset are shown in Table 1. There are 148 wind farms recorded in operation in England and Wales over this period. The mean operational wind farm has 11 turbines (6 median) with a capacity of 18.6 MW, but the distribution is highly skewed, with a maximum number of turbines of 103 and capacity of 150MW. These largest wind farms are off-shore. The average height to the tip of the turbine blades of just over 90m, though the tallest turbines (mainly offshore) reach to 150m. The distribution of wind farms across land cover types shows that most wind farms are in farmland locations, followed by mountain and moorland locations (wild). Offshore sites are also included in the analysis, where these are potentially visible from residential areas on shore. Urban and most industrial locations (except where these impact on rural areas) are excluded from the analysis. The table also shows the numbers of wind farms in the planning process and in other stages of development. Only the operational, planning and refused categories are used in the empirical analysis described below.

Table 2 summarises the main postcode-by-quarter aggregated panel data set, with information on property prices and characteristics, and the distribution of visible and non-visible operational turbines. This sample is the sample of postcodes with visible-operational turbines within 14km in 2000, or appearing within 14km at some time over the sample period up to the end of 2011. Price data is merged to the windfarm data with a one-quarter lag, so the price data runs from the first quarter of 2000 to the first quarter of 2012.

5.1 Strategy A results

Table 3 reports the results from the postcode fixed effects approach of Strategy A, described in Section 4.1. This restricts the sample to postcodes which have or will have an operational wind

farm within the specified distance band. Identification comes purely from comparing the change in postcode prices between the periods before and after the site, with the changes occurring in postcodes that have already got visible-operational wind farms or which will do so in the future. Results are reported for 6 radiuses from 1km-14km. The table reports coefficients and standard errors from the regressions. Standard errors are clustered at Census Output Area level (10 or so postcodes) to allow for serial correlation in the errors over time and some degree of spatial correlation in the price changes across neighbouring postcodes. Alternative clustering assumptions are explored in Table 10 in the Appendix, where the conclusion is that OA level clustering gives similar results to more general double clustering that allows for serial correlation within postcodes and cross sectional correlation within quarters. All specifications include a full set of quarterly dummy variables. There are two columns for each distance category, one in which the specification includes no other control variables, and the second controlling for the array of property characteristics and trends described in the methods section. Evidently, controlling for these property and terrain characteristics makes little difference to the results.

The key finding from this table is that prices in places where wind farms are close and visible are reduced substantially after a wind farm becomes operational. The price impact is around 7% within 1km, falling to 6% within 2km, 3% within 4km. Within the 8km or 14km radius, the effect is less than 1%. These results do not inform us specifically about the visibility impacts of wind farms, as distinct from other costs and benefits associated with their visibility and operation. These estimates should be interpreted as the net impact on prices resulting from all channels, including the potential costs linked to visual impact and noise, and potential benefits of wind farm proximity. Disentangling visibility from other impacts is left until Section 5.3.

Clearly, interpretation of the estimates in Table 3 as estimates of the causal impact of wind farms assumes that there are no changes in unobserved housing characteristics coinciding with wind farms. The results may also be sensitive to pre-existing area specific price trends, that are not controlled using the various groups of time dummies. Table 4 and Table 5 present some assessment of these identifying assumptions, based on the sample with the 4km distance threshold – this being the maximal distance at which there appear to be substantial price effects in Table 3. Table 4 presents a series of 'balancing' tests in which the dependent variable in the regressions of Table 3, column 6, is replaced by housing characteristics, and the housing characteristics are excluded from the set of regressors. The aim here is to see if there are within-postcode changes in the composition of the sample, in terms of housing characteristics, that coincide with the start of wind farm operations. Columns (1)-(6) use the few characteristics that are available in the Land Registry data set. In the remaining columns, mean postcode-by-year characteristics taken from an auxiliary dataset of transactions from the Nationwide building society are merged to the dataset. This dataset has far more information on housing characteristics, but is only a sub-set of transactions, and hence postcodes, in the Land Registry data, therefore the sample size is much reduced. Looking across Table 4 it is evident that there are no statistically significant changes in the composition of housing transactions associated with wind farm operation, and there is no systematic pattern in the point estimates that would suggest that the price changes in Table 3 could be related to the sale of lower quality houses. The floor area of the property, a potentially important omitted variable in the land Registry data is in fact positively associated with the wind farm treatment, though the point estimate (in metres squared) is not large.

Table 5 carries out further robustness tests on the 4km sample, firstly adding in the Nationwide data set characteristics as control variables (column 2), and replacing the Land Registry prices with prices from the Nationwide data (column 3) The coefficient estimates from the Nationwide sample

are slightly larger than those from the Land Registry data, although not by much relative to the standard errors, and changing the source of the price information does not make any difference. Column (4) adds in additional demographic characteristics from the 2001 Census (proportion not qualified, proportion tertiary qualified, proportion born in UK, proportion white ethnicity, proportion employed, proportion in social rented accommodation) interacted with linear time trend, but again this has no bearing on the results.

Columns (5) shows a specification which controls for region-specific quarterly changes. It is not feasible to do this simply by including region-by-quarter dummies in the regressions, because there are too few wind farms becoming operational in any region-quarter period. Instead, the region-quarter price effects are recovered from a first stage postcode-fixed effects regression of log prices on region-quarter dummies in the Land Registry dataset, using postcodes beyond the 14km wind-farm distance limit. The estimated region-quarter effects are then used as controls in the second stage estimation. Again this has no impact on the key result, even though the region-quarter effects are strongly correlated with the prices close to the wind farms (the coefficient on the region-quarter effects is 0.456, with a coefficient of 0.021).

Column (6) does something similar, but controlling for predicted pre-operational linear price trends in the area defined by the set of postcodes that share the same nearest operational wind farm within 4km. Again it is not practical to simply include nearest-wind-farm specific trend variables, since the price changes in response to wind-farm operation are not sharp enough to successfully identify separately from wind-farm specific price trends over the whole period. Instead, similarly to the region-quarter trends, the pre-operation wind farm price trends are estimated in a first stage regression of prices wind farm-specific time trends using observations for the pre-operation period only. The first stage regression predictions of the wind farms specific

price trends from the pre-operation period are then extrapolated over the whole sample period and included as controls in the second stage regression. Nothing much changes as a result of this exercise, although the point estimate is reduced slightly (by around 1 standard error).

Overall, there is no evidence from Table 4 and Table 5 that the finding of negative impacts from wind farms on prices arises from omitted variables or unobserved price trends.

More detail on distance-decay of the wind farm price effects within the 14km limit is provided in Table 6. Here the sample is postcodes with transactions within 14km of a site, and the treatment indicators for the different distance bands are included in the same regression. The coefficients indicate the effects at each distance band within this 14km radius. As before Column (1) includes just quarterly dummies, whereas Column (2) includes the full set of control variables, including distance-band-by-year dummies. The results are broadly in line with the alternative presentation in Table 3. The price effect within 1km, and at 1-2km is around 5.5-6%. This falls quite sharply in the 2-4km distance band, to 1.9%. Beyond this there are price effects right out as far as 14km, although these are small at around 1%.

5.2 Strategy B placebo results

Section 4.2 described extensions to the analysis that compares the price effects of operational turbines with the price effects of planned, but undeveloped wind farms that are not yet constructed. The distribution of these planned wind farms is shown in Figure 3. The regression results relating to planned and refused wind farm developments are shown in Table 7. The sample includes postcodes within the specified distance of sites that are operational by the end of the study period (same samples as Table 3) plus postcodes within the specified distance of sites that are in planning by the end of the study period. The purpose of these results is to assess whether the patterns in Table 3 could arise from endogenous spatial targeting of wind farms.

Looking across Table 7, the same pattern of results for visible-operational wind farms emerges as in Table 3 (which is the case by construction – the coefficients are basically identified from the same variation as in Table 3). By contrast the coefficients on the placebo 'planning 'treatment are statistically insignificant and small in magnitude relative to the operational effects, in the distance bands close to the wind farm sites. There are, however, small positive, significant effects in the larger samples corresponding to the bigger distances. There is no clear causal explanation for these patterns, given that the planning events are randomly allocated across time within postcodes. A potential explanation is that the before-after planning treatment indicator is picking up interactions between non-linear postcode-specific unobserved price trends and the postcode fixed effects, which may not successfully be controlled for by postcode fixed effects and the time trend dummies included in the regressions. Whatever the explanation, the effects are opposite in sign to those for operational turbines, so do not appear to be a cause of the patterns seen for the effects of operational turbines.

The distance decay of the price effects for operational, as compared to planned wind farms is illustrated in Figure 4. The figure plots the coefficients from regressions of the type shown in Table 6 for visible operational wind farms, but with the addition of the 'placebo' treatment effects for the planned wind farms. The sample includes postcodes which have visible-operational wind farms or visible-planned wind farms within 14km by the end of the period. In this distance-band set up there is no evidence of statistically significant effects of any magnitude from the placebo treatments. The final row presents a difference-in-difference-in-difference comparison between the visible-operational and visible-planned treatment effects, which are virtually identical to the results in Table 6.

5.3 Strategy C results

The methods described in 4.3 proposed comparing the price effects in postcodes with visible-operational turbines to the price effects in postcodes with non-visible operational turbines. To illustrate the basis for Strategy C, Figure 5 shows the viewshed for a wind farm in north east England. This is the Haswell Moor wind farm in County Durham, which has 5 turbines, a total capacity of 10MW and the height to the tip of the turbines is 110m. This is a fairly typical wind farm development in the sample. The dark shaded areas are residential postcodes and the light grey shading indicates the land where at least the tips of the turbine blades are visible (technically, these are computed as the land surface that is visible to an observer at the tip of the turbine). Strategy C is compares prices changes occurring with the start of wind farm operation in postcodes where the turbines are visible, with those occurring where they are not-visible.

The results for different distance radii are shown in Table 8. This is presented in the same way as Table 7, but allowing for effects from non-visible operational wind farms rather than planned wind farms. The sample includes postcodes with visible-operational turbines and non-visible operational turbines within each distance band by the end of the period. All regressions include the usual controls for trends and differences in topography, and allow for differences in general time patterns between postcodes where operational turbines will become visible and postcodes where they do not. Note that it is infeasible to compare visible and non-visible wind-farms within the 1km distance band as there almost no cases where turbines are not visible at this distance, so the 1km results are missing. Otherwise, the usual pattern is seen in the coefficients for visible-operational turbines, but the effects in areas close to operational turbines where these are not visible is quite different. The point estimates within the 2km band are similar to those for visible-operational turbines, but statistically insignificant. Again, an issue here is that there are relatively few cases where turbines are not visible at a postcode if they are this close, and the classification

into visible and non-visible cases is potentially very noisy, given the 200m resolution of the viewshed (and the fact that a person probably does not have to move far from there house to observe turbines at this distance, even if they are obscured from view at the house itself). Further out, a more interesting pattern emerges: within 4km there is no effect on prices from operational turbines that are not visible, which begins to suggest that the effects from visible-operational turbines are largely attributable to visibility. Within 8km, and at bigger radii around the wind farm site, small significant positive price effects start to emerge, whilst the effects in postcodes with wind turbine visibility remain negative. Again, the results for distance bands are presented graphically in Figure 6, to show the distance decay pattern, and the offsetting effects of visibility and non-visibility are clearly evident (except within the 1km band where the estimates for non-visibility are too imprecise).

One potential explanation for these contrasting effects is that wind farms provide some general benefits in the local area, due to community donations, shares in profits, other local area enhancement schemes and rents to land owners. There may also be wage and employment benefits. In this case, the basic price effects estimated from the visible-operational treatment dummies under-estimate the marginal willingness to pay to avoid the visual dis-amenity, because these are in part already compensated by higher wages or other benefits (as in the classic wage-price-amenity trade off in the Roback model of compensating wage and land price disparities, (Roback 1982). An alternative interpretation is that housing market frictions create very localised housing markets, and construction of turbines therefore restricts the availability of housing without views of the turbines, thus raising the price of postcodes without visibility relative to those where the turbines are visible. Unfortunately, it is not possible to distinguish between these two hypotheses in the current set up. Either way, the willingness to pay to avoid visibility should be estimated by the difference between the coefficients on the visible-operational treatment

dummies and the non-visible operational treatment dummies. These difference-in-difference-in-difference estimates are shown at the bottom of Figure 6, and indicate a visibility impact of around 2.6% from 2km out to 8km. Beyond 8km there is no effect from the average wind farm, and below 2km no effect is detectable due the lack of clear distinction in visibility at this distance.

5.4 Further results on numbers of turbines.

The results so far have looked simply at turbine development as a binary treatment effect, and have ignored the scale of the wind farm. Table 9 investigates the whether there is a greater cost associated with larger developments with more turbines, and over what distance. The setup is basically the same as in Table 6, but with interactions between dummies for wind farm size and distance. The results are in line with what would be expected if the price impacts are related to the dis-amenity of wind farm visibility. Bigger wind farms have a bigger impact on prices at all distances. A wind farm with 20+ turbines within 2km reduces prices by some 11% on average. Note though that a postcode within 2km of the centroid of a 20+ turbine windfarm could be almost at the turbine field, so this price effect could relate to noise and visual flicker problems, and is quite clearly an extreme case. However, even at 8-14km there is a 3.7% reduction in prices associated with large visible operational wind farms. Medium size wind farms above average size also have strong effects throughout the distance range, falling from 5.7% within 2km to just over 1% by 14km. The effect of smaller wind farms with less than 1-10 turbines is, as might be expected, concentrated in the first 2km where there is a 5% reduction in prices, falling to just over 1% at 4km and becoming smaller and/or insignificant beyond that.

The possibility of using other planning events was discussed in Section 4.4. Figure 7 shows findings related to the impacts of wind farm planning refusal, using the same distance band set up of Figure 4 , but with postcodes with potentially visible wind farms that were refused planning

permission, alongside the usual visible-operational cases. The results are quite surprising. Refusal events seem to be associated with positive price effects, and these are very large close to the proposed wind farm locations. One potential explanation for these positive impacts is that refusal of planning permission may trigger price effects, if it signals to home owners and buyers that the local planning authority will be unwilling to proceed with future wind farm developments in the local area.

It is also possible that places where wind farms were refused permission were the subject of vigorous local campaigning, and these campaigns may have lowered prices prior to refusal – e.g. because local residents tried to sell quickly, or because the campaigns raised awareness amongst potential buyers. The positive effects from refusal of permission may therefore represent some bounce back of prices to pre-planning levels. Of course if similar effects were observed during the planning and pre- approval periods for operational wind farms, the results presented so far could underestimate of the impact of visible operational wind farms, because there is a pre-operation dip in prices in response to the planning process, and this will reduce the estimated pre-post operation price differential. In this case the refusal effects are, in effect, the mirror image of the effect of wind farm planning on local prices (which it is not possible to estimate directly, for reasons discussed in 4.2).

Under either of these assumptions, the difference-in-difference-in-difference estimates implicit in the graph in Figure 7 might provide better estimates of the effects of wind farm operation relative to the re-planning stage. These estimates are shown at the bottom of the figure, and are substantially bigger than the baseline estimates of visible operational turbines in Table 6 and elsewhere in this paper. Given the uncertainties in interpretation, these estimates are best treated as an upper bound to the potential impacts.

6 Conclusions

The paper has estimated the effects of visible wind farm turbines on housing prices in England and Wales. The study used a micro-aggregated postcode-by-quarter panel of housing transactions spanning 12 years, and estimated difference-in-difference effects using a postcode fixed effects based methodology. Comparisons were made between postcodes in which turbines became operational and visible with various control groups. All the results point in the same direction, regardless of the specific research design. Wind farms reduce house prices in postcodes where the turbines are visible. This price reduction is around 5-6% for housing with a visible wind farm of average size (11 turbines) within 2km, falling to 3% within 4km, and to 1% or less by 14km which is at the limit of likely visibility.

Evidence from comparisons with places close to wind farms, but where wind farms are less visible suggests that most if not all of these price reductions are directly attributable to turbine visibility. The effects of wind farms on the prices of locations with limited visibility are statistically insignificant or even positive – providing some indication that wind farms generate some local benefits, though these are more than offset by the dis-amenity associated with visibility. This may be why previous studies that have failed to distinguish between places where nearby turbines are visible and places where they are not, have failed to find effects. As might be expected, the effects are bigger and have greater geographical spread for larger wind farms. Wind farms with 20 or more turbines reduce prices by 3% at distances between 8-14km, and by up to 12% within 2km.

The paper presents a number of robustness tests, but even so the findings should be interpreted with some 'health warnings'. The information on wind farm location and visibility is limited by lack of data on the precise location of individual turbines, so the classification of postcodes in terms of visibility is subject to measurement error. This is most likely to result in some attenuation

of the estimated effects. Steps were taken to minimise this problem by eliminating postcodes where visibility is ambiguous. More importantly, the data lacks historical information on the timing of events leading up to wind farm operation (announcement, approval, construction etc.) so the price effects reported here relate to the difference between the post-operation and pre-operation periods, for the periods spanned by the data. However, the wind farm development cycle can last a number of years, and price changes evolve fairly slowly over time in response to events. Again the most likely consequence of this is that the results underestimate the full impact between the pre-announcement and post-construction phase. Results based on comparison of operational sites and those refused planning permission suggest that these full impacts could be much bigger – the upper-bound estimate is about 15% within 2km of the average wind farm. Further data collection effort is required to fully address these issues.

Well established theories (Rosen 1974) suggest that these price effects can be interpreted as marginal willingness to pay to avoid the dis-amenity associated with wind farm proximity and visibility, net of any benefits provided by the wind farms in terms of economic opportunities, community payments or other financial compensation. If we take the figures in the current paper seriously as estimates of the mean willingness to pay to avoid wind farms in communities exposed to their development, the implied costs are quite substantial. For example, a household would be willing to pay around £600 per year to avoid having a wind farm of average size visible within 2km, or would be willing to pay around £200 per year to avoid having a large wind farm visible within 8-14km.[7] The implied amounts required per wind farm to compensate households for their loss of visual amenities is therefore fairly large: about £12 million for a typical 11 turbine wind

[7] This is based on an average house price of £140,000, a 3% price reduction and a 5% interest rate

farm, based on the average numbers of households with turbines currently visible within 4km.[8] The corresponding values for large wind farms will be much higher than this, as their impact is larger and spreads out over much greater distances.

These per-household figures are comparable to the highest estimates from the stated preference literature. The figures cited in Bassi, Bowen and Fankhauser (2012) are typically much less than £100 per year, though this is per individual, so household willingness to pay could be higher. It is worth noting, however, that the revealed preference method based on housing markets elicits the preferences of marginal home owners in the areas close to wind farms, which may differ from the mean willingness to pay amongst all households in the population.

[8] Based on: around 1.8% of postcodes within 4km of a visible turbine; the number of households in England and Wales is 23.4 million; the capitalised effect of visibility within 4km is 3%; the average house price is £140000; and the number of operational turbines is 148.

References

Bell, Derek, Tim Gray & Claire Haggett (2005), The 'Social Gap' in Wind Farm Siting Decisions: Explanations and Policy Responses Environmental Politics, 14 (4) 460 – 477

Busso, Matias, Jesse Gregory & Patrick Kline (2013) Assessing the Incidence and Efficiency of a Prominent Place Based Policy, American Economic Review, American Economic Association 103(2) 897-947

DECC (2013a) Digest of United Kingdom Energy Statistics, Chapter 6: Renewable sources of energy, Department of Energy & Climate Change, London

DECC (2013b) Digest of United Kingdom Energy Statistics, Internet Booklet, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225056/DUKES_2013_internet_booklet.pdf, accessed November 2013

European Commission (2006) Energy Technologies: Knowledge – Perception – Measures, European Union Community Research Report, Luxembourg: Office for Official Publications of the European Communities

Hoen, Ben, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (2013) A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States, Environmental Energy Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-6362E

Hoen, Ben, Ryan Wiser, Peter Cappers, Mark Thayer, and Gautam Sethi (2011), Wind Energy

Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices, Journal of Real Estate Research

Moulton, Brett (1990) An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units, The Review of Economics and Statistics Vol. 72, No. 2, May, 1990

Munday, Max, Gill Bristow, Richard Cowell, Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity? Journal of Rural Studies 27 1-12

Roback , Jennifer (1982), Wages, Rents, and the Quality of Life, The Journal of Political Economy, 90 (6) 1257-1278.

Rosen, Sherwin (1974) Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition, The Journal of Political Economy, 82 (1) 34-55

Samuela Bassi, Alex Bowen and Sam Fankhauser (2012) The case for and against onshore wind energy in the UK, Grantham Research Institute on Climate Change and Environment Policy Brief, London

Thompson, Samuel (2011) Simple Formulas for Standard Errors that Cluster by Both Firm and Time, Journal of Financial Economics, 99 1–10

University of Newcastle (2002) Visual Assessment of Windfarms Best Practice. Scottish Natural Heritage Commissioned Report F01AA303A.

Vidal, John (2012) Wind turbines bring in 'risk-free' millions for rich landowners, Guardian

28th February online http://www.theguardian.com/environment/2012/feb/28/windfarms-risk-free-millions-for-landowners, accessed November 2013

Bakker, R.H., E. Pedersen, G.P. van den Berg, R.E. Stewart, W. Lok, J. Bouma (2012) Effects of wind turbine sound on health and psychological distress, Science of the Total Environment, 425 42–51.

Farbouda, A., R. Crunkhorna and A Trinidadea (2013), 'Wind turbine syndrome': fact or fiction? The Journal of Laryngology & Otology, 127 (03) 222-226

Table 1: Windfarm summary data, 1992-2011 England and Wales

	Mean	s.d.	Min	Max
Operational				
Turbines mean	11.2	15.4	1	103
Turbines median	6			
MW capacity	18.6	39.2	.22	300
Height to tip	90.9	29.2	42	150
Offshore	14			
Forest	8			
Farm	82			
Wild	39			
Coast	5			
Status				
Operational	148			
Approved	61			
Construction	10			
Planning	160			
Refused	57			
Withdrawn	34			

Table 2: Main estimation sample summary data, 2000-2011 England and Wales

	Visible-operational turbines within 14km	
	Mean	s.d.
Log price	11.542	0.654
New build	0.043	0.197
Detached house	0.261	0.428
Semi-detached house	0.065	0.24
Terraced house	0.332	0.455
Flat/Maisonette	0.342	0.462
Freehold	0.859	0.34
Proportion with visible turbines within 1km	0.004	0.062
Proportion with visible turbines within 1-2km	0.014	0.119
Proportion with visible turbines within 2-4km	0.046	0.210
Proportion with visible turbines within 4-8km	0.158	0.365
Proportion with visible turbines within 8-14km	0.306	0.461
Obs	797470	

Table 3: Fixed effects estimates; sample with operational windfarm within k km, during 2000-2011

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Radius	1km	1km	2km	2km	4km	4km	8km	8km	14km	14km
Control vars.	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Postcode fixed fx										
Visible and	-0.0539**	-0.0713**	-0.0601***	-0.0596***	-0.0308***	-0.0289***	-0.0184***	-0.0081**	-0.0097***	-0.0053**
operational:	(0.0185)	(0.0239)	(0.0097)	(0.0099)	(0.0059)	(0.0056)	(0.0033)	(0.0031)	(0.0020)	(0.0018)
Obs	6,164	6,164	27,854	27,854	99,114	99,114	339,991	339,991	797,470	797,470
R-squared	0.8098	0.8421	0.8140	0.8471	0.8292	0.8562	0.8460	0.8699	0.8423	0.8674

Robust standard errors in parentheses, clustered at Census OA *** p<0.001, ** p<0.01, * p<0.05
Data in postcode-quarter cells, 2000-2011. Dependent variable is postcode-quarter-mean log prices.
Visible and operational is the treatment indicator (visible, 0<distance<k, operational) described in Section 4, indicating that a postcode has an operational windfarm visible within the specified radius k.
Sample restricted to postcodes with visible-operational turbines within distance k at some time over the study period.
All regressions control for quarter dummies.
Control variables are postcode slope-by-year, elevation-by-year, aspect by-year dummies, proportions of sales of detached, semi-detached, terraced, flat/maisonette.

Table 4: Balancing tests for various housing characteristics. 4km radius

(1) New	(2) Detached	(3) Semi	(4) Terraced	(5) Flat	(6) Leasehold	(7) Age	(8) Area	(9) Beds
-0.0051	0.0011	-0.0001	-0.0059	0.0049	0.0034	-0.6389	0.3803	-0.0383
(0.0062)	(0.0040)	(0.0017)	(0.0046)	(0.0039)	(0.0022)	(1.7063)	(2.0852)	(0.0457)
99,114	99,114	99,114	99,114	99,114	99,114	13,256	13,256	13,256
0.4968	0.6412	0.6462	0.5200	0.6461	0.7595	0.9248	0.8133	0.7936

(10) Baths	(11) No CH	(12) No Gar	(13) Detached	(14) Semi	(15) Terraced	(16) PB Flat	(17) Conv Fl	(18) Other
0.0587	-0.0051	-0.0018	-0.0214	0.0099	-0.0072	0.0194	0.0040	-0.0048
(0.0451)	(0.0152)	(0.0307)	(0.0229)	(0.0284)	(0.0244)	(0.0150)	(0.0097)	(0.0053)
13,256	12,678	13,256	13,256	13,256	13,256	13,256	13,256	13,256
0.7709	0.6874	0.7601	0.7898	0.7620	0.8224	0.8087	0.7796	0.7805

Specifications as in Table 3, column 6, but with property type control variables excluded.

Table 5: Robustness to additional control variables and trends. 4km radius

	Baseline estimate from Table 3	(1) Sub-sample with additional Nationwide property Xs	(2) Nationwide prices and Xs	(3) Census output area Xs x trends	(4) Control for regional trends from from full dataset	(5) Control for pre-operational nearest wind farm trends
Visible operational turine within 4km	-0.0289***	-0.0463**	-0.0405***	-0.0275***	-0.0272***	-0.0219***
	(0.0056)	(0.0145)	(0.0120)	(0.0057)	(0.0052)	(0.006)
Observations	99,114	12,678	12,678	93,510	99,114	99114
R-squared	0.8562	0.8913	0.9768	0.8383	0.8582	0.857

Robust standard errors in parentheses, clustered at Census OA *** p<0.001, ** p<0.01, * p<0.05
Column 2 controls for floor size, number of bedrooms, bathrooms, central heating type, garage type, and detailed property type for postcodes represented in Nationwide data. Column 3 similar, using price reported in Nationwide data. Column 3 adds linear trends interacted with census 2001 variables at output area (OA) level (OA land area, proportion with no qualifications, proportion with tertiary qualifications, proportion born UK, proportion white ethnicity, proportion employed, proportion in social rented housing).
Column 5 controls for piecewise constant quarterly price trends predicted from transactions beyond 14km from any windfarm, operational, planned or refused (coefficient on predicted prices 0.456 (0.021).
Column 6 controls for nearest operational windfarm linear time trends estimated from pre-operational period (coefficient on predicted prices 0.103 (0.014).
Specifications otherwise as Table 3, column 6,

Table 6: Postcode fixed effects estimates; distance bands; sample with operational windfarm within 14km, during 2000-2011

	(1)	(2)
Control Xs	No	Yes
Visible, operational <1km	-0.0332*	-0.0580**
	(0.0131)	(0.0180)
Visible, operational 1-2km	-0.0294***	-0.0556***
	(0.0085)	(0.0099)
Visible, operational 2-4km	-0.0011	-0.0189**
	(0.0046)	(0.0060)
Visible, operational 4-8km	-0.0094**	-0.0116***
	(0.0029)	(0.0033)
Visible, operational 8-14km	-0.0171***	-0.0104***
	(0.0020)	(0.0020)
Observations	797,470	797,470
R-squared	0.8424	0.8675

Robust standard errors in parentheses, clustered at Census OA *** p<0.001, ** p<0.01, * p<0.05

Table 7: Postcode fixed effects estimates; comparisons of operational windfarms with planned windfarms within k km, during 2000-2011

	(1)	(2)	(3)	(4)	(5)
Radius	1km	2km	4km	8km	14km
Control Xs	Yes	Yes	Yes	Yes	Yes
Operational	-0.0770***	-0.0595***	-0.0183**	-0.0095**	-0.0054**
	(0.0218)	(0.0103)	(0.0060)	(0.0032)	(0.0020)
Planned	-0.0153	0.0042	0.0049	0.0117***	0.0109***
	(0.0165)	(0.0078)	(0.0043)	(0.0028)	(0.0018)
Obs.	11,117	50,754	169,237	506,208	1,085,839
R-squared	0.8480	0.8585	0.8656	0.8706	0.8684

Robust standard errors in parentheses, clustered at Census OA *** p<0.001, ** p<0.01, * p<0.05

Table 8: Postcode fixed effects estimates; comparisons of visible operational windfarms with non-visible operational windfarms within k km, during 2000-2011

	(1)	(2)	(3)	(4)	(5)
Radius	1km	2km	4km	8km	14km
Control Xs		Yes	Yes	Yes	Yes
Operational visible	-	-0.0596***	-0.0274***	-0.0074*	-0.0059***
		(0.0099)	(0.0056)	(0.0030)	(0.0018)
Operational	-	-0.0688	0.0059	0.0162***	-0.0117***
not visible		(0.0630)	(0.0133)	(0.0042)	(0.0021)
Obs.	-	28,951	116,595	508,147	1,391,879
R-squared	-	0.8498	0.8578	0.8712	0.8685

Robust standard errors in parentheses, clustered at Census OA *** p<0.001, ** p<0.01, * p<0.05

Table 9: Effects by windfarm size and distance bands

	(1) <2km	(2) 2-4km	(3) 4-8km	(4) 8-14km
1-10 turbines	-0.0531***	-0.0153*	-0.0031	-0.0057**
	(0.0091)	(0.0061)	(0.0035)	(0.0022)
11-20 turbines	-0.0565**	-0.0321***	-0.0483***	-0.0117***
	(0.0189)	(0.0097)	(0.0059)	(0.0035)
20+ turbines	-0.1163***	-0.0568***	-0.0593***	-0.0276***
	(0.0284)	(0.0171)	(0.0063)	(0.0030)

Obs. 797469. R-squared 0.8676

Figure 1: Development of wind turbines in England and Wales, 1993-2011

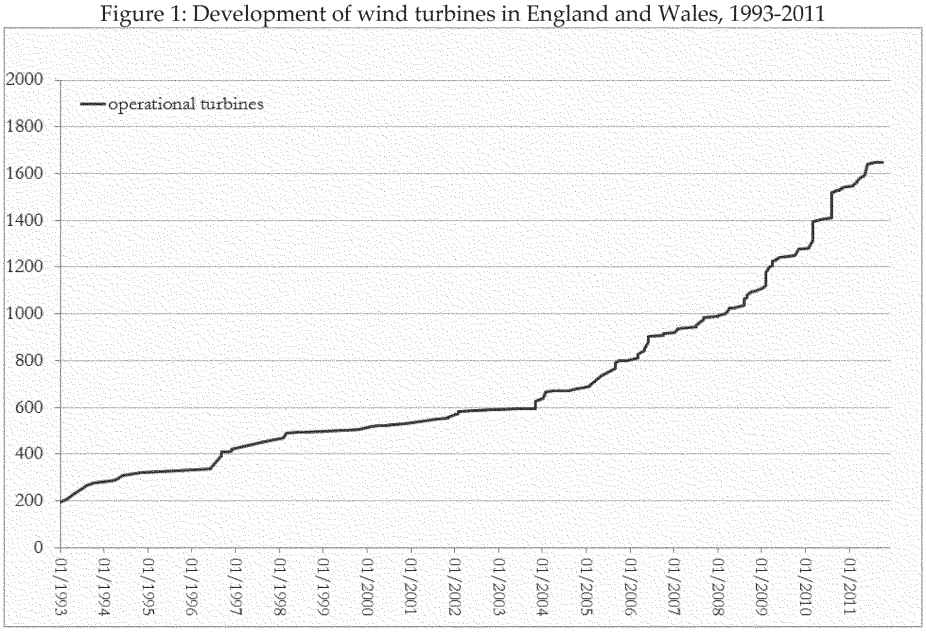
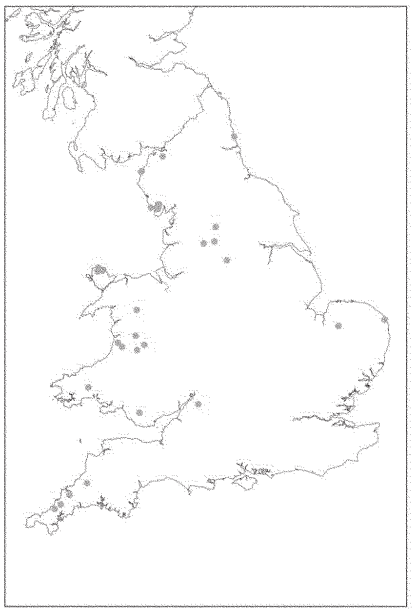
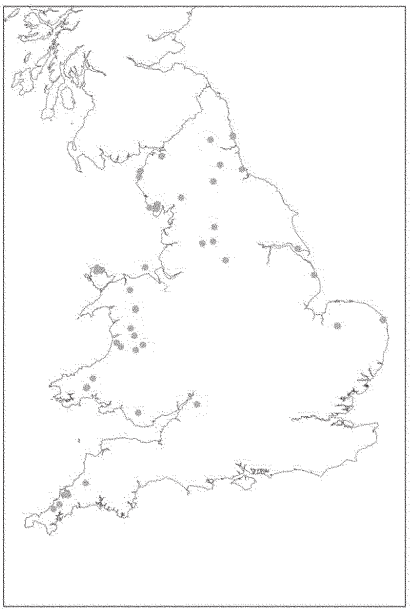


Figure 2: Development of wind turbine sites in England and Wales

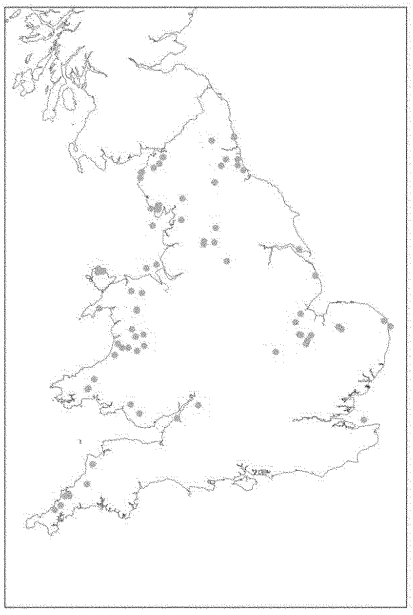
2000: 30 sites



2003: +20 sites



2007: +33 sites



2011: +65 sites

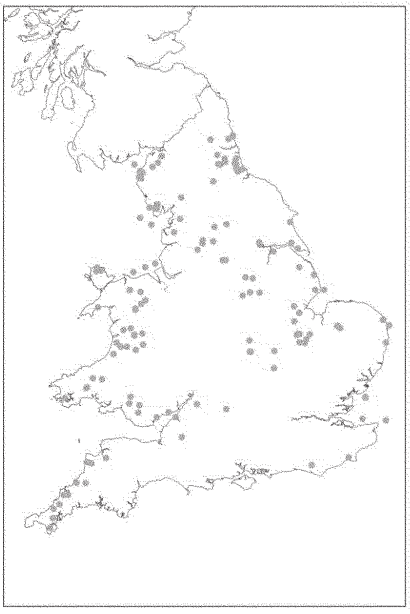


Figure 3: Spatial distribution of planned windfarm sites in 2011

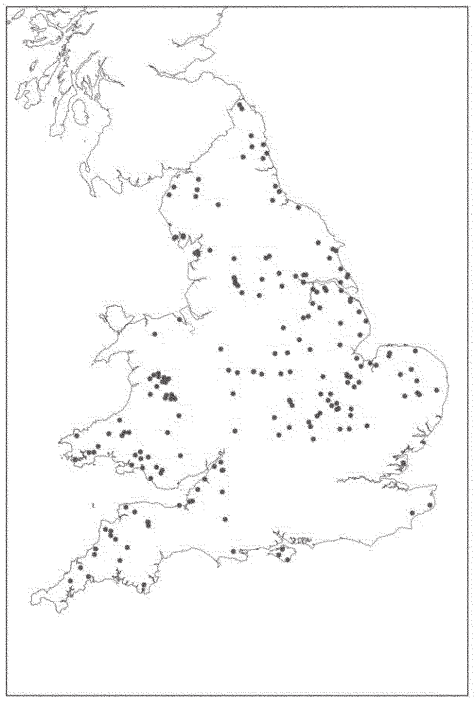
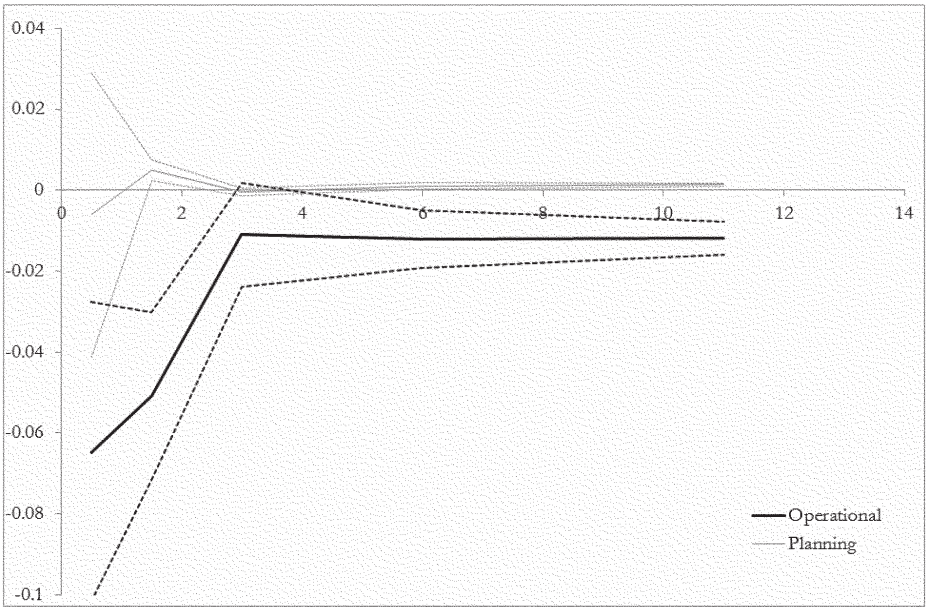


Figure 4: Comparisons by planning status: Postcode fixed effects estimates; distance bands; controls include distance-band-by-status-by-year effects



Difference-in-difference-in-difference comparisons at each distance band					
	<1km	1-2km	2-4km	4-8km	8-14km
Operational v	-0.0586*	-0.0558***	-0.0106***	-0.0132***	-0.0133**
Planning	(0.0260)	(0.0107)	(0.0065)	(0.0036)	(0.0021)

Figure 5: Example viewshed. Haswell Moor wind farm in north east England

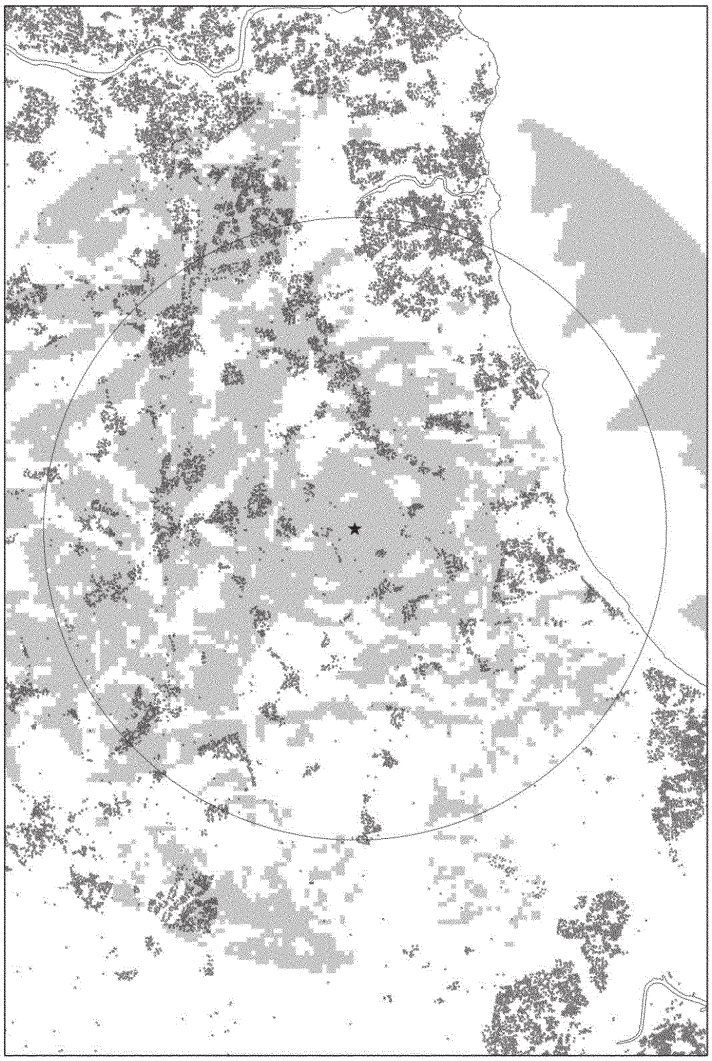
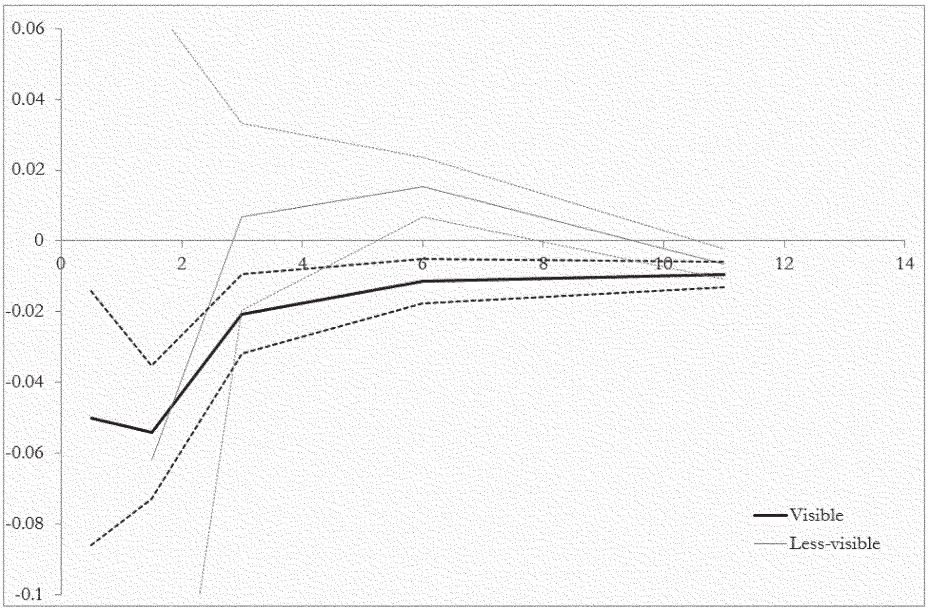
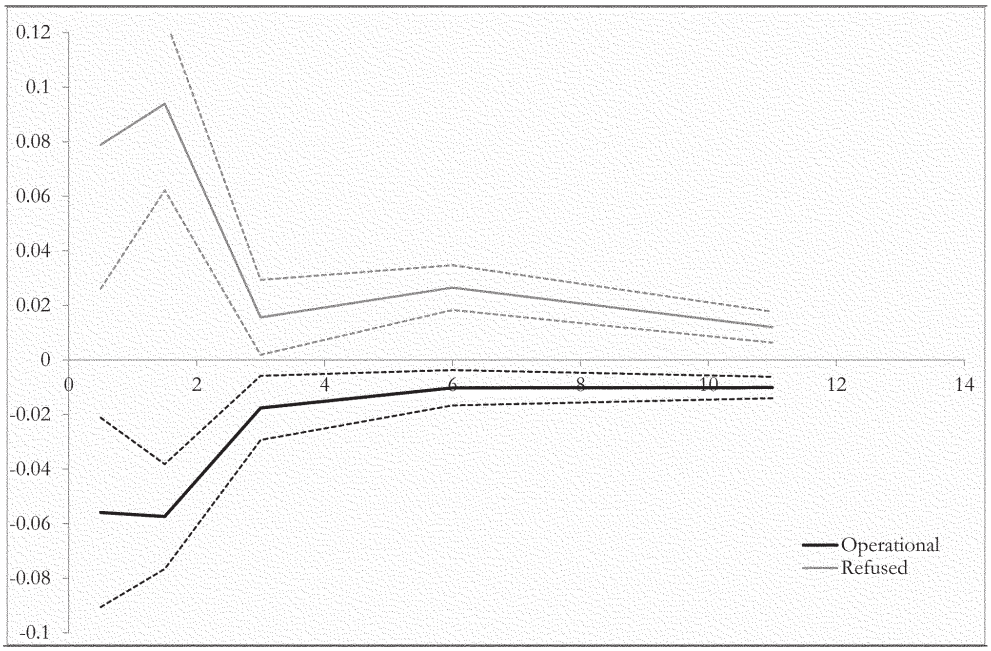


Figure 6: Comparison by visibility: Postcode fixed effects estimates; distance bands; controls include distance-band-by-visibility-by-year effects



Difference-in-difference-in-difference comparisons at each distance band					
	<1km	1-2km	2-4km	4-8km	8-14km
Visible v	-	0.0079	-0.0275†	-0.0267**	-0.0029
less-visible	-	(0.0670)	(0.0146)	(0.0054)	(0.0029)

Figure 7: Comparisons by planning status: Postcode fixed effects estimates; distance bands; controls include distance-band-by-status-by-year effects



Difference-in-difference-in-difference estimates

	0-1km	1-2km	2-4km	4-8km	8-14km
Operational v	-0.1349***	-0.1514***	-0.0332***	-0.0367***	-0.0220***
Refused	(0.0322)	(0.0189)	(0.0092)	(0.0054)	(0.0035)

7 Appendix

There are potential concerns over the standard errors of the estimates presented in the main results, because the regression unobservables are potentially correlated over space in unknown ways, and are undoubtedly serially correlated within postcodes. As is well known (Moulton 1990), the standard errors on aggregated treatment variables can be downward biased when there is serial and/or spatial correlation in the regression error terms, although in the current application the treatment is by its nature aggregated. In the current analysis the treatment is constructed at postcode level, although the effect is aggregated across postcodes within the distance bands in Table 6 for each wind farm, since when a windfarm is built it affects visibility in all postcodes within that distance band. Of course this is a genuine effect due to the geographical level of the treatment, not an arbitrary geographical aggregation of micro level interventions, so the Moulton example does not necessarily apply exactly.

The usual adjustment for this kind of problem is to use 'clustered' standard errors at the level of the treatment - i.e. distance band-by-windfarm clusters in the current example - though in this case this would be an extremely conservative assumption, since it assumes, in effect that the errors are perfectly correlated both within a distance band, both in the cross section and over time. An equivalent evaluation of a national policy would dictate a single cluster, which is clearly a silly assumption. On the other hand, when researchers use fixed effect estimators, they generally cluster at the level of the fixed effects – i.e. postcodes in this case - to allow for serial correlation within the erros within panel units. The standard errors reported in the main results cluster at Census output area (OA) level, but given the uncertainty over the appropriate level, Table 10 in the Appendix explores a range of clustering options, using the specification of Table 6.

The first column reports the standard errors with OA level clusters. The second column clusters at groups define by the distance-band, the identifier of the nearest windfarm and the time period (quarter) allowing for cross sectional spatial error autocorrelation or heteroscedasticity across these groups. The standard errors are smaller in this case. The next column allows for clusters both at postcode level (to allow for serial correlation within panel units) and for each quarter (allowing for correlation across all panel units within each period).[9] These standard errors are close to those estimated using OA clusters, and seem likely to account for most plausible sources of bias in the standard errors.

The remaining columns adopt other more conservative assumptions. Column 4 expands to Census ward clusters, allowing for cross sectional and serial correlation within census wards, which doubles the standard errors, although the coefficients remain significant witn the 0-1 and 1-2 km bands. Finally, the last column adopts the most conservative clustering assumption and allows for arbitrary correlation over time and in the cross section within wind-farm-by-distance-band-groups. The estimates in the 0-1km and 1-2km bands are still significant, if only at the 10% level.

[9] Using the method of Thompson (2011).

Table 10: Postcode fixed effects estimates; distance bands; sample with operational windfarm within 14km, during 2000-2011. Alternative clustering assumptions.

Fixed effects	Postcode	Postcode Nearest windfarm x distance-band x quarter	Postcode Postcode and quarter (Thompson 2011)	Postcode	Postcode Nearest windfarm x distance-band
Clusters	OA			Ward	
Number of clusters	21278	22526	87517 + 48	1942	614
Control Xs	Yes	Yes	Yes	Yes	Yes
Visible, operational <1km	-0.0580**	-0.0580***	-0.0580**	-0.0580*	-0.0580†
	(0.0180)	(0.0150)	(0.0188)	(0.0256)	(0.0313)
Visible, operational 1-2km	-0.0556***	-0.0556***	-0.0556***	-0.0556**	-0.0556*
	(0.0099)	(0.0089)	(0.0082)	(0.0195)	(0.0268)
Visible, operational 2-4km	-0.0189**	-0.0189***	-0.0189**	-0.0189	-0.0189
	(0.0060)	(0.0056)	(0.0059)	(0.0124)	(0.0206)
Visible, operational 4-8km	-0.0116***	-0.0116*	-0.0116*	-0.0116	-0.0116
	(0.0033)	(0.0051)	(0.0053)	(0.0080)	(0.0180)
Visible, operational 8-14km	-0.0104***	-0.0104***	-0.0104**	-0.0104*	-0.0104
	(0.0020)	(0.0031)	(0.0034)	(0.0049)	(0.0097)
Observations	797,470	797,470	797,470	796,829	797,470

*** p<0.001, ** p<0.01, * p<0.05, †p<0.10

Appendix 6

Research Papers

Research and Information Service
Briefing Paper

Paper 000/00 20 July 2013 NIAR 767-13

Des McKibbin

The contribution of wind to Northern Ireland's energy needs?

1 Introduction

Towards the end of the 20th and beginning of the 21st centuries, there has been a significant growth in the amount of electricity generated from wind energy. Within the European Union (EU) cumulative wind power capacity increases by an average of 32% per year.[1] Indeed the OECD (Organisation for Economic Co-operation and Development) suggests wind power is the fastest growing form of electricity generation in the world.[2]

Wind power alone will not replace fossil fuels; rather it is envisaged that it will form part of a wider mix of renewable energy sources that will potentially play a significant role in reducing our reliance on fossil fuels, thereby reducing CO2 emissions and improving fuel security.

Despite the advantages offered by wind power, it is a contentious issue; its proponents often accuse journalists of "cheery-picking" stories that portray wind turbines as expensive, dangerous, inefficient and unreliable. However, there are numerous examples of peer-reviewed studies pointing to the benefits of wind power.

What is clear from a cursory examination of the literature, which is extensive, is that those who approach the debate around wind power with a vested interest will often be unswaying in their conviction that wind energy is either a good or a bad thing. Therefore, a level of caution is always advised when considering evidence on this issue.

The Department for Enterprise, Trade and Investments (DETI) Strategic Energy Framework (SEF) 2010 has set a target of producing 40% of Northern Ireland's power from renewable

1 European Commission: Energy. 'Renewable energy: wind energy' [online] available from: *http://nia1.me/gw*

2 Justus, D. (2005) Wind Power Integration into Electricity Systems

energy sources by 2020 however, this strategy recognises that fossil fuels will continue to make up the greater part of Northern Ireland's energy mix for the foreseeable future.[3]

- This paper considers the current and potential contribution of wind energy to the UK and Northern Ireland's electricity generation. Furthermore consideration is also given to some of the common 'shortcomings' often associated with wind energy.

3 DETI (2010) Energy: A Strategic Framework for Northern Ireland [online] available from: *http://nia1.me/1kk*

2 Renewable energy sector

In 2012, 11.3 per cent of electricity generated in the United Kingdom came from renewable energy sources.[4] Of this 11.3 per cent:

- 29 per cent came from onshore wind;
- 18 per cent from offshore wind;
- 13 per cent from hydro; and
- 3.2 per cent of generation was from solar PV.
- 37 per cent of renewables generation was from bioenergy; [5]

Table: 1 Share of each UK regions generation, by fuel type, 2010 and 2011. Source: DECC (2013)

	Northern Ireland	Wales	Scotland	England
2010		%		
Coal	24.4	18.4	29.4	29.2
Gas	64.0	49.8	16.8	50.1
Nuclear	-	17.2	30.6	14.1
Renewables	10.2	5.0	19.2	4.7
Oil and Other	1.4	9.5	4	1.8
2011				
Coal	18.4	22.6	21.0	32.0
Gas	68.0	39.1	45.7	43.6
Nuclear	-	19.7	33.0	16.6
Renewables	12.6	7.9	26.8	6.2
Oil and Other	1.1	10.7	3.5	1.5

4 DECC (2013) Energy trends section 6: renewables [online] available from: *http://nia1.me/1jx*

5 Ibid.

3 Wind energy

As these figures show, wind is the single most deployed renewable electricity technology in the UK, with an onshore capacity to generate around 7 TWh annually. Figure one shows the extent of both the onshore and offshore wind energy generation across the United Kingdom (UK). Currently there are almost 5,000 turbines generating enough energy to power 5.45million homes, with the potential to reduce CO2 emissions by 10million tonnes.

Figure 1: UK Wind Energy Database Operational Figures – At a Glance

Source: Renewables UK

Units of power and energy

Power refers to the rate at which energy is transferred, used, or converted from one form to another (power = energy/time).

It can be used to measure how much energy a device needs to operate satisfactorily. In the case of electricity generation it is used to measure the rate at which coal, gas, oil, wind, or sun etc. is converted into electricity.

The basic unit of power used when referring to electricity is the Watt. There are a number of terms used to describe multiples of watts:

- 1000 Watts = 1 kilowatt (kW);
- 1000 kilowatts = 1 Megawatt (MW);
- 1000 Megawatts = 1 Gigawatt (GW); and,
- 1000 Giga Watts = 1 Tera Watt (TW).

The amount of energy created or consumed is typically measured in kilowatt hours. It measures power over time (energy = power x time). It is used, for example to measure and bill consumers for the amount of electrical energy delivered to their home.

A 1kW system will consume or produce 1 kilowatt hour of energy in 1 hour. A 10 kilowatt system will produce or consume 1kilowatt hour in six minutes. There are a number of common multiples:

- 1000 Watts or 1 kilowatt for 1 hour = 1 kilowatt hour (kWh);
- 1000 Kilowatt hours = 1 Megawatt hour (MWh);
- 1000 Megawatt hours = 1 Gigawatt hour (GWh); and
- 1000 Gigawatt hours = 1 Terawatt hour (TWh).

To put the above into context, the average household uses roughly 5 MWh per year for their domestic electricity requirements. Alternatively, 1 kWh will light a 100-watt light bulb for 10 hours.

3.1 Regional variations

The wind energy sector is most developed in Scotland where over 60% of the UKs wind resource is found. Currently, this equates to around around 2.5GW of operational onshore wind capacity. Scotland is followed by England (~0.9GW), Wales (~0.4GW) and Northern Ireland (~0.3GW).[6]

The Renewables UK Wind Power Database includes information on both operational and planned wind projects. Table 2 compares the total wind power capacity for Northern Ireland with Scotland, taking into account both planned and operational projects:

Table 2: Comparison of wind farm operations in Scotland and Northern Ireland

	Projects	**Turbines**	**Capacity**	**Av. Turbine Capacity**
Northern Ireland	80	522	1096.09	3.176
Scotland	338	3546	7702.995	11.280

Source: Renewables UK

Within Northern Ireland there is the capacity to produce 1096 MW (1.096GW); 40 per cent of this capacity is in County Tyrone; 32% in County Londonderry; the remaining capacity is spread across counties Fermanagh and Antrim while counties Armagh, Down have only one turbine each. Table three shows that less than half of Northern Irelands wind projects are operational, therefore capacity is set to double in the coming years.

Table 3: Wind Projects in Northern by County

	Total Projects	Operational	Under Construction	Consented	No. Of Turbines	Capacity (MW)	Av. turbine capacity
Antrim	18	12	0	6	73	126.21	1.742
Armagh	1	0	0	1	1	0.25	0.250
Down	1	1	0	0	1	0.8	0.800
Derry	19	7	3	9	162	354.43	2.096
Fermanagh	7	4	0	3	62	128.9	2.114
Tyrone	31	15	0	16	209	449.2	2.026
NI Total	**80**	**39**	**3**	**38**	**522**	**1096.09**	**3.176**

Source: Renewables UK

When considering the potential of wind power it is important to distinguish between capacity and production. The first is the amount of installed power in a region, and is measured in MW (tables 2 and 3). Production is how much energy is produced by that capacity, and is measured in MWh. The breakdown of renewable energy produced in Northern Ireland by renewable technology is provided in table 4.[7]

6 Ibid (Page 30)

7 AQW 23447/11-15 [online] available from: *http://nia1.me/1km*

Table 4: Renewable electricity as a percentage of total consumption 2012-2013

Technology	Output (MWh)	Contribution as a proportion of output (%)	Contribution to overall electricity generated (%)
Onshore Wind	1,026,322	92.4	12.62
Landfill Gas	57,394	5.2	0.71
Hydro	9478	0.9	0.12
Biogas	6064	0.6	0.07
Biomass	5051	0.5	0.06
Tidal	3567	0.3	0.04
Combined Heat & Power	2928	0.3	0.04
Solar PV	12	0	0.00
Total	**1,110,816**	**100**	**13.7**

3.2 The Costs of wind energy

Approximately 75% of the total cost of wind energy is related to upfront costs such as the cost of the turbine, foundation, electrical equipment, grid-connection and so on. Unlike in power plants which rely of fossil fuels - fluctuating fuel costs have no impact on power generation costs of wind turbines. This is one of the major differences between the two production methods:

- a wind turbine is capital-intensive compared to conventional fossil fuel technologies such as a natural gas power plant; while
- as much as 40-70% of costs of fossil fuel generators are related to fuel and Operation and Maintenance.

This cost trade off was characterised in a recent report for the Department of Energy and Climate Change (DECC) which stated:

> *"Plant can be broadly categorised either as being 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 former group comprises most renewable generation and nuclear plant, while the latter group comprises plant running on fossil fuels."*[8]

- Table 4 gives the price structure of a typical 2 MW wind turbine.[9] It is based on a costing on €1,000 per MW installed. Therefore, in this table a typical 2 MW wind turbine will cost €1.2m of which €928,000 (75%) is the cost of the turbine, €109,000 for grid connection and so on.

8 DECC (2011) Review of the generation costs and deployment potential of renewable electricity technologies in the UK [online] available from: *http://nia1.me/1ke*

9 Krohn, S., Morthorst, P.E. and Awerbuch, S. (2009) The Economics of Wind Energy: A report by the European Wind Energy Association

Table 4: Cost structure of a typical 2 MW wind turbine installed in Europe (€ 2006)

	Investment (€1,000/MW)	Share of total cost %
Turbine (ex. Works)	928	75.6
Grid Connection	109	8.9
Foundation	80	6.5
Land rent	48	3.9
Electric Installation	18	1.5
Consultancy	15	1.2
Financial Costs	15	1.2
Road Construction	11	0.9
Control Systems	4	0.9
Total	**1,227**	**100**

Krohn (et al.) 2009

3.2.1 Additional cost factors

Hoogwijka, et al. (2007) distinguishes four mutually related factors which tend to cause additional costs for wind:

- Declining quality of the resource in terms of power density and location, i.e. depletion of the wind resources;
- The need for large investments in back-up capacity due to a low and decreasing "guaranteed capacity" or capacity credit of wind and solar PV power;
- Additional operational requirements, such as an increase of spinning reserve due to the fluctuating nature of wind power; and
- The necessity to discard part of the available wind at higher penetrations unless this energy can be stored.

3.3 Quality of energy supply (i.e. wind intermittency)

The operation of the electricity grid involves a complex process of forecasting the demand for electricity, and scheduling and operating a large number of power plants to meet that varying demand. The instantaneous supply of electricity must always meet the constantly changing demand.[10] However, wind power is an intermittent energy source given the fact that the amount of electricity that can be generated by a wind turbine is totally dependent on the wind speed.[11]

Using an intermittent energy sources such as wind is different to generating electricity in a conventional power plants as the availability and quality of the energy source is outside the control of the system operator. This provides both technical and economic consequences which can last for seconds, minutes, days or longer.[12]

10 Denholm, P., Ela, E., Kirby, B. and Milligan, M. (2010) The Role of Energy Storage with Renewable Electricity Generation. U.S. Department of Energy [online] available from: *http://nia1.me/1kj*

11 Centre for Sustainable Technology (2011) Common concerns about wind power [online] available from: *http://nia1.me/1kd*

12 Hoogwijka, M., Van Vuurenb, D., de Vries, B. and Turkenburga, E. (2007) Exploring the impact on cost and electricity production of high penetration levels of intermittent electricity in OECD Europe and the USA, results for wind energy. *Energy Volume 32 (2007) 1381–1402*

To address this variability, power supply companies must install backup capacity, which kicks in when demand exceeds supply from the wind turbines; failure to do so will adversely affect grid reliability. The need for this backup capacity significantly increases the cost of producing power from wind.

It should be noted at this stage that the impact of this intermittency varies, depending on the concentration of wind power in a region.[13] When this is low as is the case in Northern Ireland the impact is negligible. However, in Scotland where wind power deployment is significantly greater, an irregular supply may pose more of a problem.

In 2008 the UK Parliament Economic Affairs Committee published a detailed overview of intermittency, from a UK context, as part of their report on the Economics of Renewable Energy. The report put forward the following findings:[14]

- Increasing renewables penetration to the Government's 40% target by 2020 would necessitate increasing the reserve of traditional power plants by about 7 – 10 gigawatts (GW)[15]. This will in turn increase balancing costs, currently £300m per year, by between £500m and £1bn per year.
- Increasing the reserve capacity of traditional power stations will have no significant impact on the CO2 benefits associated with wind power;
- Currently, 20% of reserve capacity is required to ensure the system as a whole can accommodate peak demand. Traditional power plants have a 5% chance of being unavailable to meet peak demand. The chances of wind farms being unavailable are significantly higher;
- The scheduled closure of conventional and nuclear power stations in coming years will necessitate the construction of 20-25GWs of generating capacity, in a scenario where like is replaced with like;
- Incorporating 30 GW of additional renewable capacity into the grid, to meet the EU's 2020 target, will require a further 14-19 GW of new fossil fuel and nuclear capacity to replace plants due to close and to meet new demand – almost doubling the total new installed electricity generating capacity required by 2020, compared to a scenario where renewable generation was not expanded.
- Technological solutions are required to alleviate the problem of intermittency;
- Cost-effective energy storage could solve the problem of intermittency, although no viable solution is imminent.

3.4 Storage

An added factor to consider with wind power is what happens when the wind does blow and the amount of energy produced exceeds demand? Technologies do exist that would allow this energy to be stored and used when needed, such as Flow Battery Energy Storage (FBES), however, these are currently not employed in the UK.

According to David Connolly of the University of Limerick (2010) energy storage is a very attractive option for increasing wind penetration onto the electric grid:

> *"…when it is needed energy storage on an electric grid provides all the benefits of conventional generation such as enhanced grid stability, optimised transmission infrastructure, high power quality, increased renewable energy penetration, and increased*

13 University of Massachusetts (2010) Wind Power: Capacity Factor, Intermittency, and what happens when the wind doesn't blow? [online] available from:

14 The United Kingdom Parliament, Economic Affairs Committee *The Economics of Renewable Energy,* Chapter 4: *Renewables in the electricity system* [online] available from: http://nia1.me/1ku

15 1GW equals 1000MWs

and farm capacity, while producing no carbon emissions".[16]

The current solution to managing power shortages in Northern Ireland is primarily based on increased grid interconnection whereby Power NI imports electricity from the Republic of Ireland via the North South Interconnector (NSIC). There are restrictions on this; however, there are plans to install a new NSIC as well as an interconnector between Wales and Ireland that would improve energy security in Northern Ireland:

"Britain will be Ireland's storage device: excess electricity can be sold when the wind is blowing, and imported when it is not".[17]

DETI's Strategic Energy Framework indicates that the Department is considering the potential for electricity storage, such as pump storage using wind power, to complement increasing levels of variable renewable power generation in Northern Ireland.[18]

Díaz-González (2012) suggests this would be a positive move as the predictability improvement of the output of wind power plants with an Energy Storage System (ESS) not only involves technical benefits that favour the incorporation of wind power in the network, but also economic benefits owing to penalty reductions in forecasting errors. In addition, operation costs of the power system can be reduced due to the reduced power reserve requirements of the system. However, he warns that the installation of ESS strongly depends on the economic viability of the project given the high capital costs as well as addition operating and maintenance costs.[19]

Both academic and governmental discourse is promoting energy storage as being *"very much the key to unlocking the door of renewable energy".*[20] This is attested to by the number of innovative solutions currently being proposed or in the early stages of research and development.

One such innovation has been proposed in Denmark. The Danish wind system currently *"covers almost 20% of the Danish power consumption",* but it is recognised within the industry that *"only a limited amount the potential energy is utilised".*[21] In addition to generating energy from the wind for domestic use, Denmark's proximity to and interconnection with neighbouring countries, allows energy to be exported.

In 2003, Eltra, a transmission company operating in western Denmark, reported an export figure of 84% to neighbours Norway, Sweden and Germany. It is argued that Denmark is unable to absorb the large generation into its domestic system.[22] While these exports are profitable, earning €4.7bn in 2007[23], Denmark is searching for a way to retain and utilise more of its generation domestically.

16 Connolly, D. (2010) Review of Energy Storage Technologies for the integration of fluctuating renewable energy [online] available from: *http://nia1.me/1kl*

17 Ibid

18 DETI (2010) Energy: A Strategic Framework for Northern Ireland [online] available from: *http://nia1.me/1kk*

19 F. Díaz-González et al. (2012) A review of energy storage technologies for wind power applications. Renewable and Sustainable Energy Reviews. Vol. 16 pp. 2154–2171

20 Hall, Peter J and Bain, Euan J *Energy-storage and electricity generation* Energy Policy 36 (2008) pp 4352 - 4355

21 Danish Wind Energy Association *Did you know? http://www.windpower.org/en/didyouknow.htm* (accessed 15/01/09)

22 White, David J *Danish Wind: Too good to be true?* The Utilities Journal (2004)

23 Danish Wind Energy Association *The Danish wind industry had a 4.7 billion euros export in 2007 http://www.windpower.org/composite-1971.htm* (accessed 15/01/09)

4 Economics of wind

4.2 Financing

Throughout Europe wind farm expansion has been financed through a number of mechanisms. The vast majority of existing farms in the EU area have been funded through project finance (a project loan backed by the cash flow of the final product). EWEA states that the predictable nature of a wind farm's future cash flow ensures that they are suited to this form of financing. They suggest too, that with the expansion of wind energy, a number of larger firms have chosen to finance projects through balance sheet funding, although such a method has been largely confined to the construction of wind farms. In addition, a minority of projects have been supported by transactions in the structured finance markets (bond markets, etc.).[24]

4.3 Support mechanisms

A number of support mechanisms, designed to directly or indirectly encourage the growth of *all* renewable energy sources, are in place in UK, examples of such mechanisms include:

Renewables Obligation Certificates (ROCs) are the most direct support mechanism employed by the UK Government. Generators receive one ROC for every 1MW of renewable energy they produce. ROCs can then be traded; the current price is approximately £20-30 per ROC.[25]

Generators receive a Levy Exemption Certificates (LECs) for 1MWH of renewable energy produced. Utility companies are required to purchase LECs to offer business customers exemption from the Climate Change Levy. Generators are allowed to sell LECs to utility companies at a price agreed between the two.[26]

The Renewable Energy Guarantee of Origin (REGOs) is awarded to generators for every 1KWH of green energy produced. REGOs have no direct monetary value but do have marketing value in the sense that they provide a certificate of authenticity.[27]

The EU Emissions Trading Scheme (ETS) places an extra cost upon carbon emissions. Holders of an ETS allowance can emit one tonne of Co2, individual generators who exceed this may buy extra permits from companies who have not exceeded their limit. The ETS is therefore favourable to renewable energy producers.[28]

4.4 Employment

Wind energy generation currently employs approximately 102,100 people in the European Union, of these 4,000 are employed in the UK and 1,500 in the Republic of Ireland. Its potential for providing green collar jobs is significant, direct employment amongst world leading countries is substantial: Germany for example employs 38,000 in the wind energy sector; Spain 20,500; and Denmark 17,000. The range of jobs offered within the sector is wide, with high and low skilled opportunities available to workers in the numerous industries which make up the sector: wind energy manufacture; development; construction, operation and maintenance; utilities; and consultancy.[29]

---

24 Wind Energy – The Facts *Part three: Economics of Wind Power* [online] available from: *http://nia1.me/1kq*

25 BERR *Green Energy Certificates* [online] available from: *http://nia1.me/1kr*

26 Ibid

27 Ibid

28 Ibid

29 Wind Energy – The Facts Part three: Economics of Wind Power [online] available from: http://nia1.me/1kq

There is also a notable skill shortage within the sector, largely on account of the sector's rapid growth (339% in the EU alone, 2000-2007). The shortages are mostly acutely felt in professions requiring a higher degree of experience and responsibility, namely:

- Research and Development;
- Operation and Maintenance;
- Projects managers;
- Professionals responsible for securing building permits;
- Financiers; and
- Sales managers.[30]

EWEA have stated that the root of the problem does not stem from the quality of the University system, but is attributable to an imbalance between the number of engineers graduating and the needs of modern economies, which are reliant upon manufacturing and technology. They note a lack of quality secondary level education courses dealing with wind-related activities.[31]

4.5 Life cycle

The lifecycle (approximately 20 years) of conventional wind energy technology consists of five distinct phases:

- Construction – comprising raw material production and the manufacture of the various components, foundations and grid connection cable.
- Onsite erection and assembly – physical erecting of individual wind turbines.
- Transport – includes transportation during the production of raw material, the transport of components to wind farm sites, and transport during operation.
- Operation – the maintenance of turbines during their lifetime, including oil changes, lubrication and transport for maintenance.
- Dismantling – includes the deconstruction and disposal (recycling) of wind farms at the end of their lifespan.

Of the above, construction is the most carbon intensive phase of a wind farm's lifespan. Tests carried out by turbine manufacturer Vestas concluded that the energy payback period (the length of time taken to offset carbon produced during a turbine's lifespan through carbon free energy production) was 6.8 months for their 3MW and 3.2 months for their 2MW onshore turbines. Offshore payback periods were found to be slightly shorter - 6.6 months for 3MW turbine and 3.1 months for 2MW models.[32]

30 Ibid

31 Ibid

32 Wind Power – The Facts *Energy balance analysis* [online] available from: *http://nia1.me/1ks*

Research and Information Service
Research Paper

Paper 000/00 14 October 2013 NIAR 767-13

Suzie Cave

Wind Turbines: Planning and Separation Distances

The following paper is in response to a request from the Environment Committee. It gives a summary of the planning process for wind development and considers Planning Policy and Guidance in Northern Ireland in relation to separation distances of turbines from residential areas. It also gives an account of the situation in the rest of the United Kingdom and the Republic of Ireland. Finally it gives examples worldwide where separation distances are more of an actual requirement

Contents

1 Background

Planning permission is needed for all individual wind turbines and wind farms under the Planning (Northern Ireland) Order 1991.

Accompanying any planning application (on a P1 form) there must be:

- Copies of a site location map showing site boundary with access road and land requiring junction improvement outlined in red;
- Copies of the site layout including access roads within the site, detailed plans to scale including turbines, details of bases, access rods, wind monitoring masts, substation and other ancillary development.
- Details of finishing material (such as on turbines, substations, control rooms, fences etc), landscaping.[1]
- Environmental Impact Assessment

More detail on requirements for a wind application is provided in the Best Practice Guidance document

1.1 EIA

If an Environmental Statement is not submitted voluntarily with an application, most turbine applications will require that the Dept. carry out an Environmental Impact Determination under Schedule 2 (3) (j) of *The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999* as amended by *The Planning (Environmental Impact Assessment) (Amendment) Regulations (Northern Ireland) 2008*

In many cases (for example a single turbine or where the hub height does not exceed 15 metres) applications for individual turbines for domestic purposes will not require to be accompanied by an Environmental Statement.

However, where it is determined that an Environmental Statement is not required, the Department may require the applicant to provide additional information to enable it to process the application – e.g. a noise assessment, ecological study or information on interference with Emergency service communication links etc.

The Dept., states that each application will be judged on its own merits and additional information will depend on the individual circumstances. For example:

- site location,
- turbine height,
- site designations such as A.O.N.B's or Conservation Areas.

1.2 How decisions are made

Applications are assessed using the information provided by the applicant in relation to Planning Policy Statements which are material to decisions made. In the case of wind, PPS 18 'Renewable Energy' is the most relevant PPS as it aims to facilitate the siting of renewable energy generating facilities in appropriate locations within the built and natural environment. PPS 18 is accompanied by a Best Practice Guidance document which provides more technical information on areas such as wind turbine technology, height, spacing, maintenance and planning etc.[2]

1 Detailed in the DOE's Windfarm Development Information Leaflet accessed at *http://www.planningni.gov.uk/index/advice/advice_apply/advice_renewable_energy/renewable_wind_farms.htm*

2 See PPS 18 ' Renewable Energy' and Best Practice Guidance to PPS 18 [available at] *http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_statement_18_renewable_energy-4.htm*

Other policies influencing decisions may include:

- Regional Development Strategy (RDS) for NI 2035 –Ch 3 and 4
- Planning Policy Statement 1 – General Principles
- Planning Policy Statement 2 – Planning & Nature Conservation
- Planning Policy Statement 3 – Access, Movement & Parking
- Planning Policy Statement 6 – Planning, Archaeology and the Built Heritage
- Relevant Development Plans
- DCAN 15 Vehicular Access Standards·
- Planning Strategy for Rural NI DES 4 in relation to ancillary buildings and structures.
- Planning Policy Statement 21 – Sustainable Development in the Countryside in relation to ancillary buildings & structures elsewhere in the countryside.
- Coastal policies in the RDS

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 proposed location in general, and on amenities that ought to be protected. According to the Dept. 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.[3]

1.3 Wind farm decisions

The following table gives information on the number of approved and refused planning applications for onshore wind applications for 2012 and 2013.

Wind farm Decisions

	2012	2013
Approved	14	3
Refused	4	1

Reasons for Refusal

According to information provided by the Department of Environment (see Appendix 1 for more detail) the most common reasons for the refusal of applications in 2012 and 2013 were:

- adverse impact on the visual amenity and landscape character of the area; and
- insufficient information submitted to enable determination of the full impacts of the planning application.

2 Separation Distances

Separation distances (or sometimes referred to as setback) between turbines and residential areas seem to vary greatly between countries in term of the distances, the reason for their establishment and the weight that is given to them i.e. whether they are recommendations or more of a statutory requirement. The following section will look at the current situation in NI and across the rest of the UK and Ireland. It will also look at areas that have introduced more stringent/statutory requirements for separation distances elsewhere in the world.

3 DOE, Best Practice Guidance to PPS18.

2.1 Current situation in NI

In Northern Ireland, there is no statutory separation distances stipulated in legislation. Recommendations or suggestions for separation are made through planning policy and guidance. Planning policy and guidance influence and inform decisions made on applications, therefore it is good practice for a developer to adhere to the recommendations made, however, they are not obligated.

Planning Policy Statement 18 (PPS18) suggests that turbines are a safe technology and that even in the rare event of structural damage occurring incidents of blade throw are most unlikely. Distances are calculated on the basis of noise levels so as to reduce nuisance:

The minimum desirable distance between wind turbines and occupied buildings calculated on the basis of expected noise levels and visual impact will usually be greater than that necessary to meet safety requirements. 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.[4]

The Department of the Environment's best practice guidance on PPS18 goes on to state that:

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).[5]

2.2 UK Position

The policy on siting of wind turbines differs across the UK:

There is no minimum separation distance in English planning law or guidance. With regards to proximity to dwellings, the draft National Policy Statement on Renewable Energy (2010) states:

Commercial scale wind turbines are large structures and can range from tip heights of 100m up to 150m although advances in technology may result in larger machines coming on the market. All wind turbines generate sound during their operation. As such, appropriate distances should be maintained between wind turbines and residential properties to protect residential amenity. The two main impact issues that determine the acceptable separation distances are visual amenity and noise.

The Government Companion Guide to Planning Policy Statement 22 (PPS22): Renewal Energy notes that safety is not really an issue and that calculations are based on noise and visual impact:

The minimum desirable distance between wind turbines and occupied buildings calculated on the basis of expected noise levels and visual impact will often be greater than that necessary to meet safety requirements. 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.

The UK Government stated that they had no plans to introduce proximity rule.[6] However, the Companion Guide to PPS22 gives examples of noise suggesting a practical separation distance of 350 metres. It contains a comparison between typical wind turbine noise at 350 metres and other common noise sources.

Well-specified and 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

4 DoE (2007) PPS 18: Renewable Energy [online] available from: *http://nia1.me/od* (page 48)

5 DoE (2009) Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy' [online] available from: http://nia1.me/oe

6 Barclay, C. (2011) Wind Farms - Distance from housing. HOC library

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. Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be completely masked by wind-generated background noise.

The Scottish Planning Policy states:

A separation distance of up to 2km between areas of search and the edge of cities, towns and villages is recommended to guide developments to the most appropriate sites and to reduce visual impact, but decisions on individual developments should take into account specific local circumstances and geography. Development plans should recognise that the existence of these constraints on wind farm development does not impose a blanket restriction on development, and should be clear on the extent of constraints and the factors that should be satisfactorily addressed to enable development to take place. Planning authorities should not impose additional zones of protection around areas designated for their landscape or natural heritage value.[7]

Welsh Planning Policy on separation distance is set out in Technical Advice Notice (TAN) 8: Planning for Renewable Energy. This states that:

500m is currently considered a typical separation distance between a wind turbine and residential property to avoid unacceptable noise impacts, however when applied in a rigid manner it can lead to conservative results and so some flexibility is advised[8].

2.3 Republic of Ireland

Irish Planning guidelines consider a number of issues around the siting of wind turbines but noise is the primary consideration. Planning Policy states that:

> *Good acoustical design and carefully considered siting of turbines is essential to ensure that there is no significant increase in ambient noise levels at any nearby noise sensitive locations [including dwellings].*
>
> *In general, a lower fixed limit of 45 dB(A)10 or a maximum increase of 5dB(A) above background noise at nearby noise sensitive locations is considered appropriate to provide protection to wind energy development neighbours […] in general, noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property is more than 500 metres. Planning authorities may seek evidence that the type(s) of turbines proposed will use best current engineering practice in terms of noise creation and suppression.*[9]

3 Legislative Attempts in UK and ROI

3.1 UK

Currently government policy does not include separation distances. However, within Parliament there have been three Private Members Bills raised in both the House of Commons and the Lords providing proposals for establishing a legal basis for a separation distance between turbines and residential properties.

7 Scottish Executive (2010) Scottish Planning Policy (paragraph 190) [online] available from: *http://nia1.me/ob*

8 Welsh Assembly Government (2005) Welsh Planning Policy: Technical Advice Note 8 – Planning for Renewable Energy (Page 59 [online] available from: *http://nia1.me/oc*

9 The Department of the Environment, Heritage and Local Government (2002) Guidelines for Wind Farm Development [online] available from: *http://nia1.me/of*

Wind Turbines (Minimum Distances from Residential Premises) Bill [House of Lords] 2010-12[10]

Reached a Second Reading in June 2011 the Bill was discontinued at second stage and will make no further progress. Made provision for a minimum distance between wind turbines and residential premises according to the size of the wind turbine;

- From 25m and not exceeding 50m 1000m
- From 50m and not exceeding 100m 1500m
- From 100m and not exceeding 150m 2000m
- Greater than 150m 3000m

Onshore Wind Turbines (Proximity of Habitation) Bill [House of Commons] 2010-12

The Bill had its first reading in November 2010 but subsequently failed to complete its passage through Parliament before the end of the session. It sought to give powers to local authorities to specify in their neighbourhood development plans a 'recommended best practice set-back distance' between onshore wind turbines and habitations. It includes recommendations for this set-back distance, calculated as a multiple of ten turbine rotor diameters.[11]

Wind Turbines (Minimum Distance from Residential Premises) Bill [House of Lords] 2012-13[12]

Re-introduction of the earlier Bill was given its first reading in May 2012. It should be noted that Private Members' Bills are introduced by individual MPs or Lords who are not progressing government business.

In practice a small minority of these types of Bills become law, as less parliamentary time is allocated to these Bills, it is less likely that they will proceed through all the stages. Furthermore, the Bills have no weight in planning decisions as highlighted in a recent appeal, where the inspector stated

"It has been mooted that a private members bill may result in mandatory minimum distances between turbines and dwellings. However at the present time this does not form part of Government policy and whether such measures would be enshrined in legislation is not known. The matter cannot therefore carry weight [.....]" APP/U2615/A/10/2131105 (November 2010)[13]

Local Council

Many Local Authorities are developing their own minimum distances between a wind turbine and housing. Although these 'policies' have limited status it demonstrates that separation distances are considered to be an issue across many areas of England. There are many different examples of practice and approaches undertaken, however, as of yet there are no adopted planning policies in place in England. The table in Appendix 2 provides a range of examples to illustrate both the range of distances selected and the 'status' of the approach.

10 Wind Turbines (Minimum Distances from Residential Premises) Bill *http://services.parliament.uk/bills/2010-12/windturbinesminimumdistancesfromresidentialpremiseshl.html*

11 Onshore Wind Turbines (Proximity of Habitation) Bill *http://services.parliament.uk/bills/2010-12/onshorewindturbinesproximityofhabitation.html*

12 Wind Turbines (Minimum Distance from Residential Premises) Bill 2012-13 *http://services.parliament.uk/bills/2012-13/windturbinesminimumdistancefromresidentialpremises.html*

13 Allerdale Local Plan: Wind Turbine Separation Distance Topic Paper (May 2013) available at *http://www.allerdale.gov.uk/planning-and-buildings/planning/planning-policy/local-plan-downloads/evidence-base/topic-papers.aspx*

Lincolnshire County Council

On 6 June 2012 Lincolnshire County Council issued a press release calling for a halt to the unrestrained invasion of wind turbines across Lincolnshire.[14] The full statement contains its own minimum distance:

c) Residential Amenity

Amenity of existing residential occupants must be maintained at an acceptable level, therefore the following criteria shall be applied:-

- no wind turbine developments shall be constructed in close proximity of a residential property (the accepted distance for separation is 700 metres) however, noise and amplitude modulation issues can be present up to 2km away. Therefore, unless through assessment, it can be demonstrated that there would be acceptable noise levels within the 2km radius of a residential property, the minimum distance should be 2km.
- no wind turbines shall be constructed within a distance of a factor of ten times the diameter of the blades of a residential property to mitigate against flicker, unless intervening topography/structures negates the impact.
- wind farm developments must demonstrate that they would have no unacceptable impact due to noise, amplitude modulation, low frequency sound or vibration on residential amenity.

The House of Commons have informed that the county council is not the planning authority; therefore this would not have the same standing in relation to Government policy.[15]

Milton Keynes

Milton Keynes Council tried to introduce a sliding scale separation distance which required more than kilometre between large wind turbines and residential areas. The Council tried to adopt in its Supplementary Planning Document a sliding scale od distance requirements according to turbine height.

However the policy was quashed in a High Court case taken by energy firm RWE npower renewables. The Judge concluded that

> *"national guidance plainly indicates that local authorities should not have a policy that planning permission for a wind turbine should be refused if a minimum separation distance is not met."*[16]

For more information on other attempts across the UK refer to **Appendix 2**

3.2 Scotland

The third National Planning Framework (NPF3) and draft Scottish Planning Policy (SPP) will influence development plans across Scotland and guide future planning decisions on a range of sectors including transport, energy and infrastructure.

In a statement on the content of the proposals in April 2013, the Scottish Parliament informed that Scottish Ministers intend to extend the separation distance between wind farms and cities, towns and villages.

It is proposed that the SPP will be finalised by the end of 2013, with NPF3 being adopted by 2014.[17]

14 Lincolnshire County council Press Release, Council says 'enough is enough' on wind farms, 6 June 2012

15 Barclay, C. (2011) Wind Farms - Distance from housing. HOC library

16 Planning Portal (April 2013) *http://www.planningportal.gov.uk/general/news/stories/2013/apr13/180413/18042013_5*

17 Scottish Parliament (April 2013) *http://www.scotland.gov.uk/News/Releases/2013/04/Planning-systems-30042013*

3.3 Republic of Ireland

The Environment and Public Health (Wind Turbines) Bill 2012 was introduced to the Oireachtas in November 2012 by Deputy Willie Penrose. It proposed to set minimum separation distances of up to 2km between wind turbines and residential property depending on the size of turbines:[18]

- 500 metres, where the height of the wind turbine is up to 50 metres
- 1,000 metres, where the height of the wind turbine is up to 100 metres
- 1,500 metres, where the height of the wind turbine is up to 150 metres
- 2,000 metres, where the height of the wind turbine is greater than 150 metres

However the Bill was not passed as it was felt that the Bill "could hinder our ability to meet ambitious but necessary and legally binding EU renewable energy and climate change commitments"[19]

This statement was made on the back of research carried out by the All Ireland Research Observatory Ireland (AIRO) who mapped the practical consequences of setting each of separation distances between turbines and residential areas. Each of the maps illustrated (see Appendix 3) the extent of the land area in the Republic of Ireland that would remain following the introduction of these exclusion buffers. In the case of the 500m setback, just under a quarter (23.75%) of the total land area of the country would remain available for new wind farm development. However, this drops to 9.4% for the 1,000 metre setback, 5.2% for the 1,500 setback and 3% for the 2,000m setback.

It is important to note that while the analysis above from AIRO at NUI Maynooth does not take into account other constraints such as:

- Availability of a viable Wind resource
- Suitable site availability
- A buffer for watercourses
- Avoidance of known archaeological features with an appropriate buffer if required
- An airport buffer
- A radar buffer
- A telecommunications buffer
- Landscape constraints for sensitive landscape
- County Development Plan zoning etc.

Therefore the total land area remaining available could in fact be smaller than the scenarios suggest.

4 Worldwide

4.1 Germany

Germany has no national level requirements or recommendations for wind turbine setback distances from residences, however local authorities or municipalities set their own recommendations, or in some cases requirements which include:[20]

18 Information on the Bill is available at *http://www.oireachtas.ie/viewdoc.asp?DocID=22164&&CatID=59*

19 Press Release Wind Action *http://www.windaction.org/posts/35923-wind-energy-lobby-says-bill-would-hinder-industry*

20 K.Haugen (2011) International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences. [Available at] *http://mn.gov/portal/search/?query=international+review+turbine+setbacks*

Hamburg

Hamburg has published a document entitled "Exclusion Zones for Wind Turbines in Hamburg," which outlines wind turbine setback requirements from many settings, but does not provide rationale for their setbacks.

Wind turbines must be setback 300 meters (985 feet) from individual dwellings and 500 meters (1,640 feet) from residential areas. Turbines are also required to be located 50-100 meters (164- 328 feet) from the nearest roads, railways, power lines, radio transmitters, and property lines. To protect the environment, turbines must be set back a distance of 200-500 meters (656-1,640 feet) from forests, wetlands, bird and bat areas, and other areas of environmental concern.[21]

4.2 Denmark

Municipalities are in charge of the planning for wind turbines up to 150 meters (492 feet) tall, with assistance from the Wind Turbine Secretariat in the Agency for Spatial and Environmental Planning. The municipalities work closely with both members from the public and wind turbine owners or sponsors. The municipalities create guidelines and requirements regarding turbine siting that fall within Danish law parameters.[22]

EIA

Other than small turbines, no turbines may be constructed without the approval of the municipality. If a project involves more than three turbines or turbines more than 80 meters (262 feet) tall, an EIA must be completed for permitting. Even without an EIA, neighbours must be informed of the project ahead of time.

Distances

All wind turbines over 25 meters (82 feet) high must be placed at least four times their height from all residences. Generally, wind turbines are prohibited from locations within three kilometres (1.86 miles) of the coast unless special permission is granted due to the positive environment for wind energy. Areas with wide, open, flat spaces are generally considered better for wind facility development than areas with many hills, as large turbines do not overpower the existing landscape in a flat area. Municipalities often require grouping of wind turbines and geometric arrangements to reduce the visual impacts.

Compensation

People living within six times the total height of the wind turbine may request to have their property assessed for loss of value due to proximity of the wind turbines.80 If the value of their property is determined to have decreased by a minimum of 1%, they may be reimbursed for their loss. The value of the property is assessed by experts in property value, and if they determine a significant decrease in the property value the wind facility developer is required to pay the difference.

4.3 Canada

At the national level, Canada does not have any requirements regarding wind turbine setbacks from residences, as setback requirements are decided at the provincial level instead of the federal

Ontario

Ontario has well-developed turbine setback regulations. It classifies wind facilities according to their capacity level and sound produced, ranging from Class 1 with a less than a 3 kW

21 ibid

22 ibid

capacity and any sound level, to Class 5 with greater than a 50 kW capacity and greater than 102 sound level.

What is interesting is that Ontario has set back distances from residential areas and also places of work:

- For wind facilities ranked class three or above, all turbines must be one blade length plus 10 meters (32 feet) away from public roads/railways, and one turbine height away from property boundaries.
- All turbines at wind facilities ranked class four or higher must be located at least 550 meters (1,804 feet) away from all residences, workplaces, and recreational areas, unless the background noise levels are greater than 40 dB(A) before turbines are erected, in which case the setback distance may be decreased.[23]

Brunswick

Brunswick has a policy regarding setbacks for crown lands, or federal or province-controlled lands, but not for privately owned land. On crown lands, wind turbines must be located at a distance of 150 meters (492 feet) or 1.5x the total turbine height from all water and industrial areas. Turbines on crown lands must also be located 500 meters (1,640 feet) or 5x the turbine height from roads, communication towers, and recreational or residential areas, and 1,000 meters (3,281 feet) from endangered species habitat. If municipalities have additional requirements in addition to the requirements on crown lands, these must be obeyed as well.[24]

Prince Edward Island

Prince Edward Island has published a number of planning regulations on wind facility development. These regulations define minimum distances turbines may be located from nearby property lines, residences, and roads. The regulations state that wind turbines must be set back a minimum of 3 times the total height from all residences, unless the developer owns the property. If the developer owns the property, the wind turbine must be located at a distance at least the height of the wind turbine from residences on the property, and 3 times the turbine height from residences on bordering properties. In addition, turbines must be set back a minimum distance of the turbine height from all property boundaries and public roads. These restrictions were developed based on possible impacts regarding the environment and public health and safety concerns.

23 ibid

24 ibid

Appendix 1:
Reasons for refusal for planning application for Wind

The following detail was provided by the Department of Environment:

2012

Planning ref: Q/2007/0914/F:

1. The proposal is contrary to Paragraph 9 of the Banbridge Area Plan 1983 -1998 and Policy COU1 of the Draft Banbridge Newry and Mourne Area Plan 2015 in that the proposal is located within the Mournes Area of Outstanding Natural Beauty and Slieve Croob Special Countryside Area Zone A, as identified in the Banbridge District Rural Area Subject Plan 1986 to 1998 and would, if permitted, have an unacceptable adverse impact on the visual amenity and landscape character of the area by reason of siting, scale and massing.

2. The proposal is contrary to Policy RE1 of the Department's Planning Policy Statement 18 - Renewable Energy in that the proposal would, if permitted, have an unacceptable adverse impact on visual amenity and landscape character of the locality, an area within the Mournes Area of Outstanding Natural Beauty and Slieve Croob Special Countryside Area Zone A, by the reason of its scale, size and siting.

3. The proposal is contrary to Policy CTY1 of the Department's Planning Policy Statement 21 - Sustainable Development in the Countryside in that it fails to comply with Policy RE1 of the Department's Planning Policy Statement 18 - Renewable Energy by reason of unacceptable adverse impact on visual amenity and landscape character

Planning Ref: J/2008/0088/F:

1. The proposal is contrary to Policy RE 1 of the Department's Planning Policy Statement 18 - Renewable Energy in that the development would, if permitted, have an unacceptable adverse impact on the visual amenity and landscape character of the area by reason of the number, scale, size and siting of turbines and by reason of the cumulative effects with existing and approved turbines in the locality.

2. The proposal is contrary to Policy RE1 of Planning Policy Statement 18 - Renewable Energy in that insufficient information has been submitted to enable full determination of the planning application on issues relating to geology and traffic routes, haulage and passing bays.

Planning Ref: J/2006/0840/F:

1. The proposal is contrary to Policy RE 1 of the Department's Planning Policy Statement 18 - Renewable Energy in that the cumulative effects of the development in addition to other existing and approved wind farms in the locality would, if permitted, have an unacceptable adverse impact on visual amenity and landscape character through the number, scale, size and siting of turbines

Planning Ref: J/2008/0840/F:

1. The proposal is contrary to Planning Policy Statement 18 - Renewable Energy (Policy RE1), Planning Policy Statement 21: Sustainable Development in the Countryside (Policy CTY1) in that the proposal will have an **unacceptable adverse impact on:**

(i) **Residential amenity** by reason of the number, scale, size and siting of the turbines in close proximity to residential properties;

(ii) **visual amenity and landscape character** by reason of the number, scale, size and siting of the turbines and cumulative impacts with existing and consented wind farms in the locality;

(iii) **biodiversity and nature conservation** by reason of potential impacts on active peatland, badgers and bats.

2. The proposal is contrary to Planning Policy Statement 18 - Renewable Energy (Policy RE1), Planning Policy Statement 2 - Planning and Nature Conservation, Planning Policy Statement 3 - Access, Movement and Parking, and The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 (as Amended) in that insufficient information has been provided to allow the full impacts of the proposal to be considered in terms of landscape and visual cumulative impacts, shadow flicker and noise, impacts on bats and badgers, and roads matters.

2013

Planning Ref: M/2006/1754/F:

1. The proposal is contrary to the Department's Planning Policy Statement 2, Planning and Nature Conservation and Policy RE1 of Planning Policy Statement 18 - Renewable Energy in that the site lies within the Slieve Beagh-Mullaghfad-Lisnaskea SPA, a designated site of national and international nature conservation importance and would, if permitted, likely **adversely affect the nature conservation interests and integrity of the area by virtue of impact on the Hen Harrier,** a species listed in Annex 1 of the EU Habitats Directive .

2. The proposal is contrary to the Department's Planning Policy Statement 2, Planning and Nature Conservation in that Hen Harrier, a species listed in Annex 1 of the EU Birds Directive and which is protected under the terms of the Wildlife Order (NI) 1985, occur within the site and would be adversely affected by virtue of:

   (i) Direct loss and damage of feeding and breeding habitat;

   (ii) Disturbance of foraging and breeding Hen Harrier and;

   (iii) Risk of displacement of breeding pairs of Hen Harrier from actual nests or discouragement from establishing potential nest sites.

3. The proposal is contrary to Policy RE1 of Planning Policy Statement 18 - Renewable Energy and Policy CTY1 of Planning Policy Statement 21 in that the development would, if permitted, be visually intrusive and have an **unacceptable adverse impact on the amenity and landscape character of the area** and adversely impact on an area designated as a Special Protection Area for Hen Harrier (Sliabh Beagh).

4. The proposal is contrary to Policy RE1 of Planning Policy Statement 18 - Renewable Energy and Policy CTY1 of Planning Policy Statement 21 in that the development would, if permitted, result in an **unacceptable adverse impact on active peatland.**

5. The proposal is contrary to Policy RE1 of Planning Policy Statement 18 - Renewable Energy in that **insufficient information** has been submitted to enable full determination of the planning application on issues relating to bats, traffic haulage routes and access.

Appendix 2

Examples of Guidance on Minimum Separation Distance in Practice

Location/ authority	Distance	Details	Policy Status
Welsh Assembly	500m	Technical Advice Note 8: Renewable Energy sets out a typical separation distance between turbines and residential property. Flexible approach, and can be refined by LPA	Adopted
Northern Ireland	10 times rotor diameter, but not less than 500m	Planning Policy Statement: Related to wind farm development proximity to occupied dwellings. Noise related.	Adopted
Cherwell District Council	800m	Informal planning guidance Recommends separation distances between turbines and settlements/dwellings, based on amenity and other issues such as landscape, noise, heritage, safety and shadow flicker.	Adopted 'without status'
Milton Keynes Council	Sliding scale approximately 10 times height	Supplementary Planning Guidance based on noise / safety.	Quashed 'no status'[1]
Lincolnshire County Council	700m (2km if there are noise issues)	Wind Energy Position Statement: Distance from residential properties. The county council is not the planning authority.	No status
Scottish Planning Policy (SPP)	2km	Guidance refers to strategic search areas for wind and relates to settlements	Adopted
Wilshire Council	Sliding scale up to 3km	Policy text within the Wilshire Core Strategy Submission Draft. Sliding scale based on distance from residential property.	No Status
Proposed Lords Bill	Sliding scale up to 3km	Private Members' Bill: Sliding scale based on distance from residential property.	No Status

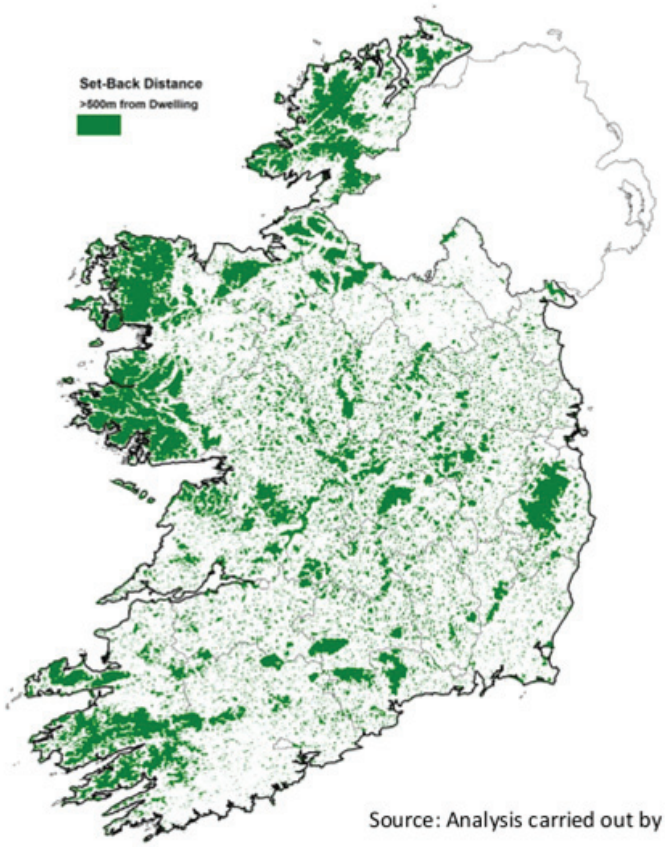
Source: Allerdale Local Plan: Wind Turbine Separation Distance[25]

25 Allerdale Local Plan: Wind Turbine Separation Distance Topic Paper (May 2013) available at *http://www.allerdale.gov.uk/planning-and-buildings/planning/planning-policy/local-plan-downloads/evidence-base/topic-papers.aspx*

Appendix 3: AIRO Separation Maps

(i) Impact of a 0.5KM Housing Buffer Zone in ROI

In the case of the **500m setback, 23.75%** of the total land area of the country would remain available for new wind farm development.

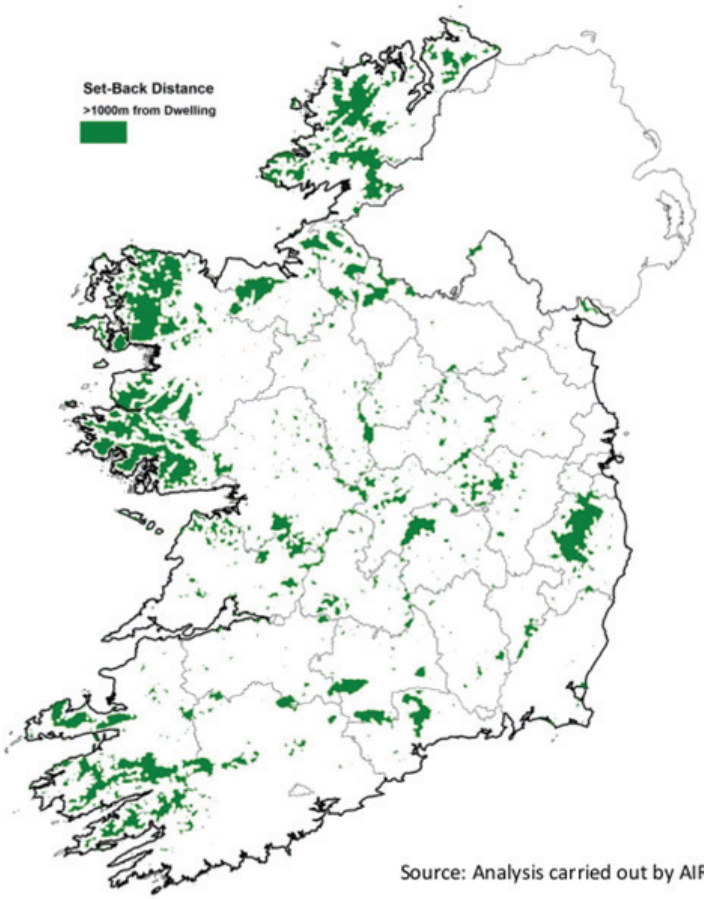


Source: Analysis carried out by AIRO at NUI Maynooth

26 AIRO *http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0*

(ii) Impact of a 1KM Housing Buffer Zone in ROI

In the case of the **1000m setback, only 9.4%** of the total land area of the country would remain available for new wind farm development.

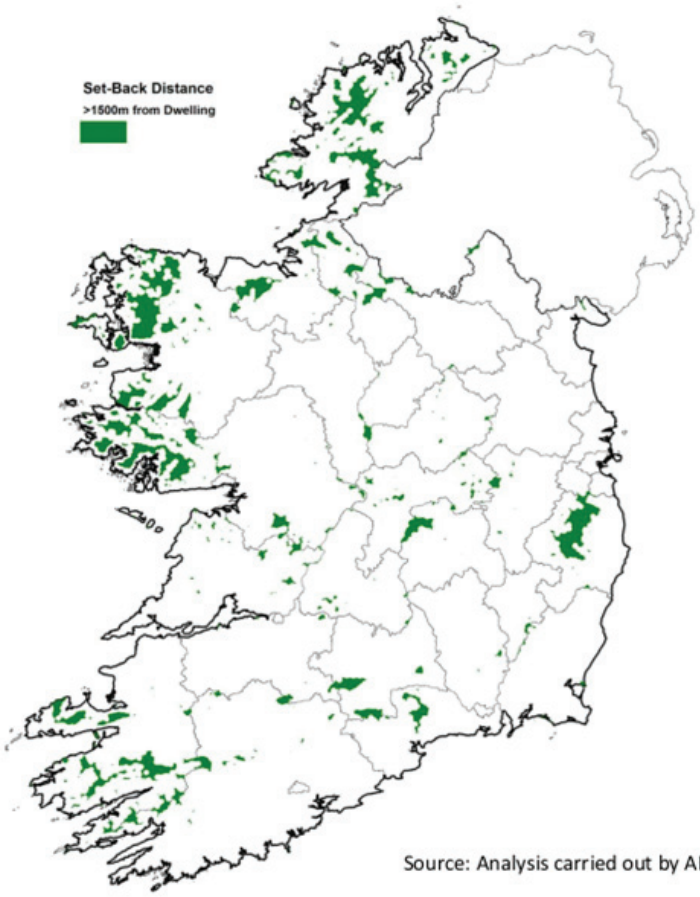


Source: Analysis carried out by AIRO at NUI Maynooth

27 AIRO *http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0*

(iii) Impact of a 1.5KM Housing Buffer Zone in ROI

In the case of the **1500m setback, only 5.2%** of the total land area of the country would remain available for new wind farm development.

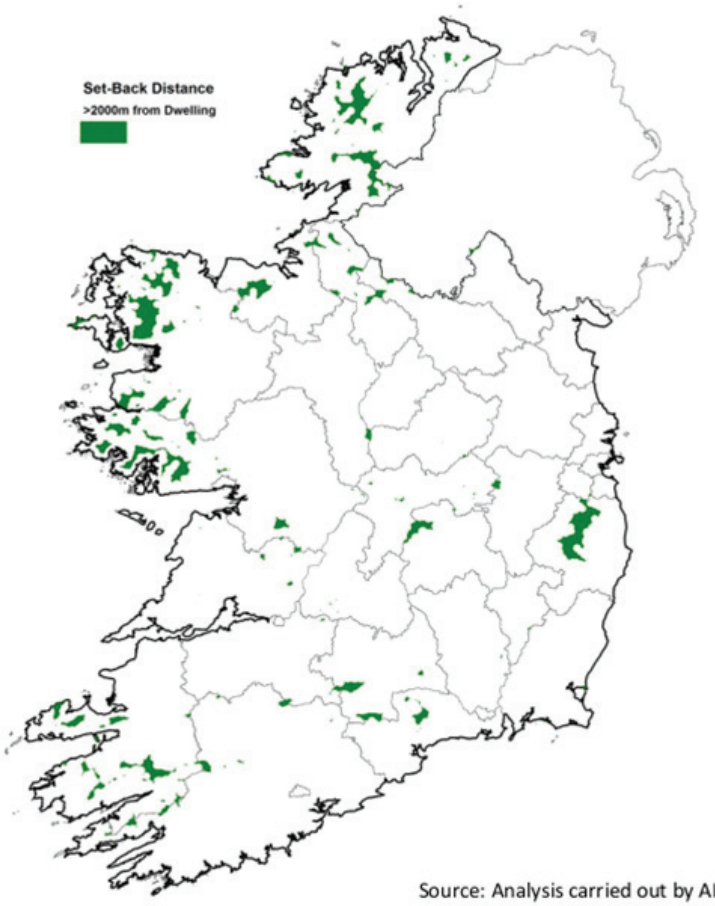


Source: Analysis carried out by AIRO at NUI Maynooth

28 AIRO *http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0*

(iv) Impact of a 2KM Housing Buffer Zone in ROI

In the case of the **2000m setback, only 3%** of the total land area of the country would remain available for new wind farm development.



Source: Analysis carried out by AIRO at NUI Maynooth

(Footnotes)

1 The Wind Turbines SPD was adopted in July 2012 and subsequently quashed by a High Court judgement in April 2013 http://www.milton-keynes.gov.uk/planning-policy/displayarticle.asp?ID=84312

29 AIRO http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0

Research and Information Service
Briefing Note

Paper 000/00 1 November 2013 NIAR 822-13

Aidan Stennett

Northern Ireland's renewable electricity target and the role of onshore wind

Introduction

The following paper looks at the background to the Northern Ireland renewable electricity target and the contribution onshore wind energy is expected to make to that target. Specifically the paper looks at:

- The European Commission's Renewable Directive from which Northern Ireland's 40% renewable electricity target originates;
- The total renewable generation capacity required to meet this target (as estimated in the Department of Enterprise, Trade and Investment Draft Onshore Renewable Action Plan);
- The proportion of this capacity that will be provided by onshore wind energy compared to other renewable sources;
- The relative cost of onshore renewable generation technologies; and,
- A brief overview of the infringement proceedings instigated by the European Commission on Member States who fail to their meet obligations under EU law.

It is important to note at the outset of this paper that the estimates of renewable generation capacity required to meet Northern Ireland's renewable electricity target, the predicted contribution made by different renewable technologies to this target, and the relative costs of developing renewable generation are sourced from the Draft Onshore Renewable Action Plan. The plan was published by the Department of Enterprise, Trade and Investment in October 2011 and represents one stage in the process of quantifying the renewable generation

capacity required to meet Northern Ireland's renewable targets. The figures included in this paper are based upon draft figures. A final version of the Onshore Renewable Energy Action Plan (OREAP) is due to go before the Executive in early November 2013. That paper may include different estimates to those included in the draft OREAP and in this paper. As such this topic may warrant re-examination once the final OREAP is available.

Background – Northern Ireland's 2020 Renewable target

Under Article 4 of the European Commission Renewable Energy Directive (2009/28/EC) Member States are required to outline national policies for meeting the binding targets in a National Renewable Energy Action Plan (NREAP). The UK's NREAP, published by the Department of Energy and Climate Change in 2010[1], states that 15% of the UK's total energy consumption could be sourced from renewable sources by 2020. This 15% total energy target is further broken down into energy types: 30% electricity from renewables, 12% heat from renewables, and 10% transport energy from renewables.[2]

As part of its contribution to this wider target, Northern Ireland committed itself to ensuring 40% of electricity consumption from renewable sources by 2020. The OREAP has the following to say about this target:

> *This is an ambitious target but, although stretching, is evidence based. The target is based on projections of future demand and assumes that demand will continue to grow, even with significant progress in energy efficiency. It is however towards the upper limit of what is achievable in the time frame, given the constraints of grid and other factors.*[3]

1 Note: the devolved administration contributed to the development of this plan

2 DETI Draft Onshore Renewable Energy Action Plan (October 2011) http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf

3 *Ibid*

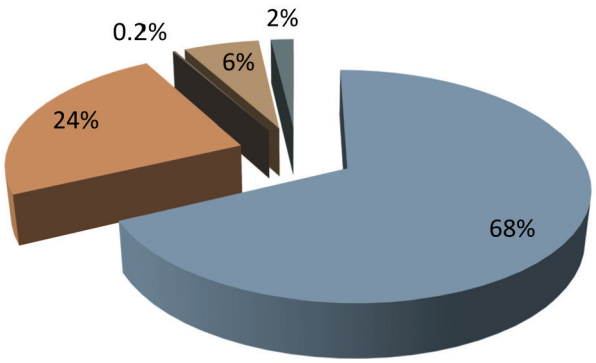
Estimated contribution of onshore wind to renewable targets

The Draft OREAP estimates that a total of 1,464MW of renewable generation will be required to meet the 40% target. Figure 1 outlines the contribution a range of renewable generation technologies are expected to make to this total. It is evident from the figure that onshore wind is projected to make the most significant contribution to the total required renewable portfolio, accounting for 68% of total renewable generation in 2020. Offshore renewables are expected to make the second largest contribution to the total renewable generation resource, accounting for 24% of total generation. Other technologies – solid biofuels, landfill gas, and small-scale hydro – are likely to make smaller contributions to the total required renewable capacity.[4]

Explaining the predominance of onshore wind in evidence to the ETI Committee in 2010 Officials from DETI stated:

> *Although the target is not purely a wind target, realistically, the lion's share of renewables used to meet our target will be delivered by onshore wind. However, the NIRO is in place. That will not only incentivise the wind element but will bring other technologies on board. As I said last week, the Department is technology neutral, and we incentivise a range of technologies such as photovoltaic (PV) power, anaerobic digestion (AD) and other forms of biomass. We want all of those to play their part. However, we are realistic about the percentage that they will deliver, particularly in the short term. They will be dwarfed by what wind can deliver, largely because wind is a more established technology. The development of the equipment needed to deliver that is well embedded in the supply chain, but other technologies will start to make their play.*[5]

Figure 1: Estimated Capacity required to meet 2020 renewable electricity targets by electricity type - % contribution[6]



Source: DETI

The Draft OREAP included System Operator for Northern Ireland (SONI) estimates of installed renewable capacity in 2020 (based upon SONI's 2011-2020 capacity statement). The total

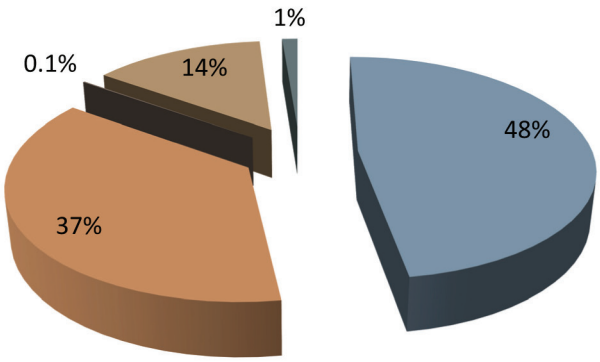
4 Ibid

5 Committee for Enterprise, Trade and Investment Official report (Hansard) DETI evidence to Renewable Energy Inquiry (9 December 2010) http://archive.niassembly.gov.uk/record/committees2010/ETI/101209_RenewableEnergyInquiry.htm

6 DETI Draft Onshore Renewable Energy Action Plan (October 2011) http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf

installed renewable capacity increases to 2,163MW in this forecast. The capacity on onshore wind also increases to 1030MW (from 994MW in Figure 1), but falls proportionally to 48%. The contribution of offshore wind increases to 37% in this scenario, with an estimated capacity of 803MW (up from 350MW in Figure 1).

Figure 2: SONI estimates of renewable generating capacity 2020[7]



Source: DETI

Figure 3 combines data from the Draft OREAP (the data used to compile Figure 1) with data from the UK Renewables wind energy database[8]. The wind energy database provides details of operational, under-construction and consented wind farms in the UK. The figure shows the generation capacity of operational, under-construction and consented wind farms in Northern Ireland, the sum capacity of these wind farms (total on-stream or due on-stream in Figure 3) and compares this to the total onshore wind capacity contribution to Northern Ireland's 2020 target and the total renewable capacity required to meet the target (as per the Draft OREAP). The following can be said about the figure:

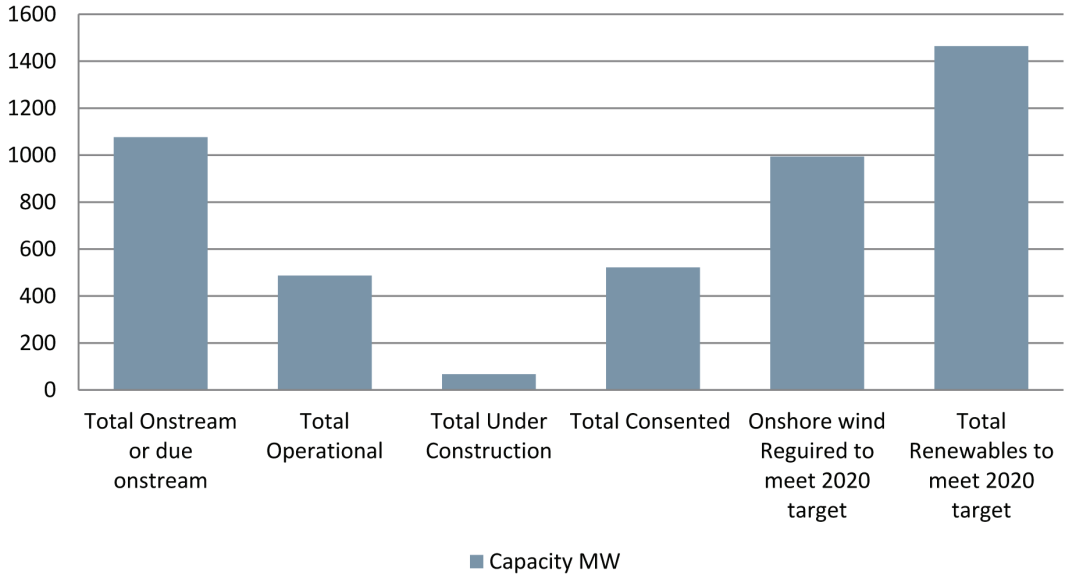
- A total of 487.34MW of onshore wind capacity was installed and operational in Northern Ireland as of 24 October 2013 (the date the data was extracted from the wind database). A further 67MW was under construction, whilst an additional 522.05MW had been consented;
- The operational capacity is sufficient to provide 49% of the required onshore wind contribution to Northern Ireland's 40% target. It could provide 33% of the total renewable capacity required to meet the target;
- If all operational, under-construction and consented capacity is combined a total of 1076.39MW of wind energy can be considered to be on-stream or due on-stream. This figure exceeds the estimated wind energy contribution to the 2020 target, and could provide 74% of the total renewable energy required to meet the 2020, as per the Draft OREAP report.

It should be noted that the data from the wind database does not include small-scale wind. It should also be noted that the fact that wind farm is consented does not guarantee its construction. Projects may run into difficulties, or become delayed for a number of reasons – being unable to secure the necessary finance for example.

7 Ibid

8 UK Renewable Wind energy database (accessed on 24 October 2013) http://www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/index.cfm

Figure 3: NI operational, under-construction and consented wind-farms as a proportion of capacity required to meet 2020 target[9]



Source: DETI and Renewable UK

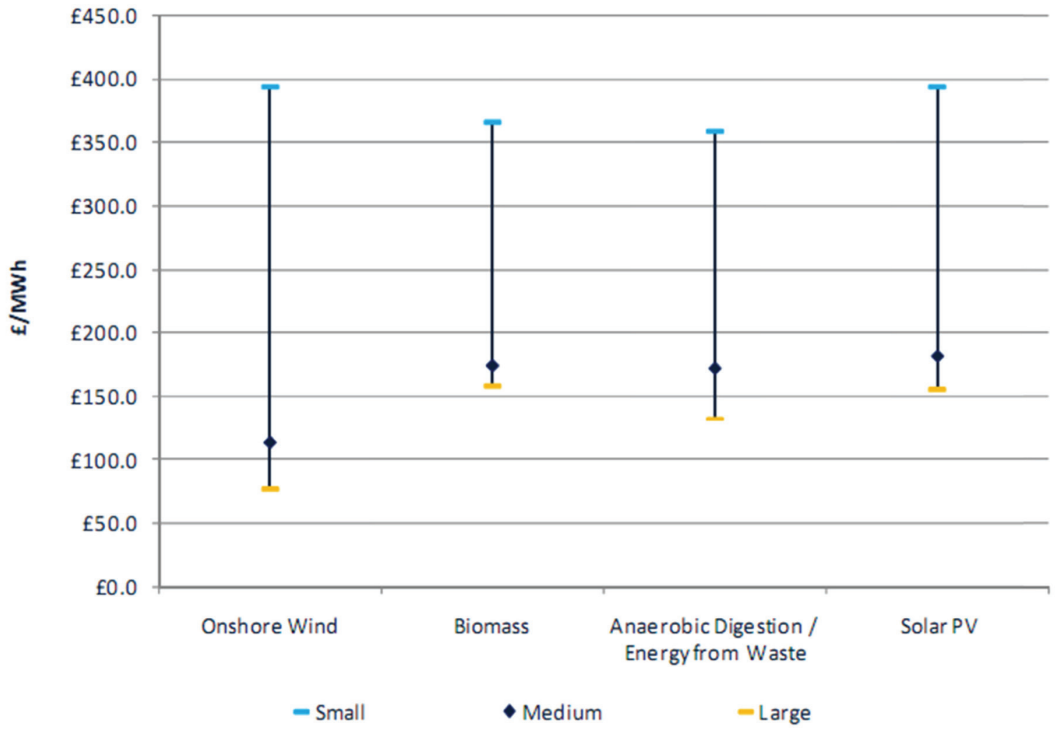
9 Ibid and DETI Draft Onshore Renewable Energy Action Plan (October 2011) http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf

Renewable technology costs

Figure 4, which is again sourced from the Draft OREAP report, compares the relative cost of each onshore renewable technology considered in that paper. The figure considers both the type and size of installations. The Draft OREAP report makes the following points about the figure:

- For most onshore renewable technologies, costs are already falling – and will continue to do so;
- Large scale onshore wind is currently the least costly (on a per MW basis) of the onshore renewable technologies, with large scale anaerobic digestion the next least expensive;
- Whilst small-scale generation can have beneficial impacts on networks and may contribute to wider policy objectives, on a purely cost basis it is typically significantly more expensive than larger scale renewable generation; and
- If there is a concern regarding meeting targets at least cost, there is a strong case for supporting larger scale technologies which can make more significant contributions.

Figure 4: Relative costs of renewable technologies, by size.[10]



Source: DETI

10 DETI Draft Onshore Renewable Energy Action Plan (October 2011) http://www.nigridenergysea.co.uk/wp-content/uploads/2011/10/Draft-OREAP-Oct-2011.pdf

Infringement proceedings

Section 2 demonstrated that one of the central drivers of Northern Ireland's renewable electricity policy was the European Commission's Renewables Directive. This section provides a general overview of the infringement proceedings that the European Commission might embark on should a Member State (or central, regional or local authority of a Member State[11]) not fulfil its obligations under EU law.

Two pieces of EU law underpin the Commissions power to instigate infringement proceedings:

- Article 4 of the Treaty of the European Union obliges Member States to fulfil their obligations as members of the EU; and
- Article 258 of the Treaty on the Functioning of the European Union is an enforcement mechanism which is brought against Member States in breach of their obligations. The article states:

  If the Commission considers that a Member State has failed to fulfil an obligation under the Treaties, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations.

  If the State concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice of the European Union.[12]

There are five stages of infringement proceedings, as follows:

- **Article 258 letter**: the first formal stage of the process. This letter informs the Member State that the Commission considers it to be in breach of EU law. At this stage the Member State has the opportunity, within a specified time-frame, to submit its *'observations on an identified problem regarding the application of the EU law'.*
- **Article 258 Opinion:** a formal determination by the Commission which states the Member State is in breach of its obligations. The Reasoned Opinion must set out *'a coherent and detailed statement, based on the letter of formal notice, of the reasons that have led it to conclude that the Member State concerned has failed to fulfil one or more of its obligations under the Treaties'.*[13] The normal time-frame for compliance is two months.
- **Court of Justice referral under Article 258**: should the Member State fail to comply with a Reasoned Opinion within the designate time-frame, the Commission may apply for a ruling that the Member Stare is in breach of the Treaty. In the case of a late transposition of EU directives the Commission may ask the Court to issue financial penalties. The Commission notes, however, that in *'over 90% of infringement cases, Member States comply with their obligations under EU law before they are referred to the Court'.*[14]
- **Article 260 letter**: should the Member State fail to action following a Court of Justice referral, the Commission will issue a formal notice indicating this failure. The Member State will be given a further time-frame to make the necessary change.

11 European Commission Application of EU Law – Infringements of EU Law (accessed 29 October 2013) http://ec.europa.eu/eu_law/infringements/infringements_en.htm

12 Eur-lex Consolidated version of the Treaty on the Functioning of the European Union – Part Six: Institutional and Financial Provisions – Title I: Institutional Provisions – Chapter 1: The Institutions – Section 5: The Court of Justice of the European Union – Article 258 (ex article 266 TEC) (accessed 27 October 2013) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12008E258:EN:NOT

13 European Commission Application of EU Law (accessed 27/06/2012) http://ec.europa.eu/eu_law/infringements/infringements_en.htm

14 European Commission Infringement Proceedings (accessed 27 October 2013) http://ec.europa.eu/information_society/policy/ecomm/implementation_enforcement/infringement/index_en.htm

- **Court of Justice under Article 260**: should the deadline set in the Article 260 letter not be met, the Commission may refer the Member State back to the Court of Justice who may impose financial penalties.

The ultimate outcome of infringement proceedings, should adequate transposition of the directive in question not take place, is a fine. There are three criteria which are used to determine the level of fine issued:

- The seriousness of the infringement;
- Its duration; and,
- The need to ensure the sanction itself acts as a deterrent to further infringements.[15]

There are two types of penalty – a lump sum penalty and/or daily penalty payment. The daily payment is calculated by multiplying the standard flat rate of €600 per day firstly by coefficients for seriousness and duration of the infringement and secondly by what is referred to as the *'n'* factor which considers the country's ability to pay. The *'n'* factor is based on GDP and on the number of votes a Member State has. The factors range from 0.36 to 25.40, with the UK situated at the higher end of the scale. The UK's *'n'* factor is 21.99 and is the second highest after Germany, 25.40 (by way of comparison, the Republic of Ireland has an *'n'* factor of 3.14).[16]

A lump sum is also determined via this *'n'* factor. This figure is designated as a minimum lump sum. For the UK this is set at €10,995,000. In addition to this minimum figure, the Court may determine a further lump sum by multiplying the daily amount by the number of days an infringement persists. The daily amount is determined by multiplying €200 by a coefficient for seriousness and multiplying the resulting figure by the state's *'n'* factor.[17]

15 European Commission Communication from the Commission Implementation of Article 260(3) of the Treaty (2010) (accessed 27 October 2013) http://ec.europa.eu/eu_law/docs/docs_infringements/sec_2010_1371_en.pdf

16 European Commission Communication from the Commission Application of Article 228 of the EC Treaty (2005)((accessed 27 October 2013) http://ec.europa.eu/eu_law/docs/docs_infringements/sec_2005_1658_en.pdf

17 Ibid

Northern Ireland Assembly

Research and Information Service
Briefing Note

Paper 000/00 | 5 November 2013 | NIAR 804-13

Suzie Cave and Anne Campbell

Approved Wind Farm Applications and Buffer Zones

The following paper was requested by the Environment Committee during its consideration of a wind inquiry. It is supplementary to the research paper "Wind Turbines: Planning and Separation Distances" and should be read in conjunction with it.

Introduction

The following diagrams show the locations of approved wind farms in Northern Ireland in relation to different buffer zone scenarios or set back distances from domestic properties. It is clear that with an increase in the distance of buffer zone the area of available or suitable land (represented by green) decreases. When considering how this would affect approved or current wind farm sites, the maps suggest that as the buffer zones widen fewer approved wind farms actually fit within the areas that would be suitable for development.

It is important to highlight that these scenarios do not take into consideration other constraints such as availability of wind resource, buffers for water courses, roads, communications, airports, protected sites etc. Therefore the total land area remaining available could in fact be smaller than the scenarios suggest.

Buffer zones

The scenarios used are based on the idea taken from research produced by the All Ireland Research Observatory (AIRO) in NUI Maynooth who produced set back scenarios for wind development from domestic properties in the Republic of Ireland.[1]

Ring buffers were created around every domestic property in Northern Ireland in a Geographical Information System called ArcGIS. The remaining area of land which is not covered by a buffer is shown in green on the maps.

The property data was extracted from Northern Ireland's address database called Pointer, which is maintained by Land and Property Services and has input from Local District Councils and Royal Mail. The data is current as of 17 October 2013. Only properties which were approved, built and domestic were used to create the buffer zones. There are 716,123 domestic properties in Northern Ireland.

The ring buffers have a radius of: 500 metres, 1000 metres, 1500 metres and 2000 metres.

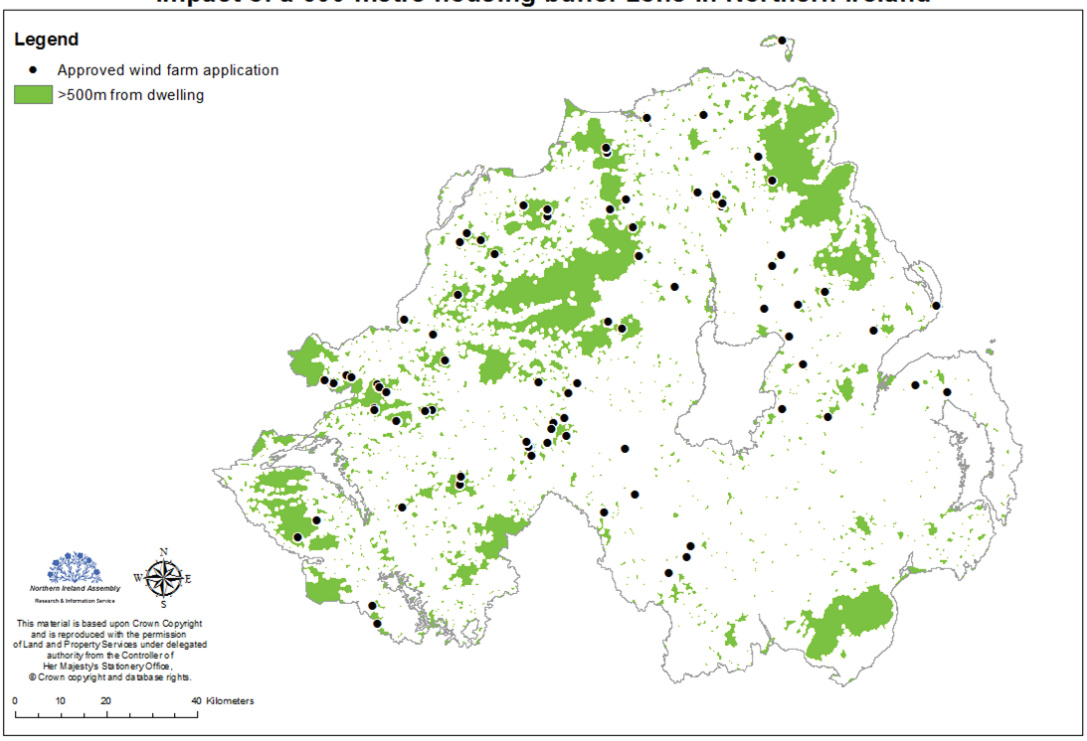
Approved wind farm applications

The data used to map the approved wind farm applications is sourced from Planning NI. The following link leads to a downloadable csv file containing grid coordinates of all applications for renewable energy:

http://www.planningni.gov.uk/index/tools/about-statistics/renewable-energy.htm

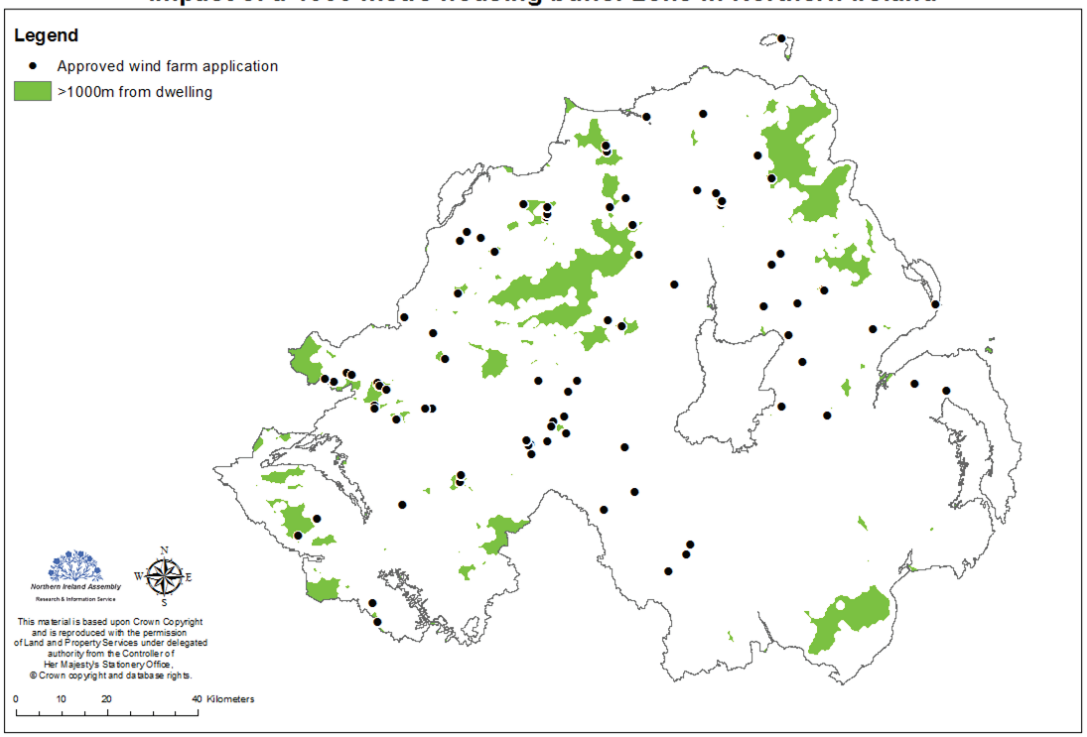
Only applications which had a status of "approved on appeal" or "permission granted" were mapped. Filters were also applied so that only small and large wind farms were included (single wind turbines were excluded). The data is current as of August 2013 and dates back to 2002.

Impact of a 500 metre housing buffer zone in Northern Ireland

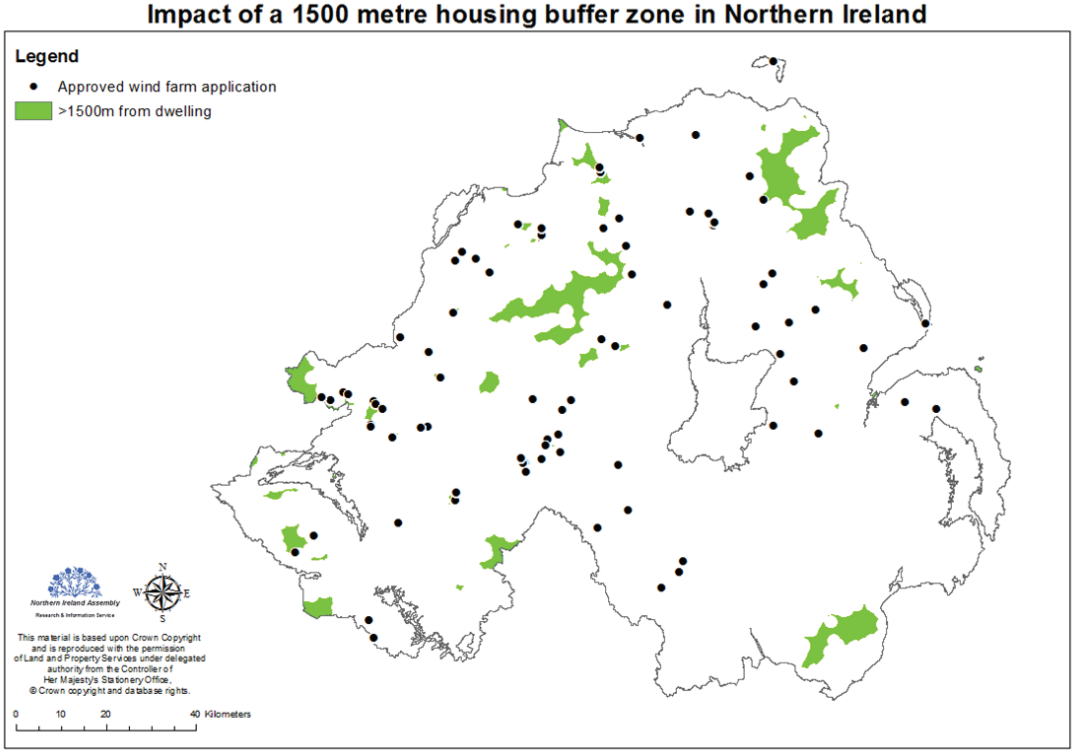


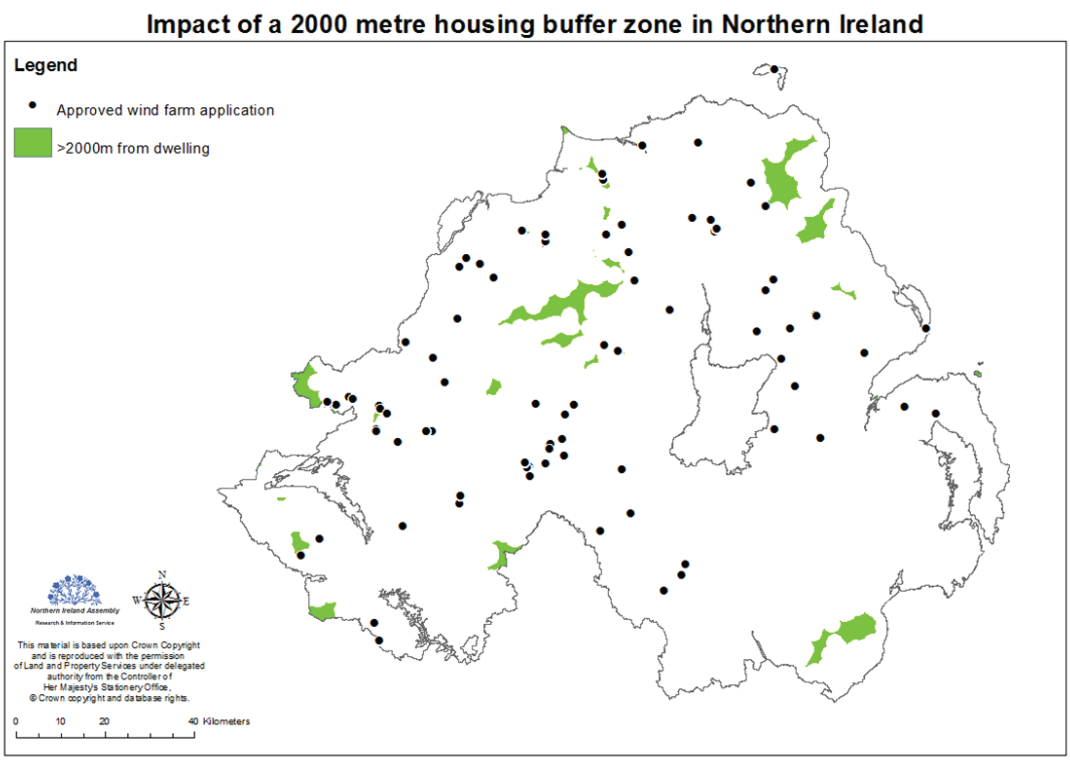
1 For more information visit the AIRO website: http://airo.ie/news/airo-mapping-asking-questions-new-wind-turbines-bill-0

Impact of a 1000 metre housing buffer zone in Northern Ireland



Impact of a 1500 metre housing buffer zone in Northern Ireland




Impact of a 2000 metre housing buffer zone in Northern Ireland
Legend
Approved wind farm application
>2000m from dwelling
Northern Ireland Assembly
Research & Information Service
N
W
E
S
This material is based upon Crown Copyright and is reproduced with the permission of Land and Property Services under delegated authority from the Controller of Her Majesty's Stationery Office, © Crown copyright and database rights.
0 10 20 40 Kilometers

Research and Information Service
Briefing Paper

Paper 000/00 28 April 2013 NIAR 000-00

Suzie Cave

Co-operative Wind Farm Schemes in Scotland

The following paper is in response to a request from the Environment Committee for information on co-operative wind farm projects in Scotland.

Introduction

As explained in more detail in paper (NIAR-308-2014) 'Wind Farm Community Benefits', there are four types of community benefit: community funds; benefit in kind; local supply; and co-operative schemes. Co-operative schemes are where there is local ownership of the development (or part) by local people or community based organisations. This is usually achieved by offering shares for sale, joint venture or majority ownership by a community-based enterprise.

The amount of direct financial benefit a host community receives from a renewable energy development can have major implications on planning proposals; where a community may experience direct financial benefits from a site then opposition is likely to be less. Direct financial gains are often obtained if the community owns, co-owns or has some form of financial stake in the development.

The following paper describes examples of co-operative wind farms in Scotland. Where the information is available it considers the size of the wind farms, location, their success/ projected success in terms of capacity and how they are funded.

The majority of examples are owned by Falck Renewables Wind Limited[1] (a European wide renewable energies developer) which works in partnership with Energy4All[2] (which set up and facilitate renewable energy co-operative projects throughout the UK) to promote community owned schemes across Scotland.

Boyndie Wind Farm

Boyndie Wind Farm is located approximately 2km inland from the north coast of Aberdeenshire between Portsoy and Banff.

Planning permission was granted by Aberdeenshire Council in 2004, work began in June 2005 with an investment of £10-15 million. The wind farm was built and commissioned in April 2006 and has a total of 8 turbines (each one a 2MW Enercon Turbine)

Standing 100m to tip, each of the eight turbines have a hub height of 65 metres, rotor diameter 71m and the rotor speed of up to 21.5rpm. When operating at full capacity the farm can generate 16.30MW of electricity supplying somewhere between 8500 -9100 –nearly all homes in Banff, Whitehills, Portsoy and all nearby rural areas.

The electricity produced by the farm flows through underground cables to a sub-station located on the site. From the sub-station the electricity feeds into an existing electricity line for distribution to consumers in the area without the need for any new overhead lines. The electricity is sold through a Power Purchase Agreement (a contract between the wind farm and those wanting to buy the electricity it generates).[3]

The Boyndie Co-operative

The eight turbine site is owned by Falck Renewables Wind Ltd and in 2005 the Boyndie Co-op was set up and established to buy a share in the wind farm in 2006. This is the first wind farm co-operative in Scotland giving local people (who have priority) and others the chance to invest in the energy produced.

Boyndie Wind Farm Co-operative Ltd is an Industrial and Provident Society registered with the Financial Services Authority under the Industrial and Provident Societies Act 1965. Members are protected by limited liability status, and its constitution is Rules approved by and registered under the Financial Services Authority.[4]

Shares

The share issue was managed by Energy4All Ltd who facilitates the ownership and operation of wind farm projects by local or community- based co-operatives around the UK. The co-op currently has 722 members each with a shareholding ranging from £250 - £20,000.

Key facts:

- Each share is worth £1
- The Minimum investment is £250 to ensure broad membership, the limit is £20,000
- All members have one vote regardless of the number of shares they hold
- Members receive annual interest on their investment
- The Board is elected by members and formed from members.

1 Falck Renewables http://www.falckrenewables.eu/chi-siamo.aspx?sc_lang=en

2 Enegy4All http://www.energy4all.co.uk/home.asp

3 Information taken from Boyndie Wind Farm Co-operative Limited http://www.boyndie.coop/boyndie_home.asp

4 ibid

- Each share is a value of £1 with a minimum investment set at £250 to ensure broad membership. The limit is £20,000.
- If the co-op wishes they can allocate funds for an energy conservation trust to promote energy conservation in the local community. The energy conservation trust will provide information and grants for efficiency measures within the locality of the turbines to individual homes and community organisations and fund environmental books for local schools[5] (there is no information to suggest such a Trust has been set up as yet, but a similar one has been set up under the Baywind Co-operative Wind Farm in Cumbria as a voluntary response to receiving planning permission)[6]

The Great Glen Energy Co-operative

The wind farm is owned and managed by Millennium Wind Energy Limited, a subsidiary of Falck Renewables Wind Ltd, and is located north of Invergarry and south west of Fort Augustus.

Planning permission was granted in 2004, and construction began in 2006. To date there are 26 Nordex turbines each around 115m to the tip. Each turbine has a capacity of 2.5MW, which can generate enough electricity to supply 36,000 homes. A new indoor 132kV electricity sub-station and overhead power line was constructed to connect to the National Grid through the existing nearby 132Kv circuit. It is estimated the farm could displace between 63,200 and 149, 640 tonnes of carbon dioxide each year.

The Great Glen Energy Co-op was set up and bought a stake in the Millennium wind farm in September 2008 at an investment of £1,288,270. According to the website the Co-op has 673 members each with a shareholding between £250-£20,000. The terms and conditions for shares and members are similar to the Byondie Co-operative.[7]

Findhorn Eco Village

This project is collaboration between Ekopia Ltd (the local development trust) and Caledonia Energy Co-operative which is part of the Energy4All group.[8]

The wind farm is located at Findhorn in Moray and began operation in 2006 after receiving planning permission from Moray Council in 2005. The farm consists of three second hand turbines from Demark and cost £600,000. Each turbine has a capacity of 225kW with a combined capacity of 750kW and provides electricity to the 250 residents of the Findhorn Foundation eco-village community.

The 225Kw turbines are 150ft high and situated next to the community's existing single turbine built 15 years previous. About 75% of the electricity produced will be used on-site on a private grid and the remainder will be distributed to the main grid. In total it produces between 75% and 100% of the electricity used at the Findhorn Foundation.

Other Co-operative examples include:

The Isle of Sky Renewables Co-operative – The Ben Aketil Wind Farm, Dunvegan on the Isle of Sky was given planning permission in 2005. Since 10 turbines each 2.3 MW have been

5 ibid

6 For more information on this see Baywind Energy Co-operative Limited http://www.baywind.co.uk/baywind_community.asp?ID=COM1

7 The Great Glen Energy Co-op http://www.greatglen.coop/greatglen_home.asp

8 Caledonia is a national Scottish Co-operative part of Energy4All http://www.energy4all.co.uk/scotland/projects.asp?id=PR01

constructed and are operating. The Isle of Sky Renewables Co-operative was set up and raised approximately £750,000 to offer locals a stake in the wind farm project.[9]

Kilbraur Wind Energy Co-operative – a stake was bought in the Kilbraur wind farm located in Strath Brora, Sutherland in November 2008 after raising £1,043,900. The co-op has 528 members with shares ranging from £250-£20,000. The share terms and conditions for members are the same as mentioned above. The wind farm has 27 x 2.5MW turbines and has the capacity to supply around 37,400 homes.[10]

9 Energy4All http://www.energy4all.co.uk/scotland/coops.asp?ID=PRO3&catID=2

10 For more information visit Kilbraur Wind Energy Co-operative Limited http://www.kilbraur.coop/

Research and Information Service
Briefing Paper

Paper 000/00 5 June 2013 NIAR 310-14

Suzie Cave

Co-op Wind Farms in Northern Ireland

This paper provides information on the Drumlin's Cooperative which is the first co-operative (co-op) wind farm in Northern Ireland. It considers how the Co-op operates, the locations of the sites, the costs associated with its set up, its governance, generation and expected return for members, and any future proposals or plans.

Introduction

The following paper can be read in conjunction with research papers 'Wind Farm Community Benefits' (NIAR-308-2014) and 'Co-operative Wind Farm Schemes in Scotland' (NIAR-313-2014). The information was obtained through discussions with the members of the Drumlin's Co-operative, its website and by attending a Funding Community Renewable Energy Projects in Cookstown 7th May 2014, run by Action Renewables in association with the Ulster Community Investment Trust (UCIT).

As discussed in more detail in the above mentioned papers, co-operative schemes are a form of community benefit which gives local ownership of the development (or part) by local people or community based organisations. This is usually achieved by offering shares for sale, joint venture or majority ownership by a community based enterprise.

According to the Drumlin's Co-operative, a co-operative is:

> *An autonomous association of persons united voluntarily to meet their common economic, social & cultural needs & aspirations through a jointly owned & democratically controlled enterprise*[1]

1 Presented at the Funding Community Renewable Energy Projects Event 7th May Cookstown – in association with Action Renewables/ Ulster Community Investment Trust

Co-operative principles as an Industrial and Provident Society are:

- One member, one vote
- Local board elected by members
- Social ethics: responsibility, equality, fairness
- Supports environmental and social goals
- Co-op devotes % of profits to 'social' projects locally

The Drumlins Co-operative

Co-operative schemes have been in operation in England, Scotland, Wales and the Republic of Ireland for a number of years. However, this year began the operation of the first co-operatively run wind farm in Northern Ireland under the Drumlin's Co-operative.

The Drumlin Co-op, with assistance from Energy4All (which set up and facilitate renewable energy co-operative projects throughout the UK) and NRG Solutions (consultants in grid connection and project management of renewable energy projects in the UK and Ireland), constructs, owns and operates wind turbines at four separate sites around Northern Ireland, each with a single 250kw turbine.

It is worth noting that while the Drumlins call it a wind farm, it consists of four single turbines each located on a completely separate site, these are:

1. Aghafad in Pomeroy – began operating this year
2. Cavanoneill in Pomeroy – began operating this year
3. Ballyboley in Larne –under construction to start in June 2014; and
4. Parkgate in Kells – construction started for generation by August 2014.

The Co-operative first launched in June 2012, where Phase 1 raised 3.4 million through loans to build the four turbines above.

Drumlin Stakeholders

Figure 1 shows the makeup of stakeholders and their responsibilities:

Figure 1: Drumlin Stakeholders

Costs

Drumlin Co-op was formed back in 2012 and supported by Energy4All who dealt with the shares aspect; it raised the required funds (£2.7 million) through a public share offer enabling local people in Northern Ireland and beyond to become members by purchasing shares. With no form of government subvention, the Co-op also secured a loan of £340,000 from Ulster Community Investment Trust to raise the required total of £3.1 million for the four separate wind turbines.

Governance

The Co-op is an industrial & provident society and its constitution is its 'Rules' which are approved by the Department of Energy Trade and Investment. These rules stipulate that all Members have one vote regardless of how many shares they hold and can hold no more than £20,000 of shares, with a minimum of £250 to make it accessible to as many people as possible.

The governance of the Co-op is vested in its Board which is made up of members and directors. The Board is voted by members of the Co-op each year and ensures that any issues/plans are put to the local community to decide.

Generation and Income

Once the turbines are operational, all the electricity generated is sold to the electricity markets through a Power Purchase Agreement (a contract between the wind farm and those wishing to buy the electricity generated) and the co-op will also receive income through the

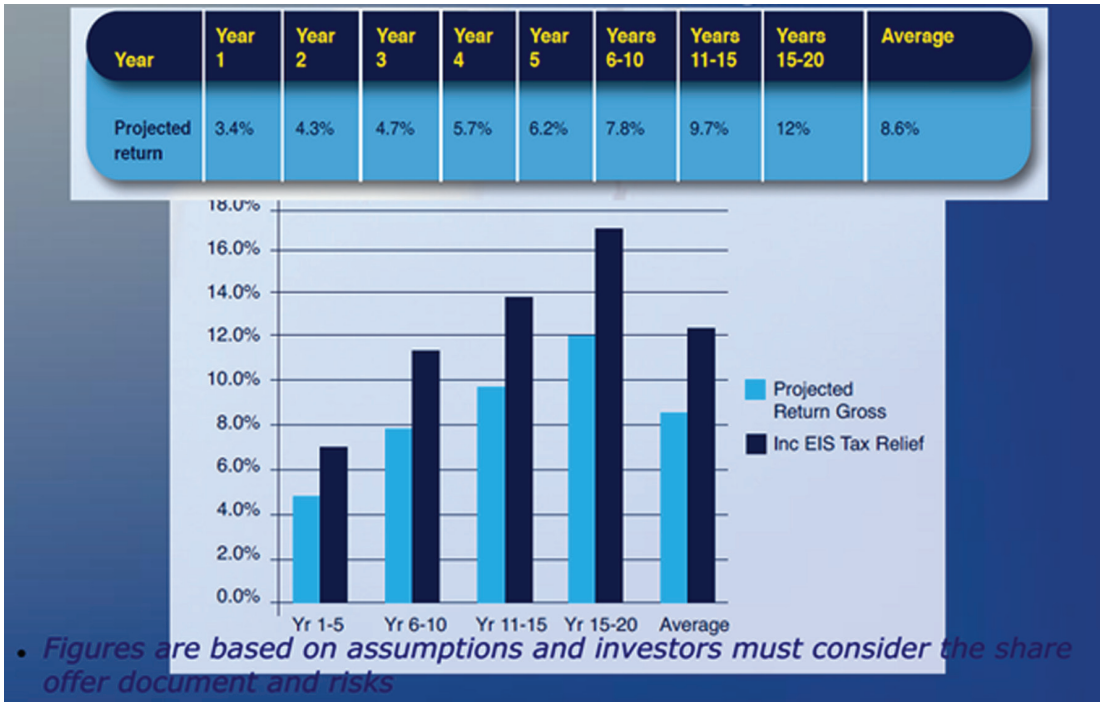
Renewable Obligation system[2]. The actual level of income will depend on the level of wind at each site and the operational efficiency of the wind turbines.

After payment of operating costs such as maintenance, rent, insurance and administration costs, the surplus profits will be available to distribute as a share interest payment to members of the co-op.

From year four the Co-op intends to repay a portion of share capital each year. It is expected all member's original investment will be paid in full by year 21. The projected return for individuals are shown in Figure 2, illustrating that investors can expect a 3.4% after year 1, and 12% return from years 15-20. The EIS Tax Relief is known as the Enterprise Investment Scheme Tax Relief which the project qualifies for.

There will also be a Community Fund available to support local community initiatives local to each wind turbine, starting at £2,000 per site.

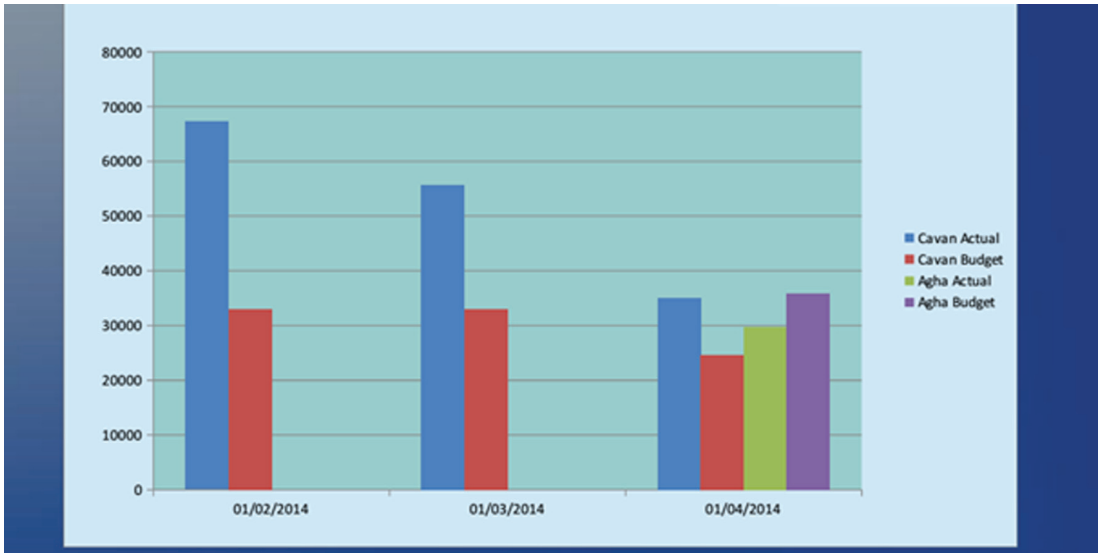
Figure 2: Co-op Financial Projections



2 Under the Renewable Obligation system, Renewables Obligation Certificates (ROCs) are green certificates issued to operators of accredited renewable generating stations for the renewable electricity they generate. Operators can trade ROCs with other parties. For more information see ofgem https://www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro

Figure 3 gives information on the first quarter production figures for two of the operating sites: Cavanoniell and Aghafad. It shows the change in production cost compared to the budget over the first three months of operation.

Figure 3: First Quarter Production Figures



Future projects

Energy4All is a not for profit organisation and it operates by taking a percentage from the Co-op for administration of the shares and uses this to fund their next initiative.

The Drumlin Co-op recently launched Phase II - a second share offer (which closed 30 April 2014) to raise up to £1.2 million for two further sites at Ballyrobert, Co. Antrim and Cavanakill, Co. Armagh each with a 250kW turbine.

For more information refer to the Drumlin's Co-op website http://www.drumlin.coop/home.asp

Grass Roots Renewables CIC

Grass Roots Renewables CIC is a community interest company set up to generate funds for community organisations in Carntogher Area of Derry/Londonderry.

Its proposal is to set up a 225KW wind turbine at Tirkane in Maghera, where proceeds will be split between four local community organisations:

- Carntogher Community Association
- Sleacht Néill GAC
- Naíscoil Charn Tóhair
- Naíscoil Mhachaire Rátha

Process to date – planning and grid connection

- March 2008 - Planning Consent Applied for
- March 2009 - Initial NIE connection enquiry
- Nov 2009 - Planning Approved
- Dec 2009 - NIE Connection application
- March 2011- NIE Connection offer
- June 2011- Paid down payment on Connection Application

- Feb 2014- NIE advised that all wayleaves, Leases etc. had been sorted out & requested final payment.
- March 2014- Paid Connection fee
- July 2014- Connection due to be provided[3]

Capital Costs

- Planning & Surveys (incl. Wind)- £ 35,000
- NIE - £138,000
- Legals - £ 10,000
- Turbine - £435,000
- Civils & Commissioning - £ 42,000
- Financing Capital Costs - £ 20,000
- Contingency - £ 10,000
- Overall Costs - £690,000[4]

Costs

Funding:

Funding was achieved through community loans (190,000), UCIT (£500,000) and capital and interest over 15 years.

Operational:

Estimated Gross Income is £130,000 p.a. (ROCS & Electricity). This is less:

- Insurance, Rent, Maintenance, Rates etc. £ 20,000
- Capital & Interest repayments - £65,000
- Estimate of Community Return - £ 45,000

Grass Roots Renewables made the following conclusions:

- Potentially great source of income for Community Sector -one single turbine could provide as much as an entire community fund from a wind farm.
- It will always take much more time to deliver a project than you initially estimate due to Planning, NIE and procuring a turbine.
- NIE Connection is the most critical element in the entire process – both in costs and in terms of timing.
- Could get planning but connection may not be available at viable costs
- Could take many months and even years to get way-leaves agreed.
- Need to lobby Government to retain ROCS for Community Sector projects – currently it's the private sector that benefits most. This could unlock major benefits for the community sector.[5]

3 In formation from presentation at UCIT/Action Renewables event 7th May 2014

4 ibid

5 ibid

Northern Ireland Assembly

Research and Information Service
Briefing Paper

Paper 000/00 28 April 2014 NIAR 000-00

Suzie Cave

Wind Farm Community Benefits

The following paper is in relation to a request from the Environment Committee on community benefits from wind farm developments. It considers the community fund rates offered in NI, how these compare with other jurisdictions and gives a number of case studies. Finally it looks at examples of other types of community benefit from other countries such as Denmark, Germany and Netherlands etc.

Introduction

Community benefit refers to a range of both monetary and non-monetary benefits that may be given to neighbouring communities due to the presence of a renewable energy development. They can be in the form of broader socio-economic benefits arising from a development, or specific mechanisms established directly by the developers to generate additional benefit to the local community.

There are 4 main types of community benefits from renewable energy developments:

1. Community funds: where a trust fund receives a lump sum and/or regular payments from the developer/operator and awards grants to support local community or environmental projects.

2. Benefits in kind: funded by the developer/operator and includes local infrastructure or other amenity improvements; direct support for local education or community projects; and reduced energy tariffs for local homes and businesses.

3. Local ownership of the development (or part) by local people or community based organisations. Usually done by offering shares for sale or gifted by the developer, joint venture or majority ownership by a community- based enterprise.

4. Local supply chain, for example through contracting to local firms and other employment and training opportunities during the project design, construction and operation.[1]

Community Benefits in Northern Ireland

The following section is more concerned with comparing the amount of community benefit received in Northern Ireland with other jurisdictions. In this case the section refers to community funds, as the direct monetary value received by a community is clearer and more readily available compared to other types of benefit. This section also considers a number of case studies in Northern Ireland, and where the detail was available it gives information on how communities have used the funds.

Community funds

The level of community fund is usually calculated in terms of pounds per megawatt (MW) of installed capacity, to be paid per annum.[2]

The level of community fund offered by projects appears to vary across jurisdictions, largely influenced by recommendations by the various UK industry bodies. Renewables UK's recommended minimum of £1000/MW/year has been increased to £5000/MW/year for England only following the UK Government's consultation on onshore wind energy in 2012.[3] However, in England and Wales variations do apply and research by the Joseph Rowntree Foundation in 2012 identified an offer of £8,000 per megawatt in a Welsh scheme.[4] The Scottish Government is also promoting a national rate equivalent to at least 5,000 per MW per year for the operational lifetime of the onshore wind development for community benefit packages. This is a minimum level and the Scottish Government would like to see opportunities for increased levels of community investment to be explored.[5] However in NI, Northern Ireland Renewables Industry Group (NIRIG) still recommend the lower figure of £1000/MW/year in their Community Commitment Protocol.[6]

Comparing the amount of community fund levels between Northern Ireland and the rest of the UK, Fermanagh Trust have found that:

- only one out of 14 wind farms located in Northern Ireland had a community fund of £2000/MW or more, and
- the majority were much lower with 11 of the 14 between £500 and £1000 MW.

Their study which was based on a number of schemes from England, Wales and Scotland concluded that community benefit funds are much lower in Northern Ireland compared to the samples used from the rest of Great Britain, where in fact levels have been seen to be increasing.[7]

---

1 Centre for Sustainable Energy (CSE), 2009, Delivering Community Benefits from Wind Energy Development: A Toolkit. http://www.cse.org.uk/search/?keywords=COMMUNITY+BENEFITS+TOOLKIT

2 Cowell, Richard et al Wind Energy and Justice for Disadvantaged Communities (May 2012) www.jrf.org.uk/sites/files/jrf/wind-farms-communities-summary.pdf

3 Department of Energy & Climate Change Onshore Wind Call for Evidence: Government Response to Part A (Community Engagement and Benefits) and Part B (Costs) (June 2013) www.gov.uk/government/uploads/system/uploads/attachment_data/file/205423/onshore_wind_call_for_evidence_response.pdf

4 Cowell, Richard et al Wind Energy and Justice for Disadvantaged Communities (May 2012) www.jrf.org.uk/sites/files/jrf/wind-farms-communities-summary.pdf

5 Scottish Government Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments (November 2013) www.scotland.gov.uk/Publications/2013/11/8279/3

6 NIRIG Community Benefit Protocol http://www.ni-rig.org/news/nirig-launches-community-commitment-protocol/

7 Fermanagh Trust (2012). Maximising Community Outcomes from Wind Energy Developments full Report http://www.fermanaghtrust.org/images/custom/uploads/127/files/Wind_REPORT_1(1).pdf

The DETI et al study[8] compared the average annual amount of community benefit fund from Scotland, Wales and NI (unfortunately no figures are given for England). It highlights that the Drumlins project, which is clearly far greater in terms of benefits compared to other projects in NI, has a large impact on the average annual figure for community benefits. Table 1 figures show that with the Drumlins project included, NI's annual average is in fact the largest out of Scotland and Wales, however remove this figure and NI' s average drops to the lowest.

Table1: Average level of community benefit in Scotland Northern Ireland and Wales

	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

Source: Communities and Renewable energy study (DETI et al)[9]

Formalising the process

It is difficult to quantify the exact amount of community benefit given as a whole throughout Northern Ireland as there is no formal record. It has been suggested that a register of community benefit such as that adopted by the Scottish government would help to keep a track record.

A form of register would add to the formalisation of the process, which according to Cass et al (2010) gives more certainty to communities. In their opinion communities want "contractual" certainty for their community benefit so that they are not dependent on what Cass et al describe as the "largesse of the developer acting out of a sense of corporate social responsibility"[10].

The Communities and Renewable Energy study[11] recognised that the combination of a register (as in Scotland), a protocol (similar to ones developed by the Scottish Government and NIRIG), or a Concordat as developed by the Highland Council, would help to formalise community benefits. These are detailed below:

Scottish Register of Community Benefits

The Scottish Government Register of Community Benefits from Renewables is voluntary and relies on communities and developers sharing their details and experiences in relation

8 DETI/DOE/DARD, Communities and Renewable Energy: a Study (2013) http://www.detini.gov.uk/deti-energy-index/renewable_electricity-2/communities-and-renewable-energy-2.htm

9 Ibid (p.42)

10 Cass, N, Walker, G., & Devine-Wright, P. (2010). Good neighbours, public relations and bribes: The politics and perceptions of community benefit provision in renewable energy development in the UK as sited in Communities and Renewable Energy: a Study (2013) http://www.detini.gov.uk/communities-and-renewable-energy

11 Communities and Renewable Energy: a Study (2013) http://www.detini.gov.uk/communities-and-renewable-energy

to community benefits. It provides information to support local communities through the community benefit process by publishing the benefits communities have received and how they have used them.

It also details fund spend, and provides ideas and advice for communities to ensure their funds are spent wisely. The Register is voluntary and relies on communities and developers sharing their experiences and the lessons they have learnt.[12]

NIRIG Protocol

To integrate community benefits, NIRIG has launched a Community Commitment Protocol which sets out a protocol for NIRIG members, based on current industry positions across the UK and Ireland. The protocol has been inspired by the success of existing community benefit funds in Northern Ireland and states the following requirements:

- A community benefit scheme will receive support equivalent to a value of at least £1,000/MW of installed capacity per annum and will be index-linked for the lifetime of the project.
- Payments and/or benefits in kind under a community benefit scheme will commence not later than twelve months from the date of completion of commissioning of the wind farm (unless otherwise agreed by the developer/operator and any proposed recipient to be paid at a later date).
- Payments and/or benefits in kind shall be provided for the duration of the commercial operation of the wind farm. Annual payments may be wholly or partially aggregated over the permitted operational life, as agreed through consultation between the developer/operator and the community.[13]

Scottish Protocol

2013 saw the launch of the Onshore Wind Community Benefit Protocol published by Scottish Renewables and backed by government, which details a consistent approach to community benefits across Scotland. The protocol, which is the first of its kind for Scotland, outlines a number of key commitments from Scotland's onshore wind sector, including a commitment to explore the potential for greater community ownership from onshore wind farms and a pledge to sign up to the government's online Register of Community Benefits from Renewables.[14]

Highland Council Concordat

The Council has a policy for community benefit and has recently agreed a Concordat to set out the terms of a new relationship between the Council and developers. As part of this agreement it will be the Council's responsibility to provide the framework and infrastructure for receiving and then disbursing Community Benefit. Developers will then agree to provide not less than £5,000 per installed megawatt annually (this appreciates each year in line with the UK Retail Price Index)[15]

Case Studies

The following section looks at examples of community benefit funds provided by a number of wind farm developments in Northern Ireland and where detail is available, the case studies

12 The register can be accessed here

13 NIRIG Community Benefit Protocol http://www.ni-rig.org/news/nirig-launches-community-commitment-protocol/

14 Scottish Renewable Community Benefit Protocol http://www.renewableuk.com/en/renewable-energy/communities-and-energy/community-benefits-protocol/index.cfm

15 For more information and to access the Concordat visit http://www.highland.gov.uk/livinghere/communityplanning/communitybenefit/

show how the funds have been used. Case studies are taken from a report commissioned by DETI, DOE and DARD.[16]

Callagheen Community Wind Farm Fund[17]

Project Timeline	operational since 2006
Location	Between Belleek and Garrison, County Fermanagh, Northern Ireland
Capacity	Total capacity of 16.9 MW, consisting of 13 turbines, each 1.3MW.
Local Community involvement	The Callagheen Community Wind Farm Fund is administered by The Fermanagh Trust. 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.[1]
Financial benefit to community	Scottish Power Renewables make annual payments to the Callagheen Community Wind Farm Fund of £1,000/turbine equivalent to £769/MW.
Additional benefits	In 2012, 13 local projects were funded from senior citizen's groups, women's groups, schools, arts and recreation, pre-schools and youth based activities. Local Primary Schools have received £1500 for their "Pot to Plot Project" environmental initiative. Young people benefited from an award to the Erne Music Club to hold master classes and workshops. A women's group in Garrison received a grant to run a health and fitness programme and Devenish GAA club was offered support towards an energy efficiency project aimed at reducing the Club's carbon footprint

RES Multiple Wind Farms

The following table details the benefits received from the four operating wind farms in NI from RES[18]

Project Timeline	Altahullion and Lough Hill in operation from 2007 Gruig Wind Farm in operation from 2009 Altaveedanin development; currently in Planning
Location	Altahullion – near Dungiven (population ~ 3000) Lough Hill – near Drumquin (population ~ 300) Gruig – near Loughgiel (population ~ 2300) Altaveedan – near Loughguile (population ~ 2300)
Capacity	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

16 ibid

17 http://www.scottishpowerrenewables.com/pages/callagheen.asp

18 RES is a developer in renewable energy and operates at a global scale http://www.res-group.com/contact-us/uk-ireland.aspx

Local Community involvement	Each of the communities are rural. RES give priority to communities within a 6km radius of a wind farm. 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 community	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 (based on projections)
Additional benefits	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 Local construction contractors, security, catering, operational staff etc. employed where possible. Use of local materials etc.

Scottish and Southern Energy (SSE) – Multiple Wind Farm Community Funds

SSE own and operate a number of wind farms in Northern 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.[19]

Project Timeline	SSE/ Airtricity wind farms have been operating for over a decade. Normal project timeline 20-25 years.
Capacity	Various capacities across 23 operational wind farms, including 3 located in Northern Ireland ranging from the 5MW (Bessy Bell) to 27.6MW (Slieve Kirk).
Local Community involvement	Priority is given to applications to the community fund from groups within 12 miles, with a particular emphasis on those sites within 3 miles. Local community groups and projects apply for funding from the Airtricity 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.
Financial benefit to community	Ranges from between £2500/MW to £3000/MW, index linked to revenue received by the site.

19 http://www.airtricity.com/uk/home/about-us/community-fund/

Additional benefits	Projects include: · Insulation and double glazing for schools, various sports clubs and community halls · 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 Local contractors and subcontractors are used in construction. In Kind Benefits · 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

Examples Worldwide

Appreciating that there are different forms of community benefits and that some are more suited to particular communities than others, the assessment of the value of such schemes may be difficult to conduct. For this reason the following section gives an account of a number of countries offering examples of community benefits. Due to the variety of community benefits explored, this section does not order them in terms of their value or as examples of best practice.

Denmark

Denmark has a number of schemes which are offered to give support and benefits to local communities, some of these include:[20]

The loss of value Scheme

Any party erecting new wind turbines with a height of 25 meters or more, including offshore wind turbines erected without a government tender procedure, must pay for any loss of value on real property if the erection of the wind turbines results in a loss of at least 1% of the property value. This is carried out through the following process:

1. The developer must invite the neighbours to a public information meeting in order to give them the opportunity to assess the consequences of the wind turbine project. The material is to include a list of the properties lying within a distance of up to six times the turbines total height. The meeting must be advertised in local newspapers and must take place at least 4 weeks before the municipal planning process starts.

2. Property owners, who feel, based on the information and the information meeting, that the build will reduce the value of their property must notify the loss of value to Energinet.dk within four weeks of the meeting. If the property owner lives further than six times the turbines total height then they must pay a fee of DKK 4,000 to Energinet.dk, however this is repaid if the owner is granted the right to compensation for loss of value. Those who live closer to the project are not required to pay a fee.

20 International Energy Agency (IEA)Task 28's "Recommended Practices on social acceptance of wind energy projects." (2013. Available at http://www.socialacceptance.ch/

3. The developer may enter into a voluntary agreement regarding compensation for property owners who have notified their claims to Energinet.dk. If this is not done then Energinet submits the owners' claims to a valuation authority. The Energy and Climate Minister has appointed five valuation authorities for assessing property value. The valuation authority decides by assessment, the extent to which the property owners can be compensated.

4. If the property owner's claim is successful, the turbine erector must pay the valuation authority costs. If the claim is rejected then Energinet.dk pays the costs not covered by the DKK 4000 fee. This cost is recouped from the electricity consumers as a public service obligation (PSO) contribution.[21]

The option to purchase Scheme

Development of wind turbines over 25 meters in height, including offshore turbines built without governmental tender must offer for sale at least 20% of the wind turbine project to the local population. Anyone within 4.5 Km from the turbine or the municipality in which it is located can purchase. If there is more interest than purchasing 20%, people who live closest have first priority on a share of ownership

The wind developer must hold an information meeting advertised by local newspapers. The meeting must include a run through of the sales material to give an indication of the nature and financial conditions of the project; this should include:

- Articles of association of the company that will be erecting the wind turbine,
- a detailed constructions and operating budget including the financing of the project,
- The liability per share; and
- The price of the shares on offer.

Energinet.dk must approve the sales material as a condition for the wind turbine erector obtaining the price supplement provided for in the Danish Promotion of Renewable Energy Act.[22]

Germany

Germany has introduced the following which have been beneficial to communities associated with wind developments:

Distribution of Trade Tax – law requires that 70% of relevant trade tax remains with the municipality where the wind farm is located, whereas only 30% goes to the municipality where the operator is based.[23]

Municipal Fund – For regions where residents are concerned about long payback periods it is possible to set up a municipal fund to support sustainable and innovative projects etc. It is also required that the depreciation schedule24 should be such that local authorities start receiving tax revenues shortly after a given installation goes into service. The IEA (International Energy Agency)suggest that co-operative models or compensation arrangements

21 Decisions of the valuation authority cannot be contested with another administrative body but may be brought before the courts as civil proceedings by the owner of the property against the wind turbine erector.

22 International Energy Agency (IEA)Task 28's "Recommended Practices on social acceptance of wind energy projects." (2013. Available at http://www.socialacceptance.ch/

23 Ibid (p.23)

24 A

such as municipal funds may be best suited to regions where project profitability depends more on economies of scale efficiencies from single owner/corporately owned projects.[25]

Community Ownership – In North Frisia 90% of the wind power plants are citizen owned. Ownership of existing wind parks increased the public's engagement and interest in additional wind installations. In fact when all areas designated for wind had been used, the communities asked the government to appoint further areas for wind energy. Shares start at 200 Euros to ensure they involve as many residents as possible, and are prioritised for those living closest to the wind farm. This measure is also being used in the Republic of Ireland. According to the IEA, community ownership is most likely successful in windy regions where a wind resource is dependable and profitable.[26]

Policy – Local German policy has encouraged and supported the development of citizen wind parks since the late 1980s. These projects, emerging from locally driven initiative, are owned by local shareholders creating a sense of responsibility amongst the community. In fact projects are seen as a cultural asset and in some cases shares are presented as gifts etc.

Japan

In Japan, to encourage investment in projects, certificates are offered for investors, names of applicants are inscribed on turbines, nicknames for turbines are asked for from the public, and turbine tours are held. The aim of these is to add value to local investment and motivate investors. Ceremonies are held to celebrate the completion of a turbine and events such as agricultural and eco tours are held to strengthen the local residents' relationships by helping to boost the local economy through the sales of local products. There is also a fund for local development which asks investors to contribute their dividends with match funds from an NGO and the local government.[27]

Netherlands

This is an example of achieving community buy in. According to the IEA, the active involvement of the public proved to be a positive driver in the Wieringermeer municipality where a plan for building 110 new turbines in October 2011 received almost no objections. At the beginning a strong animosity existed among local politicians and residents against wind energy development in their area. However it was assured by the initiators of the project that they were committed to make a plan that would only count on support from the local community.

In the two and a half years of planning, two wind events were held in the town in order to involve the locals in the planning stage:

- In the first event, the public and inhabitants were engaged to express their opinion and requirements of wind energy, these included trips to existing turbines which also included events suitable for children. Ideas were recorded and translated into the plans of the wind farm.
- The second event involved a week long programme with public hearings; turbine design workshops; a contest for students of the local colleges; and discussions with politicians, landscape architects and artists.

25 ccording to DfP NI depreciation schedule is an accounting procedure for determining the amount of value left in a piece of equipment. This is usually calculated based on either the passage of time or the level of activity (or use) of the asset. Depreciation schedules are used in the calculation of taxes where a fraction of the total value of certain assets is allowed to be deducted each year. http://www.dfpni.gov.uk/index/finance/eag/eag-glossary.htm

26 ibid

27 International Energy Agency (IEA)Task 28's "Recommended Practices on social acceptance of wind energy projects." (2013. Available at http://www.socialacceptance.ch/

- The building plans were presented along with ideas for a participation community fund which resulted in a town owned turbine being accepted.[28]

Distribution of revenue

In the north of the Netherlands and Wieingermeer, a turbine is owned by the community and financed by the public who enjoy the returns. Revenues from these projects are often used to develop and maintain common services within the communities.

The public can also buy bonds from projects which is considered to be less risky. Sustainability funds are also formed where a small fee on the returns of the wind energy contributes to the fund. Each year anyone in the community can submit plans to be supported by the fund.[29]

Switzerland

The Mont Crosin wind farm which opened in 2012 has 16 turbines and is located in a rural area and has a large focus on promoting the local through the following means:

- Guided wind park tours in Switzerland's first wind park have attracted 40,000 visitors per year for over 10 years. The local restaurant benefits from these tours and in fact local farmers are also supported who work as tour guides. Farmers are also able to sell their products to visitors and offer tours by horse and cart.
- The operating company hires local farmers for basic supervision and maintenance work in the wind park.
- The local bakery and dairy offer "wind bread" and "wind cheese" produced entirely from power from the local wind park. These are sold both locally and outside the immediate community.
- When receiving guests or visitors the operating company offers local products (breads, cheese, apple, juice, dried meat etc.) served by local people instead of hiring professional catering companies.[30]

United States

Community wind has played a significant role in the United States to help build locally owned projects with relatively limited amounts of capital e.g. Minnesota, Iowa, Nebraska. Financial models use small amounts of local equity (1%-5% of total project cost) which is then leveraged with equity investments from institutional investors. Development of such financial models has led to the benefit of the broader industry capturing federal tax credits available for wind energy in the US. Other community ownership models include farmer- based cooperatives and investments by municipal utilities. Such projects tend to be welcomed as they offer an additional income for rural farmers or residents.[31]

28 ibid

29 ibid

30 ibid

31 ibid

Northern Ireland Assembly

Research and Information Service
Briefing Paper

Paper 000/00 22 September 2014 NIAR 563-2014

Suzie Cave

Onshore Wind Power in Denmark

Introduction

The following paper is in response to a request from the Environment Committee. It gives background to wind power in Denmark including an overview of the policy position behind its development and schemes offered to encourage the expansion of the industry.

Denmark had 4,772MW of wind power installed by the end of 2013, contributing to 4% of the EU's total installed wind capacity.[1] This puts it in sixth place behind Germany, Spain, the UK, Italy and France (see Figure 1).

Denmark currently has over 5000 wind turbines (onshore and offshore)[2]. Latest figures published for 2012 (2013 not available until autumn 2014) show that wind power contributed to almost 30% of domestic electricity supply. Of the total power generated by wind that same year, 72% came from onshore wind and 28% from offshore.[3]

1 European Wind Energy Association, 2014, Wind in Power 2013 European statistics. http://www.ewea.org/statistics/european/ (p.12)

2 Danish Energy Agency (July 2014) Register of wind turbines http://www.ens.dk/en/info/facts-figures/energy-statistics-indicators-energy-efficiency/overview-energy-sector/register

3 Danish Energy Agency (2012) Energy Statistics 2012 http://www.ens.dk/en/info/facts-figures/energy-statistics-indicators-energy-efficiency/annual-energy-statistics (p.10)

Figure 1: Wind power installed in Europe

Source: EWEA 2014[4]

Planning for onshore wind turbines is the responsibility of the local municipalities for turbines up to 150 metres. Turbines over 150 metres are dealt with by the Ministry of the Environment, who also manages the production, implementation and enforcement of planning legislation for onshore wind. Any planning proposal at a general or strategic level, and those requiring an Environmental Impact Assessment (EIA), are also handled by the Ministry of the Environment.[5]

Policy Position

The EU's 2020 Climate and Energy Package set Denmark with a target of at least 30% renewable energy of its total energy consumption by 2020[6], and 10% renewable energy in the transport sector by 2020[7].

Denmark has set its own target of 100% renewable energy in the entire energy supply and transport sectors by 2050. By way of achieving this, a new Energy Agreement was reached in Denmark in March 2012 setting interim targets. These include more than 35% of final energy consumption from renewable energy sources by 2020, and 50% of all electricity consumption supplied by wind power by 2020[8].

4 European Wind Energy Association, 2014, Wind in Power 2013 European statistics. http://www.ewea.org/statistics/european/

5 Danish Energy Agency Onshore Wind Power [online]. Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/onshore-wind-power and Danish Energy (2009) Wind Turbines in Denmark. http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/facts-numbers (p.12)

6 European Commission, Europe 2020 in Denmark – Renewable Energy. Available at http://ec.europa.eu/europe2020/europe-2020-in-your-country/danmark/progress-towards-2020-targets/index_en.htm

7 European Commission, Biofuels and other renewable energy in the transport sector. Available at http://ec.europa.eu/energy/renewables/biofuels/biofuels_en.htm

8 Danish Ministry of Climate Energy and Building (2013) Energy Policy Report 2013. Available at http://www.ens.dk/sites/ens.dk/files/policy/danish-climate-energy-policy/dkenergypolicyreport2013_final.pdf

Supporting the expansion of wind power up to 2020, the energy agreement sets plans for 1000 MW of offshore wind turbines, 500 MW of near-shore wind turbines and 500 MW of onshore wind turbines, while also accounting for decommissioning old wind turbines.[9]

Schemes

The Promotion of Renewable Energy Act entered into force in Denmark on 1 January 2009. It contains four new schemes to promote the development of wind turbines:

1. Loss of value to real property due to the erection of onshore wind turbines

If a property loses more than 1% in value due to the erection of new wind turbines, the owner is entitled to full compensation for the loss. The turbines must be 25 metres or more in height, and the affected property must be within a distance of up to six times the turbine's height. To give neighbours the opportunity to assess the consequences, it is the responsibility of the developer of the wind project to notify all neighbours within the distance, at last four weeks before the planning process starts.[10]

The owner of the property must notify their claim for compensation to Energinet.dk, which operates the electricity grid in Denmark. Those within the distance do not pay a fee; however owners beyond the distance pay DKK 4,000 (£427) to Energinet.dk, which is refunded if the right to compensation is granted.[11]

An owner can choose to enter into a voluntary agreement for compensation with the erector of the wind turbine, or can ask Energinet.dk to submit the claim to an impartial appraisal authority to make a specific appraisal of the property, and determine the loss. The Energy and Climate Minister has appointed five valuation authorities for this purpose.[12]

If the property owner's claim is successful, the erector must be notified before the turbine has been erected and must pay the valuation authority costs. If the claim is rejected then Energinet.dk pays the valuation authority costs that are not covered by the DKK 4000 fee. This cost is recouped from the electricity consumers as a public service obligation (PSO) contribution.[13]

2. Local citizen's option to purchase wind shares in new projects

Any citizen 18 years or older living within 4.5km of new wind turbines, will be given the option to buy a share in local turbine projects. Priority is given to those living closest, however any shares not bought will be offered to permanent residents in the rest of the municipality.[14]

The erector of the turbines must announce the project in the local papers. The shares on offer must equate to at least 20% of the cost of the turbines; a single share is around DKK 3,000-4,000 (£320-£427). Shareholders share the costs, revenues, risk and influence on equal terms with the erector of the turbine.[15]

The wind developer must hold an information meeting advertised by local newspapers. The meeting must include a run through of the sales material to give an indication of the nature and financial conditions of the project. Following this meeting, local citizens have four weeks to make a purchase offer.

9 ibid

10 Danish Energy Agency (2009) Wind Turbines in Denmark (p.22). Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/facts-numbers

11 ibid

12 ibid

13 decisions of the valuation authority cannot be contested with another administrative body, but may be brought before the courts as civil proceedings by the owner of the property against the wind turbine erector.

14 Danish Energy Agency (2009) Wind Turbines in Denmark (p.23). Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/facts-numbers

15 ibid

Energinet.dk must approve the sales material as a condition for the wind turbine erector obtaining the subsidy provided for in the Danish Promotion of Renewable Energy Act.[16]

3. A green scheme to enhance local scenic and recreational values

The Danish Promotion of Renewable Energy Act has introduced a green scheme for the financing of projects that enhance the scenery and recreational opportunities in the municipality. Under the scheme, Energinet.dk pays DKK 0.004 (0.04 pence sterling) per kWh for the first 22,000 full-load hours, for wind turbine projects connected to the grid since 2008.[17] According to the Danish Energy Agency this could work out at DK 200,000 (£21,325) per turbine depending on their size.[18] Money for the scheme is recouped from electricity consumers as a PSO contribution. Money is lodged into an account for the given municipality, and the amount of money depends on the number and size of turbines connected to the grid in that municipality.

The green scheme may:

- Wholly or partially finance development works for enhancing scenic or recreational values in the municipality; and
- Be granted to municipal cultural and information activities aimed at promoting acceptance of the use of renewable energy sources.[19]

4. A guarantee fund to support financing of preliminary investigations etc by local wind turbine owners' associations.

A new scheme with a total of DKK 10 million was established in January 2009. The scheme which is run by Energynet.dk, grants guarantees for commercial loans taken out by local groups, such as wind turbine associations. The money for the fund is recouped from electricity consumers as a PSO contribution.

The guarantee is to act as a security for groups of citizens, wind turbine owners' associations and others to apply for a loan to help finance preliminary investigations, before deciding whether to erect a turbine. This may include preliminary investigations of the area and proposed turbine sites, nuisance for neighbours, financial aspects etc. The maximum loan a guarantee can be applied for is DKK 500,000 per project.

The guarantee will lapse once the turbines are connected to the grid, or if the project is sold on. If the project is not implemented and the loan cannot be repaid, the guarantee will be paid.[20]

Replacement/scrapping scheme

The Promotion of Renewable Energy Act also contains a scrapping scheme for old wind turbines. According to this scheme, a scrapping certificate can be earned by replacing old inappropriately situated wind turbines with new and more efficient turbines. The most recent scheme granted the erector the right to an extra subsidy for new turbines that were grid connected up until December 2011. This was managed and paid by Energynet.dk.[21]

16 More information on the subsidy can be viewed here http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/subsidies-wind-power

17 Danish Energy Agency (2009) Wind Turbines in Denmark (p.23/24). Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/facts-numbers

18 Danish Energy Agency, Green Scheme. Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/onshore-wind-power/green-scheme-enhance-local-scenic-recreational

19 ibid

20 Danish Energy Agency (2009) Wind Turbines in Denmark (p.24). Available at http://www.ens.dk/en/supply/renewable-energy/wind-power/facts-about-wind-power/facts-numbers

21 More information on this scheme can be obtained from the Danish Energy Agency at http://www.ens.dk/en/supply/renewable-energy/wind-power/onshore-wind-power/replacement-scheme-wind-turbines-land-expired

TSO
information & publishing solutions

Published by Authority of the Northern Ireland Assembly,
Belfast: The Stationery Office

and available from:

Online
www.tsoshop.co.uk

Mail, Telephone, Fax & E-mail
TSO
PO Box 29, Norwich, NR3 1GN
Telephone orders/General enquiries: 0870 600 5522
Fax orders: 0870 600 5533
E-mail: customer.services@tso.co.uk
Textphone 0870 240 3701

TSO@Blackwell and other Accredited Agents

£21.00

Printed in Northern Ireland by The Stationery Office Limited