Submission of Written Evidence to the Committee for Agriculture, Environment and Rural Affairs

SONI Response to Climate Change Committee Advice

24 February 2021

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1 Introduction to SONI

1. SONI Ltd. is the Electricity Transmission System Operator for Northern Ireland. We have a unique set of roles. Our central role is to plan and operate the electricity transmission system in Northern Ireland. In addition, through the contractual joint venture SEMO, we operate the Single Electricity Market. We also manage power flows on interconnectors with our neighbours. This gives us a whole-of-system perspective.

2. SONI is focused on delivering an efficient, reliable, secure and increasingly cleaner electricity supply for Northern Ireland consumers. We ensure that electricity is always available when and where it is needed. We do this in the most cost-effective way possible, and in the interests of all electricity users across Northern Ireland.

3. SONI is an independent entity, with no vested interest in the generation or selling of electricity. We do not own the grid infrastructure and have no self interest in adding to it. We work in closely with Northern Ireland Electricity Networks (NIE Networks) who own and build the grid transmission assets.

4. NIE Networks also operate the electricity distribution system. The transmission and distribution systems are intertwined. SONI recognises that the operation of the transmission and distribution systems requires partnership working and that this is critical to the success of the energy transition. So we are collaborating and co-ordinating with our colleagues in NIE Networks to achieve the best outcomes for the consumer.

5. SONI is regulated by the Utility Regulator for Northern Ireland who determines our funding. We implement policy set by government and as approved by the Utility Regulator.

6. We thank the Committee for the opportunity to provide this evidence and would emphasise that SONI develops and implements deep expertise in the service of the people of Northern Ireland. We are keen to collaborate as we all navigate the energy transition, to that end, we would encourage the Committee and its members, on an individual basis, to freely approach SONI for anything which may be of assistance. SONI is a trusted expert advisor and are keen to assist.

7. Further information regarding SONI's role in the energy transition is discussed in Annex A of this document.

2 SONI Response

8. Northern Ireland will need to deliver its share of Green House Gas (GHG) emission reductions as part of the UK's legal commitment to net zero emissions by 2050. As such, the 2021 to 2030 period is a critical one for the energy sector in Northern Ireland if it is to be ready to facilitate the energy transition and for Northern Ireland to meet its commitments as outlined by the Committee on Climate Change.

9. While meeting these targets is critical for tackling the climate emergency, there are also important implications for the economic growth and development of Northern Ireland. In order to attract investment and local expansion Northern Ireland has to be equally competitive as neighbouring markets in Great Britain and the Republic of Ireland. In addition, the green energy industry offers significant opportunities for economic stimulus for Northern Ireland as we emerge from the pandemic.

10. SONI restricts its comments to what can be achieved within the electricity sector, as this is our area of expertise.

2.1 Conclusions from Tomorrow's Energy Scenarios Northern Ireland

11. SONI recently published the first publication of Tomorrow's Energy Scenarios Northern Ireland (TES NI)[1]. The TES NI outlines a number of credible pathways for Northern Ireland's energy transition and considers the electricity system beyond the ten-year planning horizon.

12. Further details of the TES NI process can be found on the SONI website[2] and in Annex B of this document.

13. As part of this work, SONI has also worked jointly with NIE Networks as Distribution System Operator and Transmission Owner[3] in order to develop and provide aligned and consistent analysis and feedback regarding the planning, operation and development of the electricity system.

14. The TES NI report highlights that in two of the three scenarios considered (Addressing Climate Change and Accelerated Ambition scenarios), Northern Ireland can meet the level of decarbonisation that it should achieve under the recommendations set out by the Committee on Climate Change for a net-zero UK by 2050.

15. A commitment to achieve at least 70% RES-E[4] for the power sector by 2030 would reduce emissions intensity of electricity to around 150g/kWh, which is around 2/3 lower than 2017 levels. The TES NI Accelerated Ambition Scenario highlights a pathway to deliver Northern Ireland's share of net-zero by 2040. However, a suite of policy incentives and actions outside the power sector are required to deliver this level of ambition particularly for energy efficiency, and within the heating and transport sectors.

16. With higher year on year efficiency gains, and a faster switch to electric alternatives for heating and transport, the total primary energy falls by 47% by 2050 compared to today with only 15% of primary energy sourced from fossil fuels by 2050[5].

17. It is important that the Climate Change Bill is holistic and enables Northern Ireland's green economic recovery in the short-term while facilitating long term prosperity, employment and

[1] http://www.soni.ltd.uk/media/documents/TESNI-2020.pdf
[2] http://www.soni.ltd.uk/customer-and-industry/energy-future/
[3] In accordance with the Transmission Interface Arrangements (TIA)
[4] Electricity generated from renewable energy sources
[5] Addressing Climate Change scenario

investment opportunities, health benefits and environmental protections. It should have a broad, yet measurable impact across key sectors of society and across all government functions.

18. The Bill should facilitate Northern Ireland's climate obligations including the Paris Climate Agreement, the UK's Net Zero Emissions 2050 commitments and support the Stormont Executive's Green Growth Agenda, Programme for Government, Infrastructure, Health and Community priorities, as well as acting as an enabler to the Department for the Economy's forthcoming energy policy.

19. This holistic and collaborative approach will be essential for success with the interaction between power, heating and transport sectors underpinned by energy efficiency measures being optimised and supported by climate change policy.

20. A strong framework for energy and climate, with long term sectoral targets will be essential across a range of stakeholders, as this will provide much needed certainty for system planners, financial planning, development of markets and it will provide confidence to investors. Long term certainty along with evidence from planning will help to inform decision makers, so that they can invest in solutions and technologies. Targets for 2030 should include energy efficiency, as well as renewable targets for heat, transport and electricity. These are critical to ensure that momentum is created within the energy sector, so that strong efforts can be made towards delivering a longer term goal of a net-zero Northern Ireland society, recognising that the power sector could achieve this first.

21. SONI agrees that setting a target for Northern Ireland that is based on an equitable share of emissions, as set out in the CCC report and 6th Carbon Budget. We agree with the CCC's recommendation of a long-term target for Northern Ireland of at least 82% from 1990 levels in all net GHG's by 2050. However, we would stress that this should be a minimum and that Northern Ireland should seek to deliver emissions beyond this, insofar as is possible. We would stress that a strong Climate Change Bill looking out to 2050, with a clear roadmap and ambitious measurable targets is essential. The Bill and any associated policies and/or strategies should be reviewed regularly as a flexible approach will ensure that technological innovation and economic efficiency are weighted, so that the direction of travel can be adjusted as needed.

Annex A: SONI Role in the Energy Transition

22. SONI fulfils an essential and critical role which is central to the wider Northern Ireland economy and in service of society. Our whole-of-system perspective gives us the deep expertise needed to deliver a low-carbon, cost-effective power system which will help to facilitate the decarbonisation of the heat and transport sectors.

23. Between 2015 and 2020, Northern Ireland met the challenge of providing 40% of our electricity needs from renewable sources. This realised some 1,600 megawatts of energy from renewable sources being accommodated on the system. SONI was among the key organisations central to this success.

24. Over the past five years we have delivered the integration of world leading amounts of variable renewable electricity, and we have done this through innovation and collaboration with NIE Networks. Presently we are reliably utilising 65% electricity from renewables at any one time. We are currently trialling 70% and hope to move to 75% in the coming months. This is a significant technical accomplishment.

25. While we work to support the Department for the Economy in the development of the future energy strategy, we note the Economy Minister's ambition for no less than 70% of electricity from renewables by 2030. To meet this ambition the Northern Ireland power system must be capable of delivering 95% electricity from variable renewable sources at any one time. It is expected that the amount of renewable generation will need to double from 1,600 megawatts today, to 3,200 megawatts by 2030.

26. The next five to ten years will result in even greater change as the energy transition moves to realise a trajectory to net zero carbon emissions by 2050. SONI is a critical enabler of the energy transition and we are actively working with a broad range of stakeholders to transform the power system for future generations. We are doing this not only through the reinforcement of physical network infrastructure, but also through the development of innovative solutions, delivering flexibility and agility to markets and system operations.

27. In order to achieve this, SONI will continue to work with all stakeholders to develop a more responsive and flexible transmission system together with the tools to operate it in an increasingly dynamic manner. Additionally, the evolution of the market and system operations will be necessary to facilitate the anticipated increase in electricity from renewable sources. SONI is considering the whole-of-system change required in its programme *'Shaping Our Electricity Future'*, which will be open to public consultation from early March 2021. In addition, through projects like *'Flex Tech'* supported by NIE Networks, we are seeking to maximise use of renewable electricity and low carbon technologies on the transmission system[6].

[6] http://www.eirgridgroup.com/how-the-grid-works/ds3-programme/flextech-initiative/

28. SONI has a unique and profound role to play in delivering the transformation of the power system. We are committed to realising the full benefits of this transformation for consumers through enabling the opportunities for the Northern Ireland economy in striving to have all of our energy needs met from renewable and low carbon energy sources.

29. The SONI Strategy 2020-25 is illustrated in the figure below.

30. If you wish to read more about our energy strategy it is available online, please visit www.soni.ltd.uk/strategy2025.

Annex B: TES NI Process

31. In undertaking this joint working SONI and NIE Networks both carry out analysis on electricity forecasts based on potential future scenarios. SONI undertakes this work as part of license conditions, and NIE Networks carries out economic assessments to support its price control submissions. In this context SONI and NIE Networks carry out similar but complementary approaches to scenario development which have informed the analysis presented in the TES NI:

- The TES NI utilises a top down planning approach from a transmission system view on what is required to deliver on a particular RES-E or GHG target.
    - SONI adopted a stakeholder led approach to developing the Tomorrow's Energy Scenarios for Northern Ireland (TES NI) which is similar to National Grid's Future Energy Scenarios[7]. We were pleased to have received the input of our colleagues from DAERA into this process.
    - The TES NI is developed under SONI license condition 40 to provide scenarios for the Transmission Development Plan for Northern Ireland.
- NIE Networks adopted a bottom up approach based on inputs from Element Energy[8], which modelled uptake rates of low carbon technologies such as electric vehicles (EVs), solar photovoltaics (PVs), electric heating, etc. for a number of policy scenarios. This information has also supported NIE Networks current submission to the Utility Regulator for an agreed second stage investment in the current price control period RP6 to manage impacts on the distribution network from April 2021 to March 2024. This will supplement the investments made in the first half of the current price control period.
- Numerous workshops were held between SONI and NIE Networks through 2019 and 2020.
- The sharing of input assumptions and data between all parties was constructive.

32. The scenarios agreed by SONI and NIE Networks, and used in the TES NI are set out in the table below.

[7] https://www.nationalgrideso.com/future-energy/future-energy-scenarios

[8] Element Energy are consultants specialising in assessing low carbon technology uptake scenarios and have been used for providing analysis used in NIE Networks price control submissions for RP6

Table 1: Mapping of SONI's Tomorrow's Energy Scenarios to the NIE Networks Assessment

RES	Sensitivity Onshore Offshore	Solar	EV	Storage	Heat	TES alignment
60%	All onshore	Low	Med	Low	Med	Yes Modest Progress
70%	Onshore plus a minimum of 350MW Offshore	Med	High	Med	High E	Yes Addressing Climate Change
70%	All Onshore	Med	High	Med	Low E & H2	
80%	Onshore plus a minimum of 350MW Offshore	High	Very High	High	High E (uptake advanced by 5 years in TES NI)	Yes Accelerated Ambition
80%	Onshore plus a minimum of 350MW Offshore	High	Very High	High	Low E & H2	

TES NI Process Overview

33. Figure 1 provides an overview of the TES NI scenario development cycle. The consultation phase laid out the basis for public engagement by:

- Developing strawman proposals for the power sector scenarios.
- Considering three scenarios with 50%, 60% and 70% renewable electricity targets while delivering 35-45% GHG reduction by 2030, in line with recommendations from the Committee on Climate Change (CCC) in its report of February 2019[9].
- The initial scenarios used low carbon technology uptakes from NIE Networks analysis carried out in 2016 for the purposes of NIE Networks' RP6 price control submission.
- Close engagement with NIE Networks ensured analysis of low carbon technology worlds could be incorporated as part of the final TES NI 2020 publication.

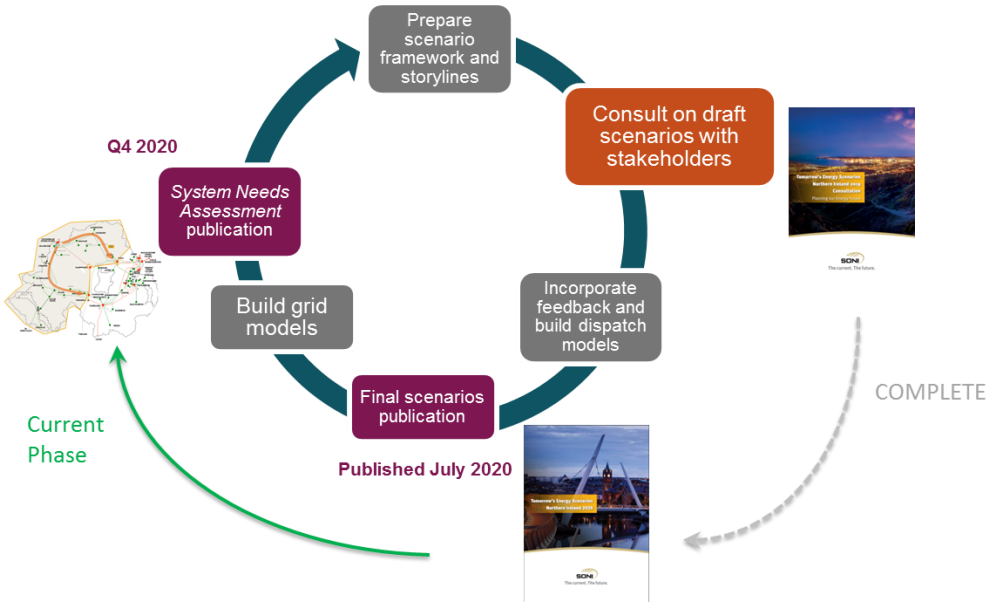

Figure 1: TES NI Process Overview

[9] https://www.theccc.org.uk/publication/reducing-emissions-in-northern-ireland/

The TES NI Consultation – Key Messages

34. The TES NI consultation provided an opportunity to receive external input to refine the TES NI scenarios. There were a number of clear messages from stakeholders which are listed below:

- A 50% renewable electricity target was not sufficiently ambitious;
- The TES NI should focus on 60%, 70% and 80% RES-E 2030 targets;
- Offshore wind should be considered for 70% and 80% targets; and
- Zero carbon gas could have a role achieving net-zero Northern Ireland energy system.

35. The final TES NI 2020 report was published once all stakeholder feedback was reviewed and relevant changes were made. The TES NI 2020 incorporates the NIE Network analysis as set out in Table 1.

Power Sector Emissions Reductions

36. SONI's role in TES NI is to capture the differences that can or may happen in the electricity system. Policy decisions such as the ban on petrol or diesel cars are factored into the Element Energy consumer choice models rather than directly within the TES NI. **Table** provides a summary of the scenario design characteristics used within the TES NI.

Table 2: TES Scenario Design Characteristics

	Modest Progress	Addressing Climate Change	Accelerated Ambition
Decarbonisation	**Medium**	**High**	**High**
RES-E by 2030	60%	70%	80%
Coal generation phase out	2024	2024	2024
Oil generation phase out	2040	2040	2035
Carbon capture and storage	No	Before 2050	2040
Electrification of heat	Low	Medium	High
Electrification of transport	High	Very High	Very High
Energy efficiency gains	Medium	High	High
GHG reduction by 2030	>35%	>45%	>50%
GHG reduction by 2050	>63%	>78%	>78% [2040]
Decentralisation	**Low**	**Medium**	**High**
Distribution connected generation	Low	Medium	High
Self-consumption	Low	Medium	High
EV charging	Simple	Smart	Smarter

37. Figure 1 provides an overview of the emissions pathways based on the three TES NI scenarios. The Modest Progress GHG reduction is around 67%, which goes slightly beyond the recommendation from the CCC in line with the previous GHG target set in the UK 2008 Climate Change Act. In both the Addressing Climate Change and Accelerated Ambition scenarios it is apparent that around 18% of "non-energy" related emissions are present in 2050. These non-energy related emissions assumptions are based on information from the CCC's 'Reducing emissions in Northern Ireland' report.

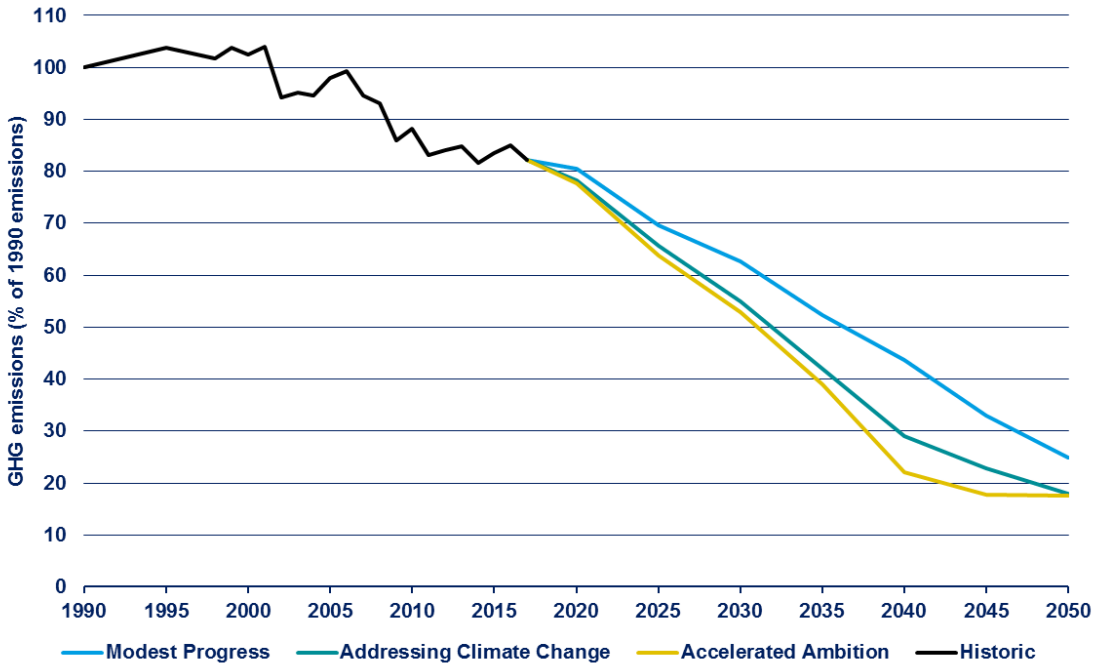

Figure 1: GHG Emissions Pathway for the three TES NI Scenarios

38. To assess the level of decarbonisation in the TES NI, the assumptions are used to create an all-island power system dispatch model. The all-island model includes technical and operational constraints, so that a realistic future schedule and dispatch of generation is created, and from which an estimation of primary energy fuel use and the associated emissions can be obtained.

39. A number of modelling process and tools were used in preparation of the TES NI. The use of commercially available power system dispatch tools enables an enhanced modelling of power sector emissions for the 2030 and 2040 horizon. The modelled power sector emissions are affected by factors such as, operational dispatch assumptions (Table 3**Error! Reference source not found.**), how interconnection is modelled, and the technical properties used for generating plant amongst others.

40. The future generation capacity mix will determine what thermal units are available to the market and the impact that they have on power sector emissions. Figure 2 provides an overview of the technology options available to the power market simulation tool based on figures from the TES NI 2020. There is a broad range of technologies that can be offered into the market including offshore wind, marine tidal energy, carbon capture and storage.

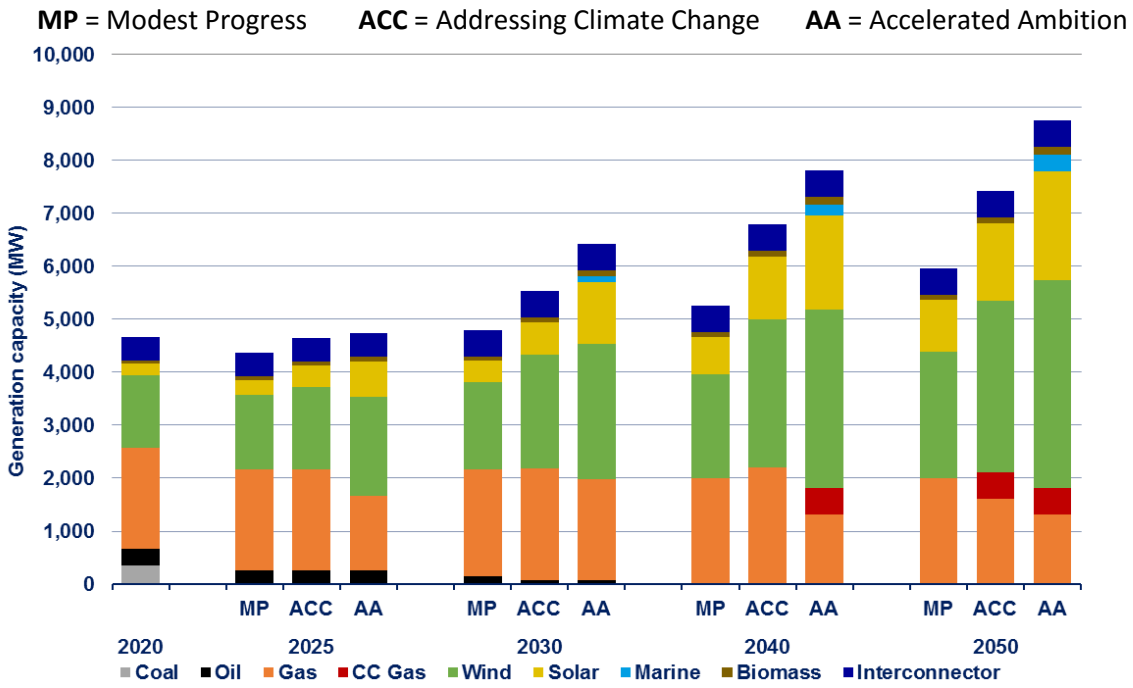

Figure 2: Generation Portfolio Assumptions for TES NI Scenarios

41. The TES NI dispatch assumptions are outlined in Table **Error! Reference source not found.**. Operational policies on the metrics identified ensure that the power system can be securely operated. Increasing the levels of renewable generation means that dispatch assumptions may need to be further relaxed or the minimum number of conventional generation units in Northern Ireland reduced so renewable power can be used and, as a consequence, result in lower emissions for the future power sector. This work is undertaken while also ensuring that operational and regulatory requirements are adhered to. Moving to operating the system with no inertial floor will require investment in alternative technologies to ensure system stability, such as synchronous condensers.

Table 3: Dispatch Modelling Assumptions for TES NI

RES	2025			2030		
	MP	ACC	AA	MP	ACC	AA
SNSP upper limit (%)	75	80	85	85	95	95
Inertial lower limit (MWs)[10]	17,500	15,000	15,000	15,000	None[12]	None[12]
Inertia provision from non-generation resources	No	No	No	No	Yes	Yes
RoCoF upper limit (Hz/s)	1	1	1	1	1	1
Limit on reserve from non-synchronous sources	No	No	No	No	No	No
Reductions from today in the minimum generation output of large thermal units	Yes	Yes	Yes	Yes	Yes	Yes

[10] *Inertial lower limit is an operational metric and does not represent the actual inertia on the power system at any point in type. Inertia is important for stable power system operation, traditionally it is provided by large conventional power plants and in the future potentially new technology, such as synchronous compensators could provide this service.*

RES	2025			2030		
	MP	ACC	AA	MP	ACC	AA
Jurisdictional reserve requirements	No	No	No	No	No	No
Minimum number of conventional units, Ireland	3	3	3	2	2	2
Minimum number of conventional units, Northern Ireland	2	2	2	2	2	1

42. Figure and 5 provide an overview of power sector emissions based on reasonable assumptions around the generation mix and the impact of operational rules. It is worth noting that the Accelerated Ambition scenario achieves net-zero by 2040, whereas the power sector emissions for Addressing Climate Change aim for a 2050 net-zero power sector.

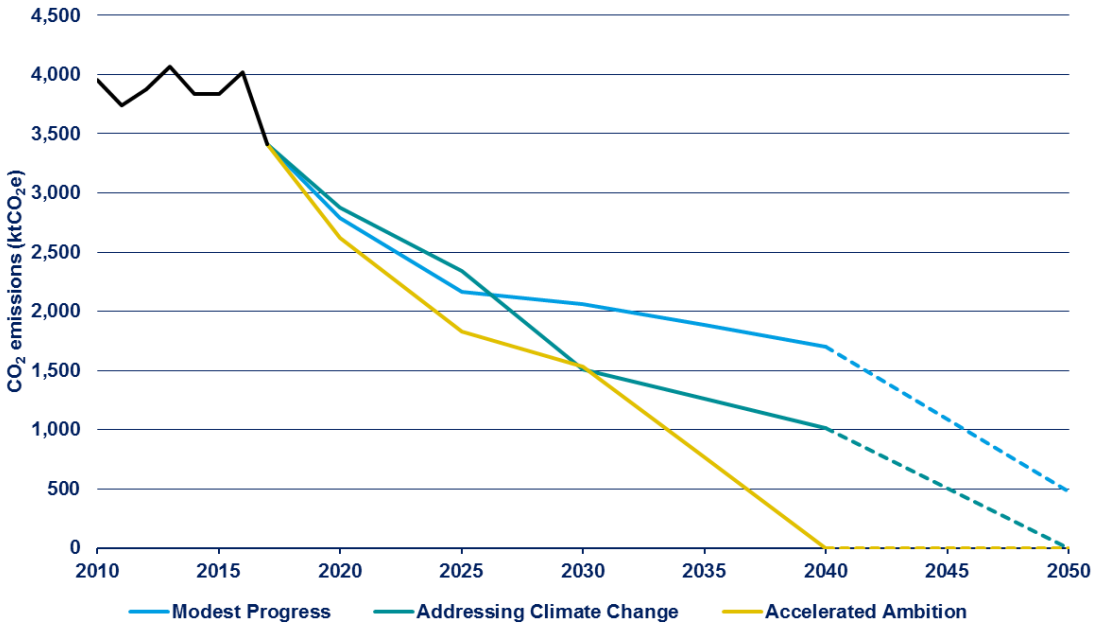

Figure 4: Power Sector Emissions Pathways for TES NI Scenarios

43. The emissions intensity of electricity is a useful metric that provides insight, so that one can compare emissions related to the switch between end user technologies (such as a move from an oil boiler to an electric heat pump). It is very important in future scenarios that when considering end user appliances that the emission intensity of the electricity system is factored in. The emission intensity changes over time as the share of renewable electricity increases; this effect is clearly illustrated in Figure . An emissions intensity of zero indicates that all electricity is produced from renewable sources or net-zero emission power plants (for example plants fitted with Carbon Capture and Storage technology).

44. The TES NI analysis clearly shows that the power sector emissions intensity in 2030 could be 150g/kWh around 68% lower compared to 2016 for a 70% RES-E target.

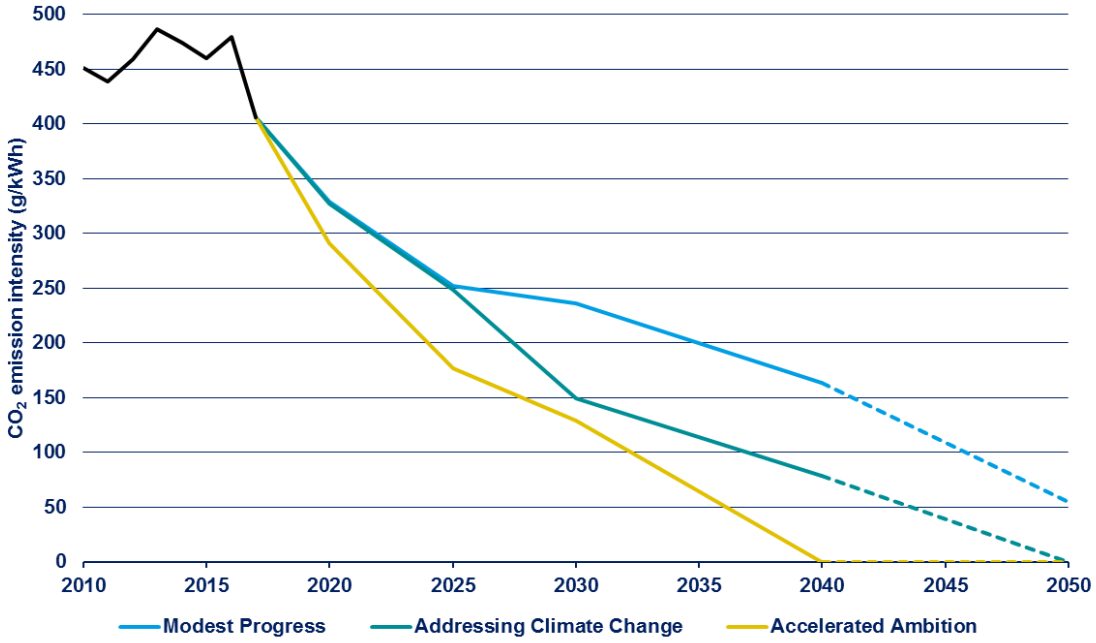

Figure 5: Power Sector Intensity Pathways for TES NI Scenarios

Facilitating the Energy Transition

45. The primary objective of the Climate Change Bill must be to confront the accelerating climate crisis, while in the case of electricity, delivering a low-carbon, cost-effective power system. It is clear that the power sector can achieve net-zero as early as 2040, depending on the level of ambition selected and the associated investments.

46. The Committee on Climate Change report 'Reducing Emissions in Northern Ireland' set out a number of key policy shortfalls and recommendations which SONI concurs with. The areas to be addressed include:

- The lack of a route to market for low-cost intermittent renewables;
- The need to tackle the high reliance on oil fired heating and the opportunities for electric heat pump technology;
- The need for support to reduce agricultural emissions;
- The need for increased afforestation;
- Incentivisation to encourage consumers to install low carbon heating;
- Incentivisation of energy efficiency improvements in buildings and housing stock; and
- Rapid deployment of electric vehicles (or EV's), along with tighter controls on vehicle standards and transport behaviour change.

47. To facilitate more renewables in Northern Ireland and to maximise their value will require:

- The second North South Interconnector to be energised so as to remove the major constraint in the Single Electricity Market. The absence of this North South Interconnector compounds the need to constrain down renewable sources in order to keep the power system stable and secure. This is a clear disincentive for potential

investors leading to a loss in potential revenues. At present, the lack of the 2nd North South Interconnector is currently costing Single Electricity Market consumers in the order of €20 million[11] per annum. With the 2nd North South Interconnector in place SONI estimates that the savings to consumers across the island of Ireland will rise year on year as more renewable energy is brought onto the system because the North South Interconnector will remove constraints or bottlenecks on the grid. This fundamental grid constraint is limiting the efficiency of the wholesale energy market, and with the drive to increase the level of renewables on the system could become a barrier to potential investors. The project will also help to ensure long term security of supply for Northern Ireland.

- Major grid reinforcement in the north west, amongst other grid reinforcements, is now essential to address a saturated network and to strengthen and enhance the Northern Ireland electricity grid.

48. The details of future grid investments are set out in SONI's Transmission Development Plan for Northern Ireland (TDPNI), which is updated and consulted upon annually[12]. The TDPNI outlines how we propose to improve and develop the transmission grid over the next 10 years.

49. Investment in the electricity grid and realisation of strategic infrastructure in a timely manner is crucial. This is an essential enabler to attracting and facilitating competitive low carbon generation technology to the Northern Ireland market place. Planning policies and processes need to deliver timely decisions to build investor confidence in grid capacity and realisation of their projects with appropriate investor returns. Planning, both strategic and local, needs to be more efficient, strategically aligned to deliver government policy, co-ordinated and involving of communities.

50. Getting community backing for new renewable infrastructure is a fundamental part of the equation if we are to meet a 2030 target. While private developers often have a community fund, there is currently no mechanism for SONI to directly give back to host communities who are impacted by electricity network infrastructure. This is in contrast to other parts of the UK and the Republic of Ireland, which allow for community funds. In Northern Ireland, this change would need to be enabled by the appropriate statutory bodies, and it will need to be considered how it could be implemented practically.

[11] Reported in Euro (€) as these figures are calculated on an all-island basis as part of the SEM.
[12] The draft Transmission Development Plan 2020-2029 is currently out for consultation and is available at: https://www.uregni.gov.uk/consultations/sonis-draft-2020-2029-transmission-development-plan-tdpni