Energy Strategy Call for Evidence

Response Template

How to Respond

This template replicates the questions asked in the Call for Evidence found at: https://www.economy-ni.gov.uk/energy-strategy-call-for-evidence

It is recommended that you should read the full consultation document before completing your response. Please note that the text boxes used throughout this template can be expanded to accommodate your response – there is no character limit.

For further information on how we handle your personal data please read our Privacy Notice

Early responses are encouraged but all responses should arrive no later than **5pm on 20 March 2020.**

Please send your response to:

energystrategy@economy-ni.gov.uk

Or alternatively by post to:

Energy Strategy
Department for the Economy
Netherleigh
Massey Avenue
Belfast
BT4 2JP

Quote the reference "**Energy Strategy Call for Evidence 2019**"

1. General Information

1. **Name (required)**

[redacted]

2. **Are you responding:**

   X as an individual (please complete 3 to 5 below)

   ☐ on behalf of an organisation / company (please complete 6 to 8 below)

If you are responding as an individual:

3. **E-mail address**

[redacted]

4. **Address**

[redacted]

5. **If you are responding as an individual, please read the Privacy Notice and tick the statement below as applicable.**

   ☐ All responses will be published on the Department for the Economy website following completion of the Call for Evidence process. Please tick if you are content for your name to be published alongside your response.

If you are responding on behalf of an organisation / company:

6. **Organisation / Company**

7. **Position within Company / Organisation**

8. **Contact details**

   a. **E-mail address**

   b. **Address**

2. Energy in Northern Ireland

Q1. What lessons can we learn from elsewhere in addressing energy within an overarching climate action framework?

Q2. What are the key considerations for decarbonising Northern Ireland's energy sector given existing linkages to other jurisdictions?

Q3. To what extent should Northern Ireland implement the key energy-related recommendations from the CCC 'Reducing Emissions in Northern Ireland' report?

Q4. Do you agree with the 30-year timeframe? If not, please state your preferred approach and reasons.

Question 1

Since the 2008 Climate Change greenhouse gas emissions have fallen at a slower rate in Northern Ireland (9%), than in the rest of the UK (27%)[1]. Whilst there has been significant progress in the effective decarbonisation in energy supply and waste management to achieve the ambitious target of net zero a radical overhaul of how we provide transport and heat will be required. As the only devolved administration without Climate Change Legislation, which sets in place legally binding targets for different sectors, Northern Ireland runs the significant risk of not being able to decarbonise in both a timely and cost effective manner. Taking the example of Scotland who enacted their own Climate legislation with specific targets put in place - saw reductions of 35% of GHG emissions in comparison to NIs 9%. Likewise the Irish Governments' Climate Action Plan[2] sets out measureable targets associated with electricity generations from renewable sources with supporting funding mechanisms and timelines in place.

Question 2

As part of the iSEM, NI policy change must be compatible and consistent with RoI policy. It is relevant to consider the current RoI target of 70% of Renewable Electricity Generation which will be indicatively comprises of 3.5GW of offshore renewable energy, 1.5GW of solar energy and 8.2GW of onshore wind capacity with the Renewable Electricity Support Scheme which incentives companies to bid for capacity and receive a guaranteed price for electricity generated [2].

At present NI is the only devolved administration that does not a funding mechanism in place to support the adoption of renewable electricity. As well as the supply side, a rigorous assessment of the likely increase in demand due to adoption of both electric vehicles (EV) and heat pumps should be undertaken. The next iteration of Generation Capacity Statement will include with EV and heat pump adoption based on RoI targets. Similar work should be undertaken for the NI context to help shape policy direction which is the essential decarbonisation of both transport and heat.

Question 3

The NI CCC report was published before the Net Zero Target by 2050 had been enacted. As such the key recommendations outlined in the CCC NI specific particularly in relation to providing route to market for new low cost intermittent renewable energy such as wind, rapid deployment of EV and enabling transport modal shifts will be essential to decarbonise.

Question 4

Whilst a 30-year timeframe for strategic planning is required to achieve the net zero ambitions by 2050, there should be strong and measureable interim targets at shorter intervals for each sector of the economy. These interim targets should be the responsibility of the appropriate government departments and be a crucial KPI for the measurement of success of a given department.

3. The Energy Transition in Northern Ireland

Q5. What are the unique characteristics of Northern Ireland that need to be considered in a net zero carbon energy transition?

Q6. Is your organisation undertaking or planning to undertake projects to support the energy transition? If so, please provide further details.

Question 5

Again as part of the iSEM NI policy should be developed with due consideration to what is being developed in RoI, the continued development of vital interconnectors should proceed as quickly as possible. Based on data available [3], IE and NI, 2018 total wind energy produced was 11,076 GWh of which 707GWh was dispatched down, 6% of the total wind energy available. In IE total wind dispatched down was 457 GWh (5%) of total wind available and in NI total wind dispatched down was 250GWh (9.4%) of total wind energy available. Since 2011 the all island dispatch down has steadily increasing, rising from 2.20% to 6% in 2018. Dispatch down is categorised under three headings – curtailment (related power system limitations), constraint (related to local network limitations) and TSO testing (represents negligible quantities with infrequent occurrence). High frequency/minimum generation – (HiFreq/MinGen). This occurs when attempting to alleviate an emergency high frequency event or when reserve requirements mean a minimum level of conventional generation necessary, priority dispatch or to provide ramping capabilities. HiFreq/MinGen is the largest source of curtailment and tends to occur at its highest levels overnight (between 12-6am). Constraint was the source of 37% of dispatch down in AI in 2018. Constraint is a network infrastructure related issue and tends to be more consistent and stable across the daily 24-hour profile, whereas curtailment varies depending on time of day. The high levels of renewable implementation in NI means that grid improvements which reduce the amount of constraints and mechanisms to enable demand side response (DSR) (such as smart meters etc) should be prioritised to help minimise peaks and match supply and demand profiles.

Question 6

I am currently employed on an Engineering and Physical Sciences Research Funded Prosperity Partnership project. “Roadmaps to Zero Net Emissions in Urban Public Transport” is a five-year research program, that commenced in 2019. Over the project duration there will be a team of academics from Queen’s University Belfast, four full time postdoctoral research fellows and eight PhD students. The project will adopt a transition-focused “whole system” approach exploring the interactions between new zero net emission buses, their operational environment and the public policy drivers which will ultimately dictate their success. As part of the research, work will be carried out to understand how these new vehicles will fulfil the challenging duty cycles of an urban bus fleet and carefully consider the constraints arising from the infrastructure available to support charging activities, ensuring that fleets can be operated sustainably within the energy infrastructure available.

4. Consumers

Q7. How should we ensure that energy remains affordable for domestic consumers? What approach should be taken to eradicate fuel poverty?

Q8. What steps could be taken to improve the relative cost competitiveness of larger non-domestic consumers?

Q9. Is a strategic position of "enable and protect" the correct policy stance?

a) What policies or schemes are needed to enable active consumers?
b) What policies or schemes are needed to protect vulnerable consumers?

Q10. What types of advice and information are required by all consumers and what are the best mechanisms for facilitating this?

Q11. Are there examples of successful citizen energy projects in Northern Ireland and elsewhere that have delivered improved energy efficiency and/or clean energy to local communities?

Q12. What opportunities are there in both urban and rural areas for citizen energy communities in Northern Ireland? What role could government have in facilitating these?

Q13. What evidence can you provide that identifies the challenges and opportunities for NI energy consumers in decarbonising energy?

N/A

5. Energy Efficiency

Q14. What, if any, energy efficiency target or targets should be set for Northern Ireland?

Q15. How should we define, measure and monitor energy efficiency to optimise its potential in our homes, business, economy and environment?

Q16. What are the most important policy levers for government to ensure zero carbon in:

a) New domestic and commercial buildings by 2050?;

b) Existing domestic and commercial buildings by 2050?

Q17. What should the future of energy efficiency support look like and who should be the key delivery bodies?

N/A

6. Heat

Q18. What is the appropriate pathway and timeline for the decarbonisation of heat between now and 2030, and subsequently to 2050?

Q19. What are the appropriate ways to measure the progress of decarbonising heat?

Q20. What are the most cost-effective and sustainable steps that government might take to accelerate the reduction of the carbon intensity of heating fuels?

Q21. Is decarbonisation of the gas grid a viable option and what evidence can be provided on both the speed and affordability of decarbonising the gas grid?

Q22. What evidence can you provide on the opportunities for district heating schemes in Northern Ireland and where should responsibility lie for facilitating these?

Q23. Can you provide any evidence or information on the opportunities for geothermal heat supply?

N/A

7. Power

Q24. What is the appropriate pathway for the decarbonisation of power from now to 2030, and subsequently to 2050?

Q25. What target for electricity consumption generated from renewable sources by 2030 is ambitious, achievable and affordable?

Q26. How can the new infrastructure necessary to meet a new renewable electricity target be delivered in a timely, affordable and acceptable way for consumers and society?

Q27. What innovations and solutions could contribute to meeting a new renewable electricity target?

Q28. What market incentives and support are necessary for investors to deliver the investment in renewable generation assets at a scale that will achieve a new renewable electricity target?

Q29. What steps need to be taken by Government to facilitate investment in offshore and marine renewables for NI?

N/A

8. Transport

Q30. What would be an appropriate pathway to decarbonised energy for transport to 2050?

Q31. What role should active travel have in the decarbonisation of the transport sector and what should government do to support this?

Q32. What energy infrastructure is needed to facilitate the uptake of electric vehicles in line with UK Government's 'Road to Zero' targets?

Q33. How will transport integrate with other energy uses (e.g. homes with solar generation, battery storage, EV charging) and what can government do to optimise the opportunities represented by this integration?

Q34. To what extent can alternative low carbon transport fuels contribute to decarbonisation of the transport sector?

Q35. Do you have any data/research to help inform and reduce the carbon intensity of our transport energy in order to achieve net zero carbon by 2050?

Question 30

According to data available from UK Department of Transport (2017) there are over one million vehicles currently licenced in NI - (1,158,335). The majority of these vehicles are cars (83%), followed by light goods vehicles (10%), "other vehicles" including construction vehicles, agricultural vehicles and ambulances and buses/coaches (3%), heavy goods vehicles (2%), motorcycles (2%) and buses and coaches (less than 1%). The Advanced Propulsion Centre (a collaboration between the UK Government, Automotive Council and others) have outlined timelines for the adoption of technologies for different vehicle types [4]. For cars there are a range of technological solutions that would enable the effective decarbonisation of vehicle drive train technology such as the use of electricity or hydrogen - however in both circumstances the widespread implementation is reliant on the development of an adequate infrastructure which must be supported through effective government policy. The decarbonisation of other vehicle types particularly HGVs, buses and construction vehicles (diggers, rollers etc.), will be more challenging given the demanding duty cycles undertaken by these vehicles, with timelines from the APC indicating that longer periods of diesel hybrid engines will be required. Noting these timelines, it will be essential for Government to support not only the research and development required to manufacture these new types of vehicles and facilitate the infrastructure required.

Question 31

Transport is a derived demand - ensuring spatial planning decisions include significant effort to reduce the necessity for transport in the first instance and increasing density in the second instance to enable cost effective provision of public transport and encourage modal shift. Encouraging modal shift from private vehicles to public transport, walking and cycling will be vital for the effective decarbonisation of travel in Northern Ireland. According to the most

recent travel survey[5], despite the average length of journey in Northern Ireland being only 6 miles only 26% of all journeys are taken by walking, cycling or public transport. The proportion of journeys undertaken using these more sustainable means of travel have remained practically unchanged in the last two decades. In the 1999-2001 travel [6] survey, 69% of all journeys were undertake by car. On average people travelled 5985 miles per year, with 82% of the distance travelled by cars. Walking, cycling and public transport during this survey period represented 3%, <1%, 7% (6% buses, 1% rail) respectively of the total distance travelled. In the most recent survey 2016-2018, 70% of all journeys were undertaken by car. On average people travelled 5868 miles per year, with 82% of this distance travelled by cars. Walking, cycling and public transport represented 3%,1% and 7%(5% buses, 2% railway) respectively of the total distance travelled. The main purposes for travelling have changed slightly with a larger distance travelled for commuting purposes (33% in 2016-2018, 19% in 1999-2001), with leisure activities being cited as the second highest reason for travel (30.5% in 2016-2018 and 30% in 1999-2001) of distance travelled in both survey periods. Overall significant strategic investment to enable modal shift will be required with particular attention on addressing the barriers (human behaviour, safety, frequency, reliability) and addressing the long standing inertia in the how we travel.

Question 32

The planning and co-ordination of energy infrastructure will be essential for the mass adoption of electric vehicle cars and light vans. Some of the key challenges associated with electrification are addressed as part of the Electric Vehicle Energy Taskforce [7]- which outlines 21 proposals to facilitate the transition of mass EV adoption in GB. In the case of electric cars for example Northern Ireland is uniquely ahead in terms of interoperability of charging points when compared to GB and should maintain the interoperability for consumers of public charging points between NI and RoI. The electrification of cars could add substantial load to grid however the dual roll out of smart metering and charge points that operate "smart charging" as default, will allow for vehicles to be charged intelligently, outside of peak hours and provide a demand for intermittent wind that is currently being dispatched down. Understanding the current fleet demands in Northern Ireland (considering both public and private transport providers such as Translink, Health Trusts, taxi and coach operators) to assess where and when likely additional demands will be required to effectively operate and maintain the existing energy infrastructure must be examined in detail. Likewise planning for "other vehicles" (including construction vehicles, agricultural vehicles and ambulances) will need to be assessed (understanding duty cycles, location, usage patterns) and what (if-any) low carbon technology currently exists to replace them. The challenges specific to energy infrastructure related to HGV's is examined in detail in [8], with six scenarios considered; 1) hydrogen refuelled from hydrogen re-fuelling stations 2) battery electric vehicles charged from ultra-rapid chargers 3) Battery electric road systems (ERS) based on pantograph, charged off motorways and A-roads by ultra-rapid chargers 4)Hydrogen ERS (powered from pantograph and refuelled off motorways at hydrogen refuelling stations 5) hydrogen range extender, on board battery (with no external charging) and hydrogen tank (refuelling from hydrogen refuelling station) 6) plug-in-hybrid electric vehicles, refuelled at conventional fuelling stations and additional power from electricity.

Question 33

Northern Ireland is the only UK region without a Smart Metering program - this offers an opportunity to learn valuable lessons from smart metering trials in the GB. Widespread smart metering will be essential to optimise energy usage in homes in the form of EVs, charging etc. and minimise additional burden to the electrical grid infrastructure.

Question 34

Alternative fuels suggested within the consultation document are hydrogen, CNG and LNG with specific reference to heavy goods vehicles. The most recent Transport Energy Model [9] as developed in GB showed the LPG and CNG have a lower greenhouse gas emission intensity per unit of energy and lower air pollutants than petrol and diesel. When compared to petrol cars for example LPG and CNG offer between 19-25% reduction on greenhouse gases. This level of reduction is not the same across all vehicle types, with heavy good vehicles (18 tonne lorry) for example consuming larger amounts of CNG when compared to diesel (23% more energy than diesel equivalent when assessed at a speed of 53kh/h), resulting in a more limited reduction in greenhouse gases of between 9-12%.

Greenhouse gas emissions associated with hydrogen fuel cell electric vehicles are highly dependent on the means in which the hydrogen is produced. Globally the vast majority of hydrogen is extracted from natural gas (steam methane reforming (SMR)) and coal (gasification). A significant amount of greenhouse gas emissions are released in these manufacturing processes, 285gCO2/kWh in the case of steam methane reforming to 675gCO2/kWh in the case of coal gasification [10]. To reduce environmental impacts there would be a need to combine these methods with carbon capture and storage (CCS). CCS technology means that greenhouse gas emissions are captured, transported and permanently sequestered deep underground. Suitable geological structures such as aquifers and depleted gas/oil fields may be used to store the compressed gases. Globally there are a small number of CCS facilities in operation, there are several CCS projects in design phase in the UK, however none are currently in operation [11]. Hydrogen may also be produced via the splitting of water (H_2O) by applying an electric current in a process called electrolysis. The environmental impact of hydrogen will depend on the method of electrolysis and the source of electricity. Alkaline electrolysis is the most common method at present, with efficiency levels of approximately 67%, however advancements and new electrolysis technologies may improve efficiency levels to between 74% - 92% [10]. At present, hydrogen produced from via electrolysis via grid electricity is significantly more expensive than hydrogen from the most common production methods such as SMR [10]. With the increased integration of intermittent renewable energy such as wind or solar onto the electricity grid, the use of surplus electricity for hydrogen production via electrolysis could become viable. An assessment from the UKCCC however outlined that the quantity of hydrogen manufactured in this way would be small in comparison to the scale of demand, with the resulting hydrogen more expensive [10]. The Low Carbon Vehicle Partnership has developed well to tank factors which estimate the greenhouse gas emissions released from the production, processing and delivery of different fuel types. The most recent values show greenhouse gas emissions of 315.98 g CO_{2eq} per kWh of electricity produced on current UK grid mix, with this number significantly decreasing if the grid continues to decarbonise. There are a range of values listed for hydrogen manufactured via electrolysis varying from 15.1 kg CO_{2eq} to 1776.6 kg $CO_{2\,q}$ per kWh, with this range of values indicating the uncertainty around technology pathways [12]. Hydrogen if

manufactured using SMR combined with CCS or widespread electrolysis could offer low carbon sources however will both require significant government investment to develop the required infrastructure with build rates that may be challenging to achieve before 2050.

9. Other Issues:

a. Security of Supply

Q36. What specific risks to security of energy supply are likely to emerge as a result of our changing energy mix, and what actions can be taken to mitigate these?

Q37. What measures or indicators could be adopted or developed to monitor energy security of supply?

N/A

b. The Role of Data

Q38. What is the most cost-effective method of capturing consumer energy usage data in electricity and natural gas (where meters are in place)? In heating oil (where there is no metering obligation)?

Q39. What concerns need to be addressed regarding data privacy, security and/or ownership?

Q40. What are your views on applying the key recommendations of the Energy Data Taskforce for NI?

Q41. What organisations or businesses do you see as having a key role in optimising the value of data? How will they do this?

N/A

c. Carbon Capture and Storage

Q42. What steps, if any, should NI policy-makers consider with regard to the development or implementation of CCUS in NI?

N/A

d. Energy and the Economy

Q43. What specific economic opportunities will arise from the decarbonisation of energy?

Q44. What skills are needed to realise the potential economic benefits of energy in the future?

Q45. What are your views on the future of overall energy demand in NI and how can we ensure that any potential demand growth aligns with our net zero carbon target?

N/A

e. Delivery Framework for an Energy Strategy

Q46. Do the existing division of responsibilities and powers across government enable the most effective approach to the overall aim of decarbonising energy? If not, what are your suggestions for improvement?

Q47. What are the opportunities for local government to contribute to the delivery of the net zero carbon target?

Q48. What are your views on how statutory duties and accompanying legislation and regulatory frameworks would need to change to facilitate the transition to net zero carbon by 2050?

Q49. Is there a need for a dedicated organisation to champion, lead and deliver sustainable energy interventions? If so, what should this look like?

N/A

10. Additional information

Q50. Is there anything else you would like to add in response to this Call for Evidence?

References cited within text

[1] Committee on Climate Change, “Reducing Emissions in Northern Ireland,” 2019.

[2] Department of Communications Climate Action and Environment, “Climate Action Plan to Tackle Climate Breakdown,” *Dep. Commun. Clim. Action Environ.*, p. 150, 2019.

[3] EirGrid, “System and Renewable Summary Report,” 2020. [Online]. Available: http://www.eirgridgroup.com/how-the-grid-works/renewables/.

[4] APC, *The Roadmap Report Towards 2040 : A Guide To Automotive Propulsion Technologies*. .

[5] Department for Infrastructure, “Travel Survey for Northern Ireland In-depth Report 2016-18,” 2019.

[6] Department for Regional Development, *Travel Survey for Northern Ireland Travel Survey for Northern Ireland 1999-2001*. 2001.

[7] E. Vehicle and E. Taskforce, “Energising Our Electric Vehicle Transition.” https://www.lowcvp.org.uk/projects/electric-vehicle-energy-taskforce.htm

[8] N. Hill, G. Hilton, S. Morgan-Price, and P. Weldon, “Zero Emission HGV Infrastructure Requirements,” no. 3, 2019.

[9] Department for Transport, “Transport Energy Model Report Moving Britain Ahead,” no. June, p. 52, 2018.

[10] Committee on Climate Change, “Hydrogen in a low-carbon economy,” no. November, pp. 1–128, 2018.

[11] Pale Blue Dot, “Hydrogen Supply Chain Map for the North Sea Region - Pale Blue Dot.” 2018.

[12] Low Carbon Vehicle Partnership, “2019 Well to Tank Conversion Factors,” 2020. [Online]. Available: https://www.lowcvp.org.uk/Hubs/leb/TestingandAccreditation/WTTFactors.htm.