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Department for the Economy
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ENERGY STRATEGY

Call for Evidence

December 2019

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Foreword

Foreword

In the absence of an Executive since January 2017, the Department for the Economy has been considering how to advance proposals for an energy strategy that will enable new and challenging decarbonisation targets. This publication represents the beginning of an on-going public engagement process to inform and shape those proposals. Our intention is to have a draft strategy for presentation to a future Minister for the Economy by the end of 2020. Ultimately, decisions on a new strategy can only be taken by Ministers. However we are eager to advance public engagement throughout the process.

The context for energy has changed substantially since the 2010 Strategic Energy Framework (SEF) was published. In June 2019, the UK became the first major economy to commit to a 100% reduction in greenhouse gas emissions by 2050. This 'net zero' target represents a significant step-change in the commitment to addressing the climate crisis.

The SEF facilitated a significant increase in low carbon electricity, and the target of 40% electricity from renewable sources has been exceeded ahead of the 2020 date. However, policy to achieve the 10% renewable heat target was poorly designed and the target was not achieved. This demonstrates the importance of robust, reliable and evidence-based policy making going forward.

Any new strategic direction for energy in Northern Ireland must consider the existing energy mix and how it will be reshaped. It must also consider energy demand reduction. This means whole systems thinking, from energy source to end consumer, incorporating heat, power and transport. The impact on society, as a whole, and consumers, individually, will be of fundamental importance.

There are undoubtedly challenges ahead with formulating and delivering a new strategic direction for energy. It will only be achieved through collaboration and joined-up delivery across government departments, the energy sector, and other key stakeholders such as local government, consumer representation bodies and academics. In addition, the transition to lower carbon energy also represents an opportunity to educate the public on some of the adverse human health and environmental implications of energy usage, as well as an opportunity to transition Northern Ireland's energy use in a co-ordinated, optimal and efficient way.

I am grateful for the support from my Permanent Secretary colleagues, from colleagues in local government, Utility Regulator, Consumer Council, from senior figures across the energy sector and from those who represent the best interests of consumers, especially vulnerable consumers. **This is your opportunity to shape the proposals to the next Minister for the Economy.**

Mike Brennan, Permanent Secretary

1.

General Information

1. General Information

Issued: 17 December 2019
Respond by: 5pm on 20 March 2020
Respond to: 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**"

Privacy, Confidentiality and Access to Call for Evidence Responses

The Department for the Economy (hereafter referred to as DfE or 'the Department') will publish responses on its website following completion of the Call for Evidence process. If a respondent is an individual acting in a private capacity they should indicate whether or not they wish their name to be withheld or disclosed when responding.

Where responses from companies and individuals responding in a professional capacity are to be published, the Department will remove contact details only.

Responses to this Call for Evidence, may be subject to requests under the Freedom of Information Act 2000 (FOIA) or the Environmental Information Regulations 2004 (EIR). All disclosures will be in line with the legislation. If a respondent feels information they provide should be treated as private or confidential, then they should explain to us why so that this may be considered should a request be received.

All personal data will be processed in line with the requirements of the Data Protection Act / General Data Protection Regulations (GDPR). For more information please see our privacy notice.

Purpose of Document

This Call for Evidence is the first stage in the process of developing an energy strategy. It asks recipients to provide evidence, data and views on a wide range of high level issues that may assist in developing the direction of the future energy strategy, including the role of consumers, energy efficiency, heat, power and transport. We are keen to hear from a wide range of bodies, groups and individuals, from within the energy sector and also more generally across society.

There are multiple questions within each section of the document. **Please respond to as many (or as few) areas as you wish**.

The publication of this Call for Evidence will also be supported by a series of targeted engagement events. **If you feel that such an event would benefit you or a group with which you are associated, please contact us.**

List of acronyms

AWS	Affordable Warmth Scheme
CCC	Committee for Climate Change
CCNI	Consumer Council for Northern Ireland
CCUS	Carbon Capture, Usage and Storage
CEP	Clean Energy Package
CfD	Contracts for Difference
CNG	Compressed natural gas
DAERA	Department of Agriculture, Environment and Rural Affairs
DfC	Department for Communities
DfE	Department for the Economy
DfI	Department for Infrastructure
DoF	Department of Finance
EPC	Energy Performance Certificate
ESB	Electricity Supply Board
EU	European Union
GB	Great Britain
GHG	Greenhouse gas
LGV / HGV	Large Goods Vehicles / Heavy Goods Vehicles
LNG	Liquefied natural gas
LPG	Liquid petroleum gas
NI	Northern Ireland
NIAUR	Northern Ireland Authority for Utility Regulation
NIRO	Northern Ireland Renewables Obligation
NISEP	Northern Ireland Sustainable Energy Programme
PfG	Programme for Government
RHI	Renewable Heat Incentive
SEF	Strategic Energy Framework
SEM	Single Electricity Market
UK	United Kingdom
ULEV	Ultra-low emission vehicles
UNFCCC	United Nations Framework Convention on Climate Change

2.

Energy in Northern Ireland

2. Energy in Northern Ireland

Energy (with the exception of nuclear energy) is a policy area devolved to the Northern Ireland Executive. Its importance, together with the need to combat climate change, was recognised by the Executive formed in 2016 in its Programme for Government (PfG). The PfG Outcomes Framework provides the basis for the Outcomes Delivery Plan which is used to give strategic direction to the work of the Northern Ireland Civil Service.

The energy strategy has the potential to impact positively on eight of the twelve PfG Outcomes:

- Outcome 1: "we prosper through a strong, competitive economy"; e.g. through developing economic opportunities and improving the skills of the workforce in the energy sector;
- Outcome 2: "we live and work sustainably protecting the environment"; e.g. through achieving net zero carbon by 2050 and delivering improvements in air quality;
- Outcome 4: "we enjoy long, healthy, active lives"; e.g. through a cleaner environment and reduced levels of pollution from heating, power and transport;
- Outcome 5: "we are an innovative, creative society where people can fulfil their potential"; e.g. by enabling opportunities for people and companies to develop, use new technologies to manage, use and generate energy;
- Outcome 6: "we have more people working in better jobs"; e.g. through the opportunities represented by installing advanced energy solutions including new heating technologies and servicing the smart energy sector;
- Outcome 8: "we care for others and we help those in need"; e.g. by tackling fuel poverty;
- Outcome 10: "we have created a place where people want to live and work, to visit and invest"; e.g. through cleaner transport, long-term policy certainty and enabling a positive contribution to the climate;
- Outcome 11, "we connect people and opportunities through our infrastructure"; e.g. by ensuring better access to a range of energy sources across Northern Ireland.

Whilst the level of aspiration is high, it is also acknowledged that these benefits will only be accrued by successful joined-up working across government, including working more closely with local government and the private sector. As always, in delivering an outcomes-based work programme, it is accepted that achieving real change and improvement at population level will require sustained collaborative effort over many years. This is particularly true in the energy sector where investment and delivery can require significant time and financial resources.

Wider policy and legislative context

Energy policy is shaped significantly by policy and goals at global, European and national levels. These include ambitions for decarbonisation, European targets for energy efficiency and EU energy market integration, particularly with regard to the all-island Single Electricity Market (SEM).

United Nations Framework Convention on Climate Change (UNFCCC) - This is the main forum for international action on climate change. The **Paris Agreement (2015)**[1] is a landmark global arrangement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Agreement requires all parties to put forward their best efforts through "nationally determined contributions", to strengthen these efforts in the years ahead, and to report regularly on their emissions and implementation efforts. **It specifically aims to keep global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C.**

European Union - In response to the Paris Agreement the EU produced its own energy strategy in 2015 – the **Energy Union**[2]. It consists of five mutually reinforcing dimensions: (1) security, solidarity & trust, (2) a fully integrated internal energy market, (3) energy efficiency, (4) climate action – decarbonising the economy and (5) research, innovation and competitiveness.

In order to meet its Energy Union objectives, and to be able to deliver on the Paris Agreement, the EU subsequently issued the **Clean Energy Package (CEP)**[3]**.** This is essentially a rulebook containing legislation for member States to adopt and enables them to collaboratively plan, implement, monitor and evaluate policies on the following areas: (a) energy efficiency; (b) renewable energy; (c) energy performance in buildings; (d) electricity market design; (e) governance; (f) risk preparedness; and (g) EU regulatory co-operation.

As of the date of publication of this document uncertainty remains about the terms and timing of EU Exit, including the future relationship between UK and EU energy policy and markets. We will take such developments into account in progressing work on the energy strategy.

1 https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
2 https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/building-energy-union
3 https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans

United Kingdom **-** The UK has gone further than the EU in legislating for 100% carbon reduction. The **UK Climate Change Act** 2008[4] is the basis for the UK's approach to tackling and responding to climate change. It requires that emissions of CO_2 and other greenhouse gases (GHGs) are reduced and that climate change risks are addressed. The Act was amended in 2019 to require the UK to have a 100% reduction in GHGs by 2050 from 1990 levels, commonly referred to as the 'net zero 2050' target. All administrations, including NI, contribute to the UK carbon budgets. Legally-binding carbon budgets act as stepping stones towards the 2050 target and provide a pathway to meet the overall UK climate change target.

As well as being covered by the Climate Change Act 2008, Scotland and Wales also have separate climate change policies, which in turn impact their energy strategies and policies.

Scotland - Scotland has passed a **Climate Change Act** 2019[5] which commits it to a net zero carbon economy by 2045. "The Future of Energy in Scotland – Scottish Energy Strategy"[6] sets out the vision for the future energy system in Scotland. Its 2050 vision is: "**a flourishing, competitive local and national energy sector, delivering secure, affordable, clean energy for Scotland's households, communities and businesses".** The vision is guided by **3 core principles**: (1) a whole system view; (2) an inclusive energy transition; and (3) a smarter local energy model. The main strategy document was accompanied by separate documents on, for example, local heat and energy efficiency.

Wales - The Welsh government created the **Well-being of Future Generations (Wales) Act 2015**[7] which requires public bodies to think about the long-term impact of their decisions on, among other things, persistent problems such as poverty, health inequalities and climate change. **Prosperity for All: Low Carbon Wales (2019)**[8] sets out their approach to cut emissions and increase efficiency in a way that maximises wider benefits for Wales, ensuring a fairer and healthier society. Work is already underway on a plan to meet net zero emissions.

Ireland - In June 2019, the Government of Ireland published its "**Climate Action Plan 2019**[9], stating that achievement of the Paris Agreement targets will require a profound change in the systems and practices supporting the Irish economy and society. Energy-related actions in the plan include an increase in electricity from renewables to 70% by 2030, stricter requirements for new buildings and acceleration of the uptake of electric cars and vans so that by 2030 all will be electric.

4 https://www.legislation.gov.uk/ukpga/2008/27/contents
5 http://www.legislation.gov.uk/asp/2019/15/enacted
6 https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/pages/1/
7 https://futuregenerations.wales/about-us/future-generations-act/
8 https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf
9 https://www.gov.ie/en/publication/5350ae-climate-action-plan/

Investing in the Transition to a Low-Carbon and Climate-Resilient Society 2018-2027[10] states that Ireland's energy system requires radical transformation in terms of energy generation and usage. It notes that investment in renewables must be complemented by limited growth in demand, improved energy efficiency, diversified supply sources through greater interconnection and storage options; thus increasing capacity to electrify heat and transport.

In addition, several key elements of the NI energy sector have direct links with Ireland, including a single wholesale electricity market on the island and common usage of gas transmission infrastructure (albeit under separate regulatory regimes).

Northern Ireland – The Department of Agriculture, Environment and Rural Affairs (DAERA) is the lead department for climate change in NI. DAERA recently issued a public discussion document on an Environment Strategy for NI[11] which included a suggested draft outcome: 'We have reduced greenhouse gas emissions and improved climate resilience'.

The pathway towards economy-wide GHG reduction requires action from all government departments and in 2018 the DAERA Permanent Secretary sought advice from the Committee for Climate Change (CCC) on recommendations on emissions reductions of 35%, 40% and 45% by 2030. The CCC is an independent, statutory body whose purpose is to advise the UK Government and devolved administrations on emissions targets and report to Parliament on progress made in reducing GHG emissions and preparing for climate change.

The CCC delivered the 'Reducing emissions in Northern Ireland' report in February 2019[12]. It stated that NI's fair contribution to the UK's fifth carbon budget requires emissions reductions of at least 35% against 1990 levels by 2030 and noted that current policies are insufficient to achieve the required reduction. However, it also outlined that there are excellent opportunities to close this gap and potentially reach a 45% reduction by 2030. A series of policy recommendations were made in the report, some of which are outlined in Figure 1. It is important to note that the report was published prior to the UK government committing, in June 2019, to a net zero target by 2050.

10 https://s3-eu-west-1.amazonaws.com/govieassets/18/8155042-Investing%20in%20the%20Transition%20to%20a%20Low-Carbon%20and%20Climate-Resilient%20Societ....pdf
11 https://www.daera-ni.gov.uk/consultations/esni-public-discussion-document
12 https://www.theccc.org.uk/publication/reducing-emissions-in-northern-ireland/

Figure 1: Committee for Climate Change recommendations for energy priorities to 2030

"Reducing emissions in Northern Ireland" February 2019 states that, in respect of energy, policy makers should focus on:

- The lack of route to market for new low-cost intermittent renewables in the electricity sector;
- Support to incentivise consumers to install low-carbon heating in homes off the gas grid;
- Options to incentivise energy efficiency improvements in homes;
- More rapid deployment of Electric Vehicles (EV), more stringent conventional vehicle standards and transport behaviour change.

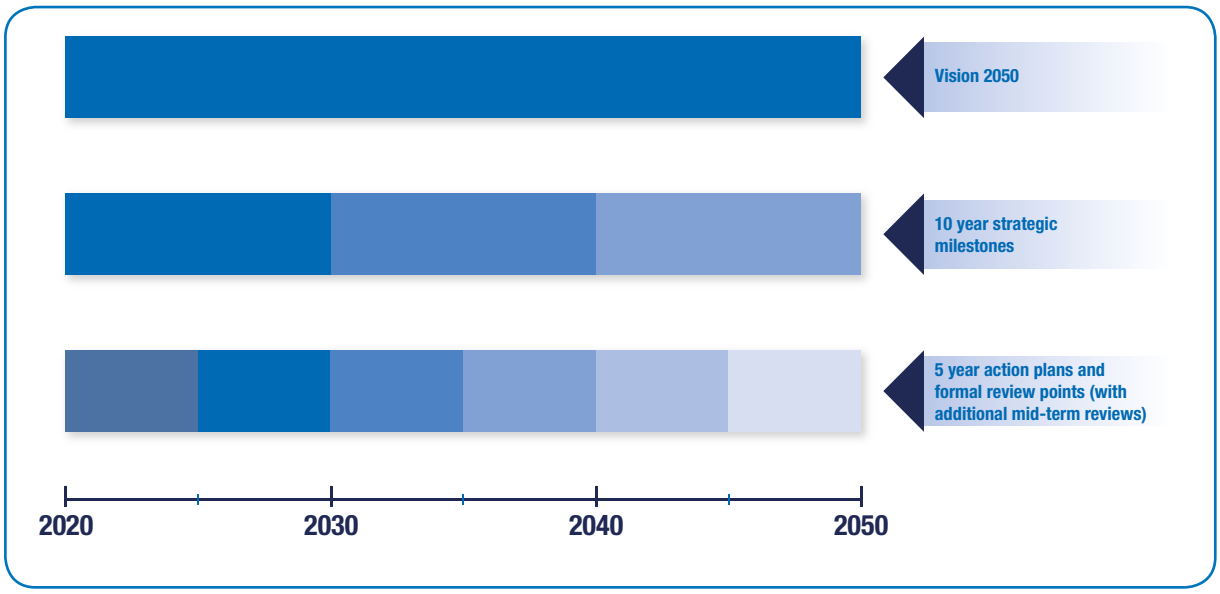
A Northern Ireland Energy Strategy

As described earlier, the UK Climate Change Act commits the UK to a 100% reduction in GHG emissions by 2050 from 1990 levels. In this context we need to assess the potential pathways to reach a net zero 2050 target for the energy sector in NI while meeting the energy needs of the population sustainably and cost-effectively. This document sets out key issues for consideration including: the role of the consumer; energy efficiency; energy for heat, power and transport; and other issues such as security of supply, data, the economy and new skills and technologies. These issues are connected and none can be considered in isolation. We believe that a whole systems approach will be required to transition towards a net zero carbon energy sector.

Timeframe

The strategy must consider an overall 2020 to 2050 timeframe, given the UK government's legislative commitment to 'net zero carbon' by 2050. This may include interim targets or objectives along the way (such as by 2030 and 2040). Some of these potential targets are discussed in the relevant sections. In effect, this allows the policy horizon to split into five year action plans for delivery as shown in Figure 2. These allow comprehensive formal review points every five years, with 'mid-term' reviews, to assist with re-scoping priorities, re-assessing cost impacts and taking account of new technologies. This would provide twelve review points in this fast-moving environment during the 30-year period.

Figure 2: Energy Strategy road map



A joined-up approach

DfE is the lead department responsible for providing the strategic vision for the future of energy in NI, as well as key aspects of the energy legislative framework including the licensing and regulatory framework and a range of consumer protection issues.

However, a holistic view of energy in terms of heat, power and transport and the interrelationship between these means that any energy strategy will influence and be influenced by policy across a range of departments as shown in Figure 3. The development of an energy strategy must therefore involve collaboration and policy coordination.

For example, the Department for Infrastructure (DfI) has lead responsibility for transport and regional and strategic planning; the Department for Communities (DfC) has fuel poverty, housing and social policy responsibilities within its remit; and the Department of Finance (DoF) has responsibility for building regulations and energy performance certification of buildings. Invest NI has a role in respect of energy efficiency in the commercial and industrial sector; and local government has responsibilities for local planning and community development. DAERA is also currently developing a Clean Air Strategy, which includes tackling air pollutant emissions from road transport, industry and home heating.

Furthermore, the increased powers at local government level with respect to the determination of the majority of planning applications as well as preparing Local Development Plans for their areas mean that they have an important role to play.

The roles of government departments in developing and delivering an energy strategy are discussed further in section 9.

Figure 3: Energy Responsibilities across Government

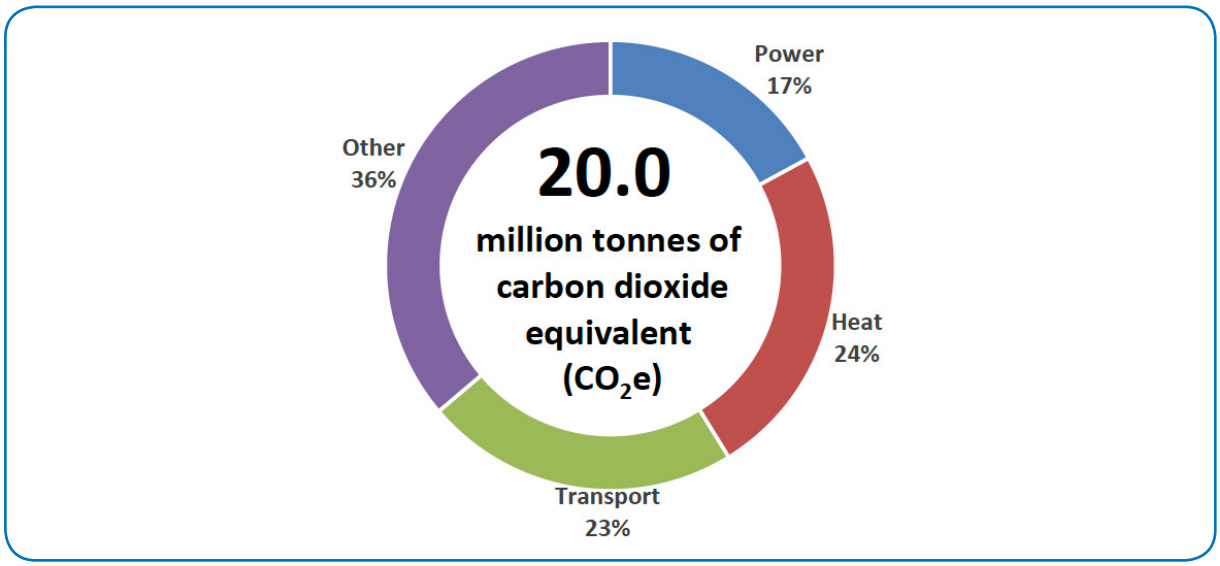
Energy and Climate in Northern Ireland

Northern Ireland's contribution to the UK fifth carbon budget requires emissions reductions of at least 35% against 1990 levels by 2030.[13] GHG emissions in 2017 were estimated to be 20 million tonnes of CO_2 equivalent, a decrease of 3% compared to 2016. The longer term trend shows a decrease of 18% compared to the base year (1990).

The largest sectors in terms of emissions in 2017 were agriculture, transport and energy supply, of which agriculture is the largest, comprising 27% of GHG emissions. The largest decreases since 1990 have been in the energy supply, waste management and residential sectors[14].

13 https://www.theccc.org.uk/publication/reducing-emissions-in-northern-ireland/
14 https://www.daera-ni.gov.uk/publications/northern-ireland-greenhouse-gas-inventory-1990-2017-statistical-bulletin

Figure 4: Greenhouse gas emissions across heat, power and transport in Northern Ireland, 2017



Note:
1. The 'other' category includes emissions from waste management, land use change and industrial process and the remaining proportions from residential, business and agriculture.
2. Heat emissions include 98% of total residential sector emissions, 85% of total business sector emissions, 100% of total public sector emissions and 0.1% of total agriculture sector emissions.

Source: https://naei.beis.gov.uk/reports/reports?section_id=4

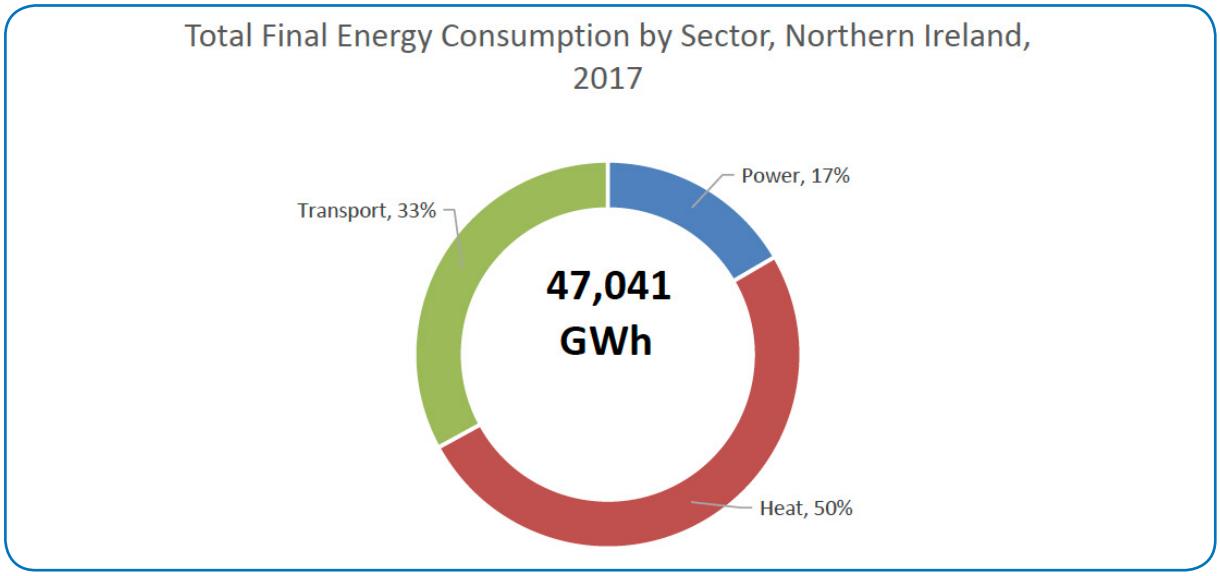
All departments have a collective responsibility to implement policies, strategies and actions that reduce emissions. Action on climate change in NI is coordinated through a cross departmental working group, known as the 'Future Generations' group. DAERA, as the lead department for climate change in NI, chairs group meetings and coordinates and reports on cross departmental action.

A 'Future Generations' programme of work is being developed to set out how NI emissions will be reduced. Policy themes of primary interest are: (a) Agriculture; (b) Energy & Energy use; (c) Transport; (d) Business & Investment; (e) Buildings & Housing; and (f) Education.

The NI energy strategy intends to address energy and energy use, giving due consideration to energy consumption across heat, power and transport.

Energy Consumption in Northern Ireland

Figure 5: Final energy consumption across heat, power and transport in Northern Ireland, 2017



Note:

1. All data is from BEIS Sub-national Final Energy Consumption tables except for gas and electricity which is taken from the Utility Regulator's Quarterly Transparency Reports.
2. Excludes consumption fed directly to power stations (these fuels are used to generate electricity which are counted in electricity consumption figures), aviation, shipping and non-energy use of petroleum and natural gas.
3. Not all data may relate to the calendar year, so the final energy consumption statistics do not necessarily cover a fixed annual period. The figures are estimates are based on the use of a number of different information sources, and as a result are subject to potential modelling inaccuracies.

Questions

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.

3.

The Energy Transition in Northern Ireland

3. The Energy Transition in Northern Ireland

Our energy system, in common with those worldwide, is undergoing unprecedented change. The key driver of the change is the need to reduce energy-related emissions, particularly CO_2, in order to limit climate change. This is generally referred to as the energy transition and it will have impacts on energy consumers and the energy industry in NI. It will impact on workers and the wider economy, as well as our society and environment.

In order to deliver sufficient clean energy in a cost competitive way to meet all our needs across heat, power and transport, we expect to see significant disruption to the established energy industry, markets and business models. We further expect to see new and changing patterns of both energy supply and demand. Renewable energy and energy efficiency measures can potentially achieve significant carbon reductions but the transition is also being driven by innovation and technology. Supplier-consumer business models are likely to evolve, with more data enabling more innovative practices for suppliers and consumers. We may also see new intermediaries arise to take advantage of increased opportunities for self-generation, storage and time of use choices for all consumers.

Considerable uncertainty remains about the pathway we should follow, what technologies we should adopt, over what timeframes and with which key transition points.

The energy transition should provide solutions to energy related challenges and create value for business and society without compromising affordability and security, resilience and reliability of supply. The transition, therefore, needs to be cost effective, secure and equitable. Interventions or actions which bring additional benefits in terms of protection of human health and the environment should also be prioritised.

We discuss value and costs for the consumer in section 4 and security of supply in section 9.

Whole energy systems

Currently our energy sector has many interdependencies but is not an integrated system. By adopting a whole systems approach, such as that shown in Figure 6, we can integrate the energy system's supply and demand with other sectors such as water, transport, telecommunications and ICT, new fuels such as hydrogen and increase overall system flexibility. However to do so requires not only physical solutions and technical enablers but also market enablers such as economic, regulatory, and policy frameworks to ensure optimal outcomes over time.

Figure 6: Whole Systems Approach

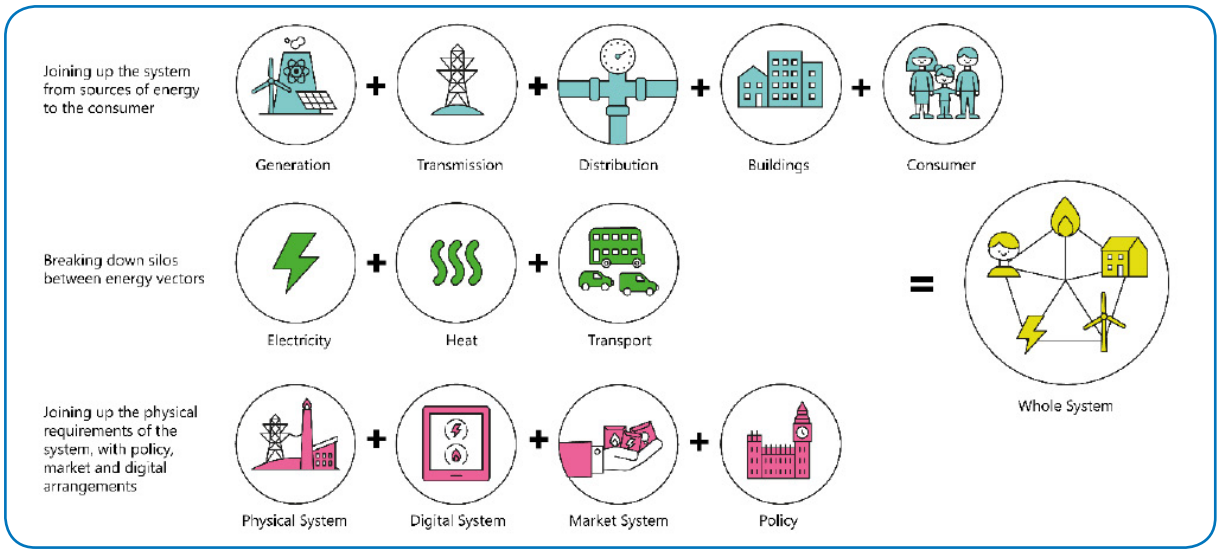


Image credit: Energy Systems Catapult, UK

The Energy Technologies Institute[15] states that a whole system approach for energy means:

"Developing a portfolio of options for clean energy in all its various uses (electricity, heating and transport), and crucially by fitting them together in the best combinations to deliver value for business and consumers. The energy system is not just generation, networks or demand; or electricity or gas; or heating, industry or transport – it is all of these things. Decisions taken in one part of the energy system have implications elsewhere in the system"

The implications of the whole system approach for our new energy strategy are wide and material. At the highest level, it means that we need to think, prioritise, and plan for the energy system in a cross-sectoral and cross-stakeholder way. The remainder of this document is structured to reflect some of the key component parts of the whole system approach: consumer outcomes and actions, energy efficiency, heat, power, transport, security of supply, consumer and system data, and the regulatory and legislative framework required to facilitate these.

Questions

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.

15 https://www.eti.co.uk/about

4.

Energy Consumers

4. Energy Consumers

Introduction

Ultimately the energy transition should be focused on benefiting energy consumers – both domestic and non-domestic. This will include consideration of energy costs as well as broader economic, health-related and environmental perspectives.

The transition to a low carbon economy will fundamentally change how energy is produced and the way households and businesses purchase and use energy. The historic landscape for our energy consumers was relatively simple, with a small number of generators, fuel choices, limited tariff options, no self-storage options and a simple supplier-customer relationship. The energy transition means that self-generation, storage options, data usage and time-of-use tariffs will increasingly provide opportunities for how domestic and business consumers interact with the future energy system (if they choose to do so).

Consumers of energy have already begun to become producers of energy, as demonstrated by the 23,000 micro-generation sites, primarily domestic solar panels across NI. There are also changes to the types of energy consumed across different modes, such as domestic electricity being used to power electric vehicles in place of conventional transport fuel. The transition involves moving towards a 'smarter' energy system and as many people as possible must be able to benefit by accessing new ways of buying, selling or indeed storing energy. We need to enable this through a policy and regulatory framework that is fit for the future.

Where we are now

Customer Numbers

The total number of electricity customers in NI stands at over 887,000: 813,000 domestic and 74,000 non-domestic customers. Around 45% of domestic customers use prepayment meters – much higher than the figure in the rest of the UK[16].

The total number of gas domestic customers is approximately 253,000: 81,000 credit and 173,000 prepayment customers[17]. There are 14,000 non-domestic gas customers. The NI Authority for Utility Regulation (hereafter referred to as NIAUR or 'Utility Regulator') price control for NI's gas distribution networks for 2017-2022 indicates that the total number of forecast new gas connections in NI in that period is 90,000 (bringing the total to around 340,000)[18].

16 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf
17 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf
18 https://www.uregni.gov.uk/gd17-final-determination

It is estimated that around two thirds of homes use heating oil as their primary heating sources (around 520,000). Heating oil usage is not regulated or metered, unlike the electricity and natural gas industries so it is not possible to identify an exact number of homes using heating oil.

Prices and price comparisons

The latest electricity price comparison for the domestic consumers shows that NI compares well with other parts of the UK and the EU (see Figure 7).

Figure 7: Comparison of domestic electricity prices across Europe[19]

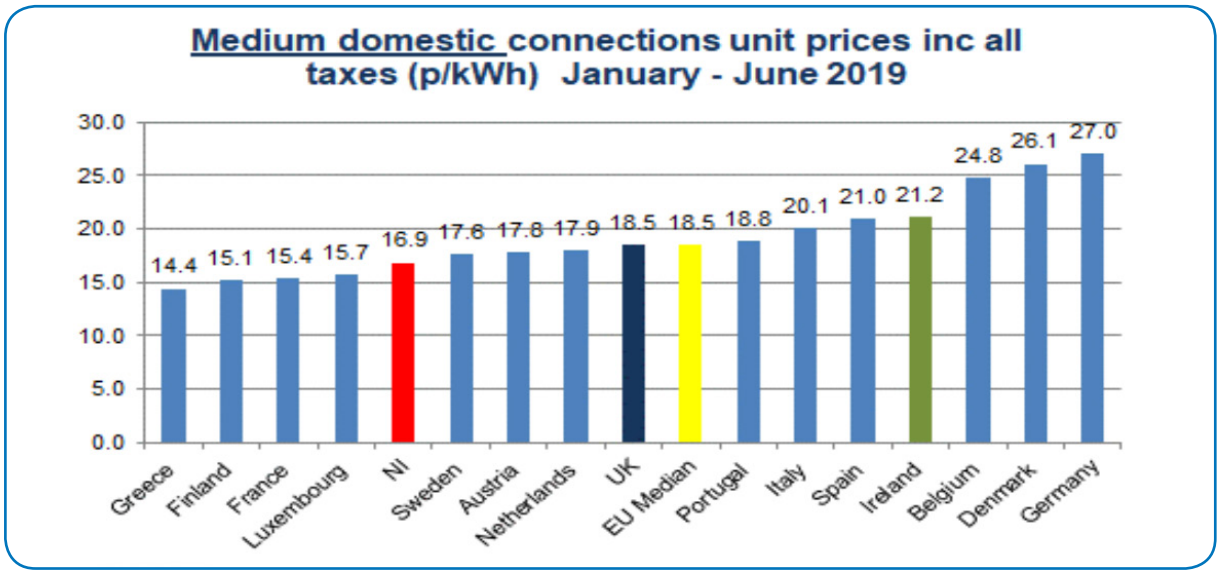
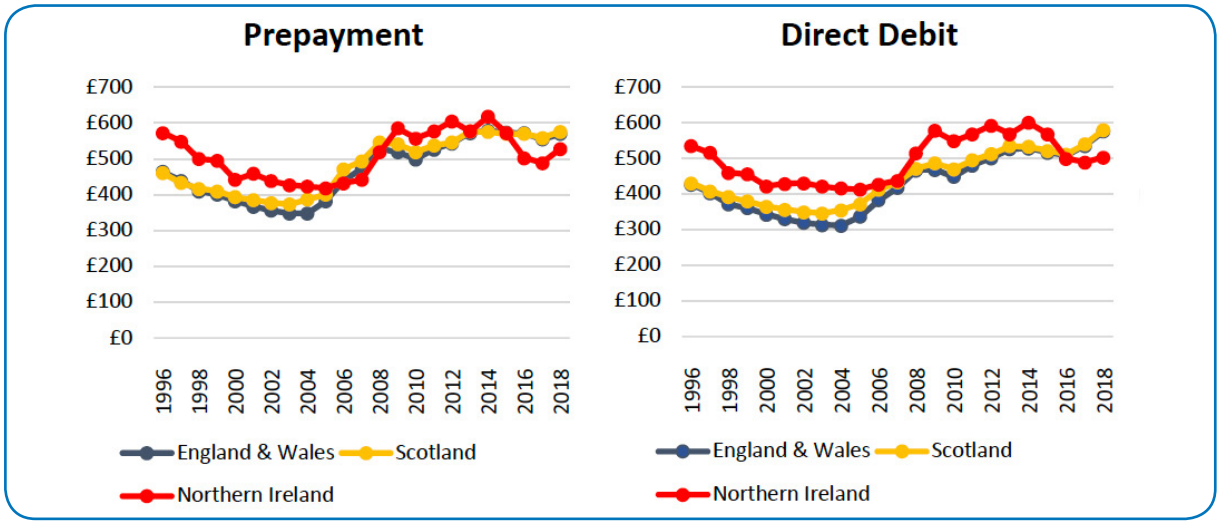


Figure 8 graphs show the average annual domestic standard electricity bills for UK countries (based on consumption of 3,800 kWh/year). The graphs reflect the two most common payment methods used in NI and show NI's improving position.

19 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf

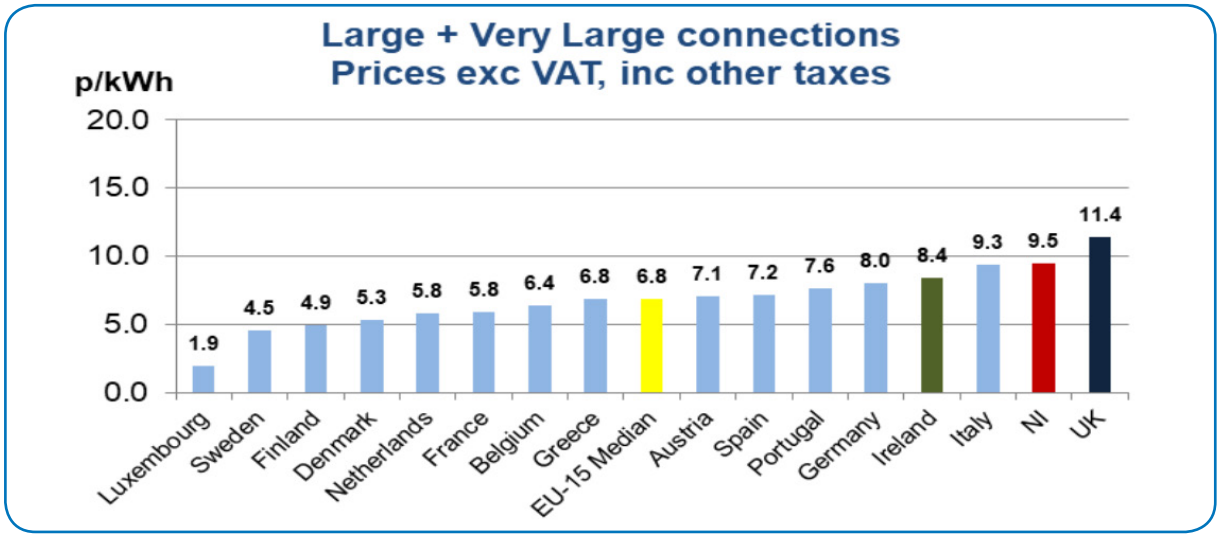
Figure 8: Average annual domestic electricity bills across the UK[20]



Similarly, smaller non-domestic customers (who make up around two-thirds of total non-domestic customers) have electricity prices slightly lower than the EU median.

However, the largest non-domestic customers experience higher electricity costs than most other EU countries, although are still lower than the UK average (Figure 9).

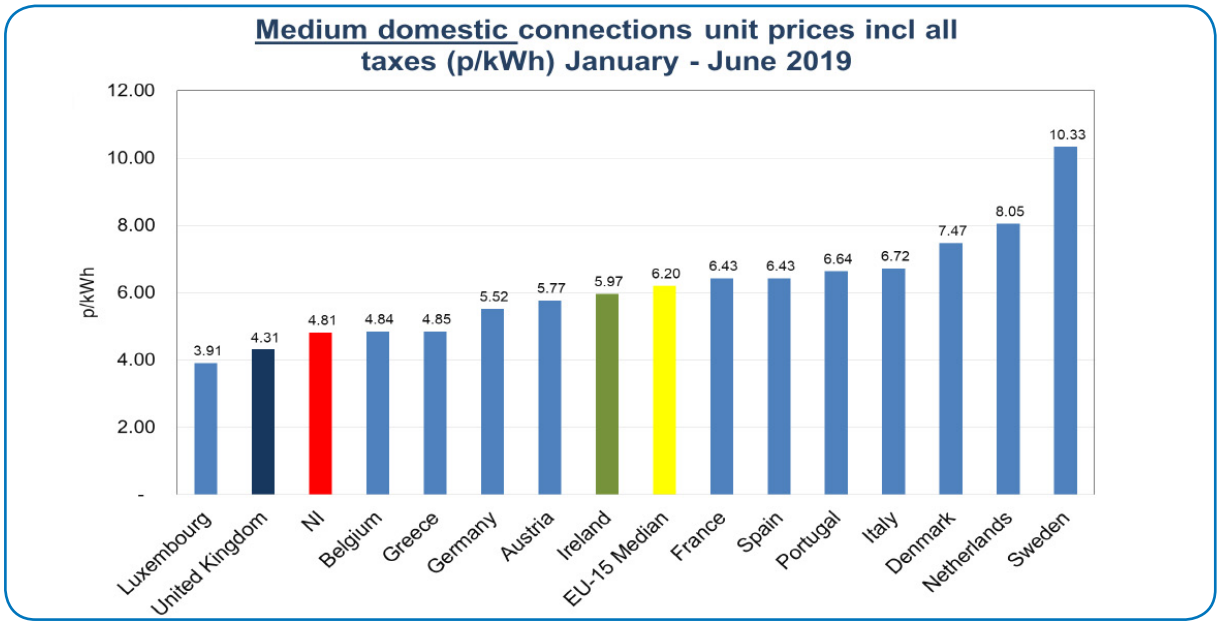
Figure 9: Comparison of non-domestic electricity prices across Europe[21]



20 https://www.gov.uk/government/statistical-data-sets/annual-domestic-energy-price-statistics
21 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf

Natural gas domestic customers also experience prices well below the European average in the latest price comparisons (Figure 10). As yet, published data is unavailable on non-domestic gas price comparisons.

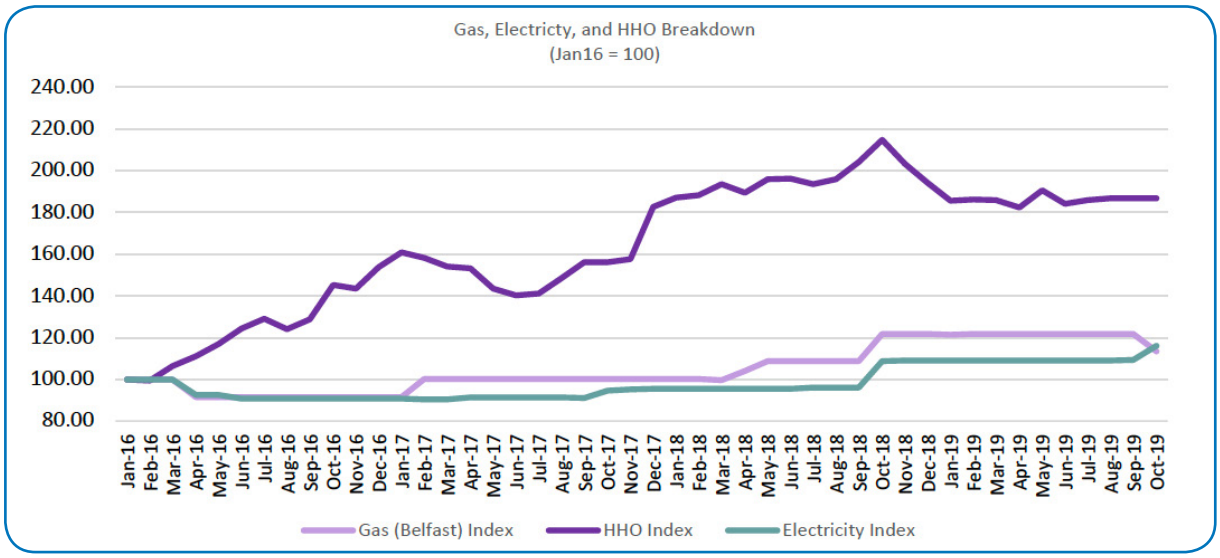
Figure 10: Comparison of domestic gas prices across Europe[22]



Around 68% of NI households used home heating oil in 2016[23]. The Consumer Council for NI (CCNI) tracks changes in household gas, electricity and home heating oil prices respectively in NI through the Home Energy Index. This Index is a number that shows the extent to which a price has changed from a base over a given period. Since January 2016 this Index has increased by 37, and demonstrates the variability and increasing costs of home heating oil (Figure 11)[24].

22 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf
23 https://www.communities-ni.gov.uk/system/files/publications/communities/ni-housing-stats-18-19-full-copy.PDF
24 The Consumer Council Home Energy Index – October 2019 Bulletin

Figure 11: Gas, electricity and home heating oil breakdown for NI (January 2016-October 2019)[25]



Fuel poverty and energy affordability

A household is said to be in fuel poverty if it needs to spend more than 10% of its total income on all heating and electricity bills. In 2016, 22% of households in NI were in fuel poverty, accounting for 160,000 households. This reduction from 42% in 2011 can be attributed mainly to a drop in oil prices during the survey period in 2016, along with continued home energy efficiency measures[26]. Beyond this, fuel poverty is a problem not just of energy prices, but also impacts upon health and social outcomes.

Cost Competitiveness

Cost competitiveness is vitally important for non-domestic customers, and therefore the energy transition needs to take account of the high electricity prices paid by our largest energy users. The energy transition has already provided opportunities for large business users through renewable self-generation and demand-side response, and will provide opportunities for future system services.

It is important to note that, other factors contribute to overall non-domestic cost comparisons and competitiveness. Research by DfE[27] previously showed that, when other costs such as wages, rent and so on were considered, NI's competitive position improved further relative to other jurisdictions.

Improvements in energy efficiency will benefit domestic customers in fuel poverty, as well as help non-domestic business efficiency and competitiveness. This is considered in section 5.

25 The Consumer Council Home Energy Index – October 2019 Bulletin
26 https://www.nihe.gov.uk/Documents/Community/Home-Energy-Conservation-Authority-Annual-Progress
27 https://www.economy-ni.gov.uk/publications/cost-doing-business-northern-ireland

Suppliers

There is currently a relatively simple one-way supply model relationship between suppliers and consumers in NI. Apart from supplying energy, they provide bills and usage information and do so in compliance with relevant codes of practice. In the domestic supply sector, NI has five electricity and two gas suppliers, while in the non-domestic sphere there are nine electricity and six gas suppliers, which are regulated differently. More supplier flexibility may enable better responsiveness to consumer needs, including the opportunity to better address fuel poverty.

Key issues for consideration

Affordability and Fuel Poverty

There will be costs and benefits associated with the energy transition. Affordability for consumers remains an important consideration. NI's relatively positive picture on price comparisons must be seen against a backdrop of high benefit dependency and lower average wage levels. On average, NI households also spend more per week on petrol and diesel than anywhere else in the UK. Other energy transition changes, therefore, such as electrification of transport, could also impact overall affordability[28]. DfC's upcoming Fuel Poverty Strategy will be developed in the context of energy initiatives that might help eradicate fuel poverty in NI in the future.

Cost Competitiveness

Competitive prices for the majority of businesses need to be seen alongside the fact that our largest energy users pay among the highest costs in Europe. We need to consider the relative cost-competiveness of these large energy users. The balance of costs for large energy users and other consumers is also important, as increased self-generation and potential disconnection from the electricity network could cause a proportionately higher cost to fall on the smaller business and domestic users.

Enabling and protecting

Over the course of the next 30 years, the role that consumers play in the energy system is likely to change significantly. For example:

- An increase in "smarter" grids, appliances and home energy systems which can respond more flexibly to demand and supply ;
- Opportunities for self-generation, self-storage, selling power back to the grid; and
- More "time of use" information, options and flexibility.

28 https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/detailedhouseholdexpenditurebycountriesandregionsuktablea35

These may mean that there is more choice for consumers, but also more decisions, complexity and potential confusion. This may require a more subtle understanding of the definition of the consumer, as well as the regulatory impacts of these changes. We note and welcome the initiation of the NIAUR "Consumers in Transition" project to better understand the consumer and regulatory consequences of the energy transition.

We believe that the energy transition must ***enable*** customers. By this we mean sufficient information and control to those willing and able to maximise the opportunities from system flexibilities and become active participants.

There is a role for policy to facilitate this. For example, Ireland has a pilot grant scheme for solar PV installations in domestic properties to incentivise uptake[29]. The UK Department for Transport has consulted on altering building regulations in England to require EV charge points in residential and non-residential buildings[30]. Enabling more active consumers is likely to require more data accessibility and management, as well as opportunities for flexible responses to high energy demand through flexible tariffs, self-generation and energy storage opportunities.

There will of course, continue to be those who are vulnerable and/or do not make active and informed decisions about energy. There will be a need for ***protections*** to ensure these consumers are not left behind. For example, a system where many consumers do not consume energy from the grid, but still require it for backup and security, may require new regulations and cost models to be developed to protect all other consumers. While the transition to a lower carbon energy supply comes with the risk of deepening fuel poverty, it also offers the opportunity to effectively end it once and for all.

Data has the potential to help consumers manage their energy, achieve savings and encourage their participation in the energy transition. Suppliers of electricity and gas may also see value in accessing and using consumer data. These issues are addressed in section 9.

Information & Advice

Regardless of whether consumers are active, passive, domestic, industrial or vulnerable, it is important that everyone has access to fair, impartial and comprehensive advice and information to allow informed decision making. Energy is a challenging area for domestic consumers with 46% not understanding correspondence from energy suppliers[31]. There are many partial and disparate sources of information available to NI energy consumers, including the CCNI, NIAUR, NI Energy Advice Line, supplier correspondence and a range of departmental policies and guidance. We want to work towards a future where energy consumers can access the information they need much more easily.

29 https://www.seai.ie/grants/home-energy-grants/solar-electricity-grant/
30 Department for Transport, Electric Vehicle Charging in Residential and Non-Residential Buildings
31 Utility Regulator, Domestic Consumer Insight Tracker 2018/19

Energy Communities

The CEP advocates for a direction change by empowering citizens in the energy transition.

The requirement to transition to lower carbon energy provides the opportunity for different models of energy provision such as Citizen Energy Communities. There is a growing emergence of citizen energy initiatives through cooperative models across many European countries. It enables local communities to take collective action to improve energy efficiency and reduce, purchase, manage and generate their own clean, renewable energy. Drivers for citizen energy communities include competitive energy prices and investment returns; a fair energy transition by tackling fuel poverty; and proactively mitigating climate change at a local level[32].

Questions

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?

32 https://cadmus.eui.eu/bitstream/handle/1814/64524/EU-CEP-2019.pdf?sequence=1&isAllowed=y

5.

Energy Efficiency

5. Energy Efficiency

Introduction

Energy efficiency might be defined as minimising the energy we need to heat and power our homes, businesses and transport, thereby decreasing overall energy demand. As well as reducing GHG emissions, improving the energy efficiency of existing homes and buildings also presents significant opportunities, such as helping to eradicate fuel poverty and its associated health problems; stimulating sustainable jobs; improving air quality and boosting the building industry. Improving energy efficiency within other sectors, such as power and transport, will be covered in respective sections later in this document.

There are a number of energy efficiency support schemes targeting different energy users in NI. However, given that the vast majority of existing housing stock will still be standing in 2050, it is vital that we find efficient means of retrofitting dwellings to net zero standards, as well as looking at regulations for new housing stock.

In the past energy efficiency measures in NI have mainly focused on affordability and heat. However, energy efficiency cuts across all energy producers and consumers. While the energy efficiency of buildings is a key focus given that heat accounts for half of energy consumed in NI, we also need to consider how best to drive consumer behaviour, the impact of energy efficiency measures on the most vulnerable in society and the need to grow local industry by maximising the skills and capacity within the sector.

Where we are now

The Energy Efficiency Directive[33] set a UK energy efficiency target of 20% by 2020. The Northern Ireland Sustainable Energy Programme (NISEP) is currently the only NI policy measure contributing recorded energy savings to the UK under the Directive. A review of the NISEP is being carried out[34], with the scheme having been extended to March 2022 to ensure no gap in support while the future of energy efficiency provision is decided. Funded by all electricity consumers, the NISEP is 80% ring-fenced for vulnerable customers, with the remaining 20% used for schemes that target non-priority domestic households and/or the commercial sector.

33 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32012L0027
34 https://www.uregni.gov.uk/sites/uregni/files/media-files/190815_Review%20of%20NISEP%20Discussion%20Paper.pdf

A number of NI departments have energy efficiency remits targeting different energy users via a range of projects and support mechanisms in order to meet local and EU requirements:

- **DfE** is responsible for energy efficiency policy with particular vires for promotion of energy efficiency in the community and voluntary sector and businesses (via Invest NI's Energy and Resource Efficiency Schemes);
- **DfC** has legislative authority for domestic energy efficiency programmes and grants, as well as fuel poverty and wider housing policy;
- **DoF** is responsible for promotion of energy efficiency in the public sector and the development and implementation of policy and legislation relating to building regulations and energy performance certification of buildings;
- **DfI** is responsible for regional and strategic planning, and infrastructure policy; and
- **Northern Ireland Housing Executive** is the Home Energy Conservation Authority for NI; it delivers a number of schemes including the Affordable Warmth Scheme (AWS) and Boiler Replacement Scheme on behalf of DfC.

Energy efficiency measures can also work in synergy with Clean Air measures, such as Smoke Control Areas[35], since these promote clean and efficient household heating. Energy efficiency can also come about through decisions made in relation to infrastructure that uses energy, such as street lighting.

Government is leading by example on energy efficiency. DfE is sponsoring the Strategic Investment Board to deliver an Energy Management Strategy and Action Plan to 2030[36] for NI central government. This will establish effective energy management processes that unlock value and lower net energy consumption by 30% by 2030 across Government from a 2016-17 baseline.

Key issues for consideration

Currently there is no standalone NI energy efficiency goal or target. This means that it is difficult to quantify or measure our ambition and monitor our performance. Potential metrics that could be used for target setting include:

- An overall energy consumption measure (as adopted by the EU and its Member States);
- Minimum building Energy Performance Certificate (EPC) ratings (as set out in Energy Efficient Scotland and Ireland's Climate Action Plan); and
- Primary energy (principal performance metric) and CO_2 (secondary metric), as set out in the Future Homes and Buildings Regulations proposals (England).

35 https://www.airqualityni.co.uk/laqm/smoke-control-areas
36 https://sibni.org/project/energy-management-strategy-and-action-plan-to-2030/

We are seeking evidence that can help inform the setting of the most appropriate target or targets for NI, particularly drawing from research or best practice from elsewhere.

Building regulations will play a key role in determining the energy efficiency, heating requirements and carbon emissions of new homes, of which there were 8,424 in NI in 2018-2019[37]. They also set standards for retrofitting existing homes when building work is being carried out. Building standards might consider future-proofing for low carbon heating for new homes and buildings. For example, the Future Homes and Building regulations[38] proposals coming forward in England will seek to ensure that buildings constructed from 2025 will be the zero carbon (or very near it) stock in place for 2050. Getting standards right now is likely to be much more cost-effective than retrofitting to the same quality and standard later.

Achieving zero carbon housing stock would require a significant retrofit programme as it is estimated that 85% of our homes will still be standing in 2050. Significantly improving the energy efficiency of the more than 800,000 existing homes and buildings in NI will require investment, consumer buy-in and a comprehensive range of supporting policies.

The DfC AWS Scheme currently retrofits approximately 3,000 homes with energy efficiency measures per year, although these are not to carbon neutral standards. This scheme is targeted where levels of fuel poverty risk is highest. The Energy Saving Trust[39] estimates that each household participating in this scheme will save on average around 118,000 kWh of energy, £4,000 of fuel costs and 25,100 kg of CO_2 throughout the lifetime of the energy efficiency measures. The AWS does not offer any renewable heating solutions or other forms of insulation and the assisted homes will not reach carbon neutral level.

The majority of current energy efficiency support and programmes for households is aimed at the most vulnerable customers. As indicated earlier in this paper, this support is essential to reduce bills, improve health outcomes and ultimately save lives of those who need help the most. However, meeting an ambitious energy efficiency vision will require a focus on energy savings across a much broader range of consumer groups.

We would therefore like evidence on what potential funding models could be utilised for energy efficiency support going forward, with consideration to the specific needs and ability to pay of different consumer groups, including social housing, the private rented sector, non-residential buildings and owner-occupied homes.

37 https://www.communities-ni.gov.uk/system/files/publications/communities/ni-housing-stats-18-19-full-copy.PDF
38 https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings
39 https://www.energysavingtrust.org.uk/

For example, to overcome known financial barriers to the installation of energy efficiency improvements and home renewables, the Scottish Government fund a range of financial support schemes for owner occupiers, tenants, and private landlords in Scotland. Key schemes include:

- Warmer Homes Scotland (Scotland's national fuel poverty programme);
- Home Energy Scotland loans and cashback;
- Equity loans;
- Area based schemes; and
- Pilot programmes.

It will also be important to better understand what other non-funding measures could facilitate greater levels of energy efficiency uptake. At present in NI there is no current requirement for a property to have a specific EPC rating before it can be rented, in comparison with England and Wales, where it is now deemed unlawful to let properties with an EPC rating below an 'E' rating[40]. Scotland is also proposing more stringent EPC targets - Band C - by 2030[41].

DfC has carried out a review of the role and regulation of the private rented sector and the standard of properties, including plans to introduce a minimum energy efficiency standard for the private rented housing sector. A public consultation exercise[42] was carried out in 2017 which proposed to introduce legislation around EPC ratings similar to that in England, although the absence of an Executive prevented further progress. This also highlighted that there was little assistance available to landlords for them to make such investments. Such measures may be effective in improving energy efficiency for this sector, although they do not cover other tenures.

As energy efficiency responsibilities are spread across multiple departments there is a wide range of policies and interventions. Feedback suggests this is leading to confusion and inconsistency in how we support energy efficiency across different groups of consumers. We address the issue of advice and information in section 4. We address the issue of departmental responsibilities in section 9.

40 Minimum Energy Efficiency Standards (MEES) in the Energy Efficiency Regulations 2015 http://www.legislation.gov.uk/ukdsi/2015/9780111132432/contents

41 https://www.gov.scot/publications/energy-efficient-scotland-frequently-asked-questions-private-rented-sector/

42 https://www.communities-ni.gov.uk/sites/default/files/consultations/communities/private-rented-sector-proposals-for-change-consultation.pdf

Questions

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?

6.

Heat

6. Heat

Introduction

Heat accounts for half of our total energy consumption in NI (Figure 5) and around 52% of household energy bills are, on average, spent on heating[43]. It is central to our lives - we use it for heating our homes, heating water and cooking. Heating and cooling are also vitally important for business and industrial processes.

The primary energy fuel mix for heating in NI is varied. It includes oil, natural gas, liquid petroleum gas (LPG), coal, peat and wood, as well as electricity, although there is a predominance of home heating oil. Approaches to heat decarbonisation may be influenced by locational factors based on availability of different technologies and heat sources.

Space heat decarbonisation is very closely linked to the energy efficiency of buildings, as well as the behaviours and actions of its occupants. Decarbonising the heat sector will require a combination of reducing heat demand through energy efficiency investment and reducing the carbon intensity of the remaining heat.

It is worth noting that there are also air quality problems associated with household heating in NI. The relatively high use of use of solid fuels as secondary heating sources, in particular coal, peat and wood, is associated with high levels of certain air pollutants and with pollution episodes, especially during winter[44].

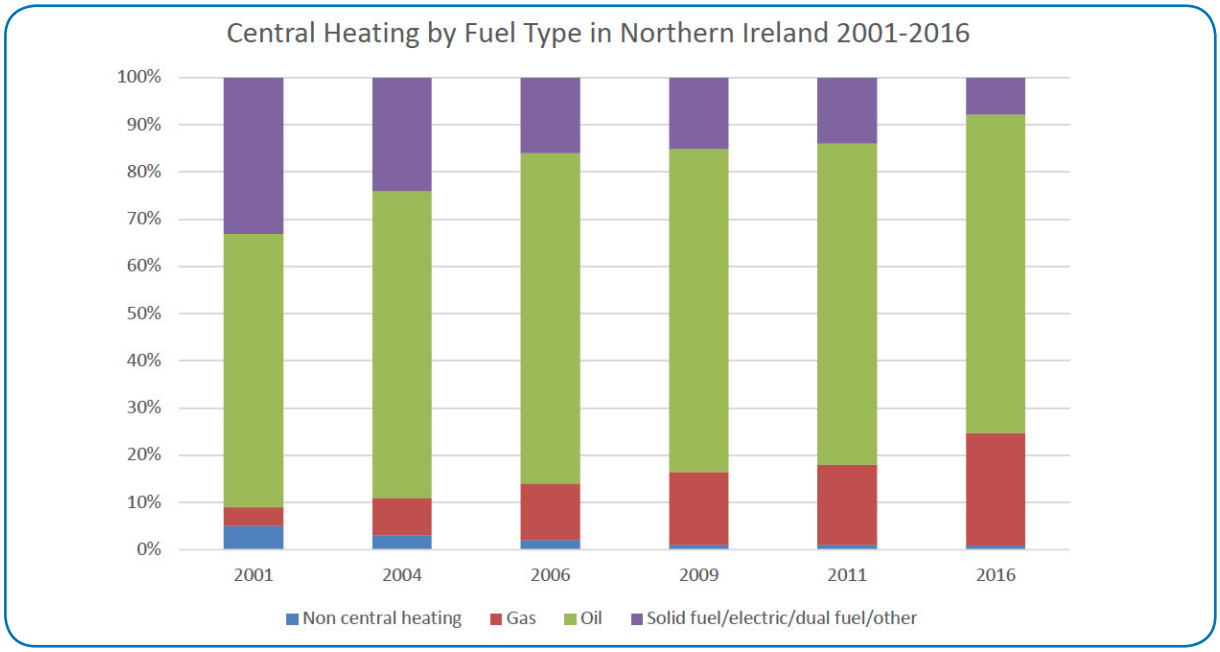
Where we are now

Around 68% of homes in NI use heating oil[45]. The NI boiler replacement scheme helps owner occupiers whose household income is less than £40,000 to replace inefficient boilers (i.e. replacing an inefficient boiler with a more energy efficient condensing oil or gas boiler, switching from oil to gas, or switching to a wood pellet boiler). To date, 32,000 boiler replacements have been completed under the scheme.

At present approximately 267,000 premises are connected to the gas network, with connections available to a further 200,000 homes and businesses. Figure 12 shows the preponderance of oil central heating and the growth of gas since 2001.

43 https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/detailedhouseholdexpenditurebycountriesandregionsuktablea35
44 DAERA real time monitoring information on air pollution levels: www.airqualityni.co.uk
45 https://www.communities-ni.gov.uk/system/files/publications/communities/ni-housing-stats-18-19-full-copy.PDF

Figure 12: Central heating by fuel type 2001 - 2019[46]



Currently, a very small number of homes are heated through electricity. Economy 7 is possibly the most familiar of these, and is used to store energy when costs are lower and release it back into the home as thermal energy.

Heat networks can take energy from a range of sources and offer the potential to both increase the use of low carbon sources (such as geothermal energy) and to capture waste heat from industrial processes. There were approximately 90 heat networks in NI in 2016, a significant proportion of which are communal heat networks in social housing[47]. There are few substantial heat networks (serviced by a central heat source) outside larger industrial or commercial sites and the social housing sector.

Under the Renewable Heat Incentive (RHI) support schemes there are around 4,500 biomass boiler installations (2,000 non-domestic and 2,500 domestic) along with a few heat pumps.

NI also has potential for geothermal heat, which is largely untapped. Shallow heat pumps and borehole heat exchange can be used for heating and cooling. Given the geographical nature of geothermal heat, it is important to understand the locational matching of supply and demand, although we do not have such a map for NI.

46 https://www.communities-ni.gov.uk/system/files/publications/communities/ni-housing-stats-18-19-full-copy.PDF
47 https://www.gov.uk/guidance/heat-networks

Switching from an ageing oil boiler to a modern condensing natural gas boiler can deliver a substantial reduction in CO_2 emissions i.e. from a range of 310-550 gCO_2 /kWh to 210-380 gCO_2 /kWh. This is delivered through reducing fuel emissions[48] as well as through heating system efficiency gains. Well-installed ground source electric heat pumps running at high efficiency have a carbon footprint of 70-100 gCO_2 /kWh[49] (assuming low carbon electricity and assuming the designed coefficient of performance is delivered and sustained). Policy on switching fuels for household heating should take account of the benefits of switching to cleaner alternatives, such as gas and electric heating.

It is important to note that the carbon footprint of electric heating technologies depends to a large extent upon the carbon footprint of the electricity used. OFTEC, a representative body for the heating oil industry in the UK, is outlining the potential for low carbon liquid fuel options to replace fossil fuel heating oil.

Energy efficiency measures are required to reduce overall heat demand and make lower-carbon heat sources more effective in existing premises. The approach to energy efficiency is discussed in section 5.

Key issues for consideration

Currently, in NI, the total amount of heating (or indeed, cooling) load is not measured. Whilst it is possible to generate a 'best guess' estimate of how much heat is generated by fuel source, there is no agreed formal methodology to do this.

The majority of premises (homes and businesses) are heated by oil or natural gas. It is estimated that less than 10% of heating is provided by electricity, solid fuel, biomass and other sources[50]. We would be keen to receive evidence of how to formally monitor heat production on an ongoing basis.

Modelling and analysis would then be able to establish the carbon intensity of the baseline heat production as well an estimated total heat production as the new decade begins. With this understanding we could then assess the potential relative impact of various decarbonisation pathways, including:

- Demand reduction: delivery of energy efficiency investments, including alternative technologies; and
- Supply shift: the substitution of higher carbon emitting energy sources with lower carbon and zero carbon emitting energy sources.

48 Kerosene emits 0.24675KgCO2 per kWh whilst natural gas emits 0.18385KgCO2 per kWh. Source: BEIS greenhouse gas conversion factors 2019: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019

49 https://researchbriefings.files.parliament.uk/documents/POST-PN-0523/POST-PN-0523.pdf

50 https://www.daera-ni.gov.uk/sites/default/files/publications/daera/northern-ireland-carbon-intensity-indicators-2019.pdf

There is also a significant locational aspect to energy for heating. We may need to consider segmenting the current heating landscape as follows:

- Premises with and without access to the natural gas grid;
- Urban areas that could be supplied by heat networks;
- Low density/rural areas where district heating and gas networks may not be viable;
- Resource availability of geothermal heat sources; and
- Urban areas where air quality may impact desirability of biomass heating.

Oil

The CCC recognises both the challenge and opportunity of NI's high dependence on oil. They note the potential for a large expansion of 'low-regret' low-carbon heating due to the high proportion of households off the gas grid that are currently fitted with oil boilers. In its February 2019 report, CCC calculates that retrofitting 25% of NI's oil-heated homes to heat pumps by 2030 could bring significant savings of carbon emissions[51].

Natural Gas

Energy legislation requires the Department and the Utility Regulator to oversee the development of an efficient and economic natural gas industry. Switching to natural gas from heating oil is reducing carbon emissions now and into the medium-term. Looking forward to the longer-term, however, net zero carbon in 2050 cannot be achieved through the use of natural gas unless the carbon is removed through carbon capture, usage and storage (CCUS) and therefore important decisions will be needed on the future of the natural gas infrastructure.

Indeed, the CCC reported that CCUS would be essential to achieving net zero carbon[52]. Carbon capture could deliver the decarbonisation of natural gas and enable continued use of the natural gas pipeline infrastructure. However, there are as yet limited examples of this technology at scale and it is likely to require substantial financial investment. It should be noted that commercially viable carbon capture for CO_2 storage technology does not exist at the present time. We discuss CCUS in section 9.

Consideration might be given to the potential for the injection of biogas (biomethane), produced by the anaerobic digestion of organic material, into the natural gas network. This is currently being done in GB and Ireland, however, the regulatory environment in NI does not currently facilitate injection.

51 https://www.theccc.org.uk/publication/reducing-emissions-in-northern-ireland/
52 https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

There is also potential to use curtailed wind to produce hydrogen through electrolysis. This could be an initial small but necessary step in gas decarbonisation. It would be important to understand the value of generating hydrogen in this way which could better utilise the currently constrained wind potential. Trials are progressing in GB to evaluate the potential to blend hydrogen into the natural gas network.

Electric Heating and Heat Pump Technology

As electricity from the grid continues to reduce in carbon intensity, there is potential to reduce emissions through low-carbon electrification of heat, primarily through use of heat pumps and/or direct electric heating. Shallow ground source heat pump systems can be deployed in many locations throughout NI, including sites off the gas grid. Electrification of heat would mean higher levels of electricity demand, which would have impacts on, firstly, the required network infrastructure and its management and, secondly, electricity generation capacity. This impact over the 30-year pathway will need to be considered carefully (see Power, section 7). The deployment of low-carbon heating such as heat pumps in new-build and 'off the gas grid' existing properties (as well as in low-carbon heat networks), is seen by the CCC as a cost-effective and low-regret opportunity[53].

There is also potential for use of hybrid heat pumps, which can use both fossil fuel and low carbon heat sources, as well as thermal energy technologies.

The UK's Ministry of Housing, Communities and Local Government has published a consultation on a new 'Future Homes Standard for England' which suggests heat pumps may soon become a more cost-effective method for new homes to achieve uplifted carbon performance standards, particularly where there is no access to the gas grid[54].

LPG

There is a relatively small number of LPG users in NI – an estimated 5,000 consumers, and two LPG suppliers. LPG costs are higher than natural gas and it is not a regulated fuel source.

District Heating and Heat Networks

Heat networks are an efficient method of delivering heat to multiple users. There may be opportunities to enable district heating and heat networks. This can enable economies of scale, as the generation of heat in one large plant can often be more efficient than production in multiple smaller ones. It may also enable the balance of supply and generation of heat, across location and over time, depending on network size. Heat networks can be supplied by a diverse range of sources including power stations, 'energy from waste', heat pumps, geothermal sources and combined heat and power plants.

53 https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf
54 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/836925/REQUEST.pdf (ref: paragraph 3.26)

Geothermal energy

This can be used for both heating and cooling and NI has substantial, but largely untapped, geothermal potential. The use of deep geothermal energy depends on the presence of suitable rocks underground and so it is important to know the geographical distribution of both the geothermal resources and the heat demand. Although we have some information about the deep geothermal energy resources, detailed maps of heat demand throughout NI are not currently available.

Consumer aspects of heat decarbonisation and government support

Energy efficiency upgrades and new heating technology will involve a range of disruption to consumers. According to Ofgem *"the challenge for heat policy, compared to, for example the decarbonisation of electricity, is that it is not simply limited to technological developments, new business models and system integration but also extends to significant issues around consumer acceptance of changes within their property, which may often be on a mandatory basis"*[55].

We therefore need to consider how heat decarbonisation will impact consumers. This will require a better understanding of upfront costs and longer-term benefits and will also need to take into account issues such as the coordination of energy efficiency measures with heat source changes, fuel poverty levels and ensuring that consumers have the right level of information available to them.

Businesses need heating and cooling for productive workplaces and heat is integral to many industrial processes. Hot water use is particularly significant in the health, hospitality, emergency services and education sectors, driven by demand for washing facilities. Cooking and catering require heat and are important for many businesses, especially those in the hospitality sector.

Renewable Heat Incentive

Outside the established heat sources of oil and gas, the key intervention on heat policy in NI was the RHI, launched in 2012. While this was designed to incentivise the use of a number of alternative, sustainable heat technologies including heat pumps and solar technology, it became associated almost exclusively with biomass boilers. Flaws in the tariffs available for biomass users accredited to the Non-Domestic RHI scheme meant the scheme significantly exceeded its budget, putting wider public services at risk. Ultimately, the schemes were closed to new applicants in 2016, cost controls have been implemented through amended tariffs and the scheme remains the subject of litigation.

55 https://www.ofgem.gov.uk/system/files/docs/2016/11/ofgem_future_insights_programme_-_the_decarbonisation_of_heat.pdf

This support scheme for renewable heat did not deliver the targeted outcomes. Lessons have been learned and it is vitally important that any required future support schemes to facilitate decarbonisation of our homes and or businesses are considered in this context.

Questions

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?

7.

Power

7. Power

Introduction

Electricity accounted for 17% of NI's total energy consumption in 2017 (Figure 5) and a similar proportion of GHG emissions (Figure 4). In general, there has been a slight downwards trend in annual electricity consumption in NI over the period 2010-2017[56].

Traditional electricity infrastructure was built to handle one way power flows from large centralised fossil fuel generators. The transmission and distribution grids then transported that electricity to end use consumers. The grids were designed to meet a peak electricity demand which only occurred for a couple of hours each year. This was fit for purpose and appropriate to the time.

Renewable electricity changed this and our future electricity system is likely to be even more different. We will continue to move away from relying on the electricity produced by a small number of large power plants. Generation will increasingly be located closer to consumers. The grid will need to be more flexible, handle more renewables, integrate more technologies and facilitate more engaged, active and informed consumers, whilst continuing to ensure secure and affordable electricity supply.

Where we are now

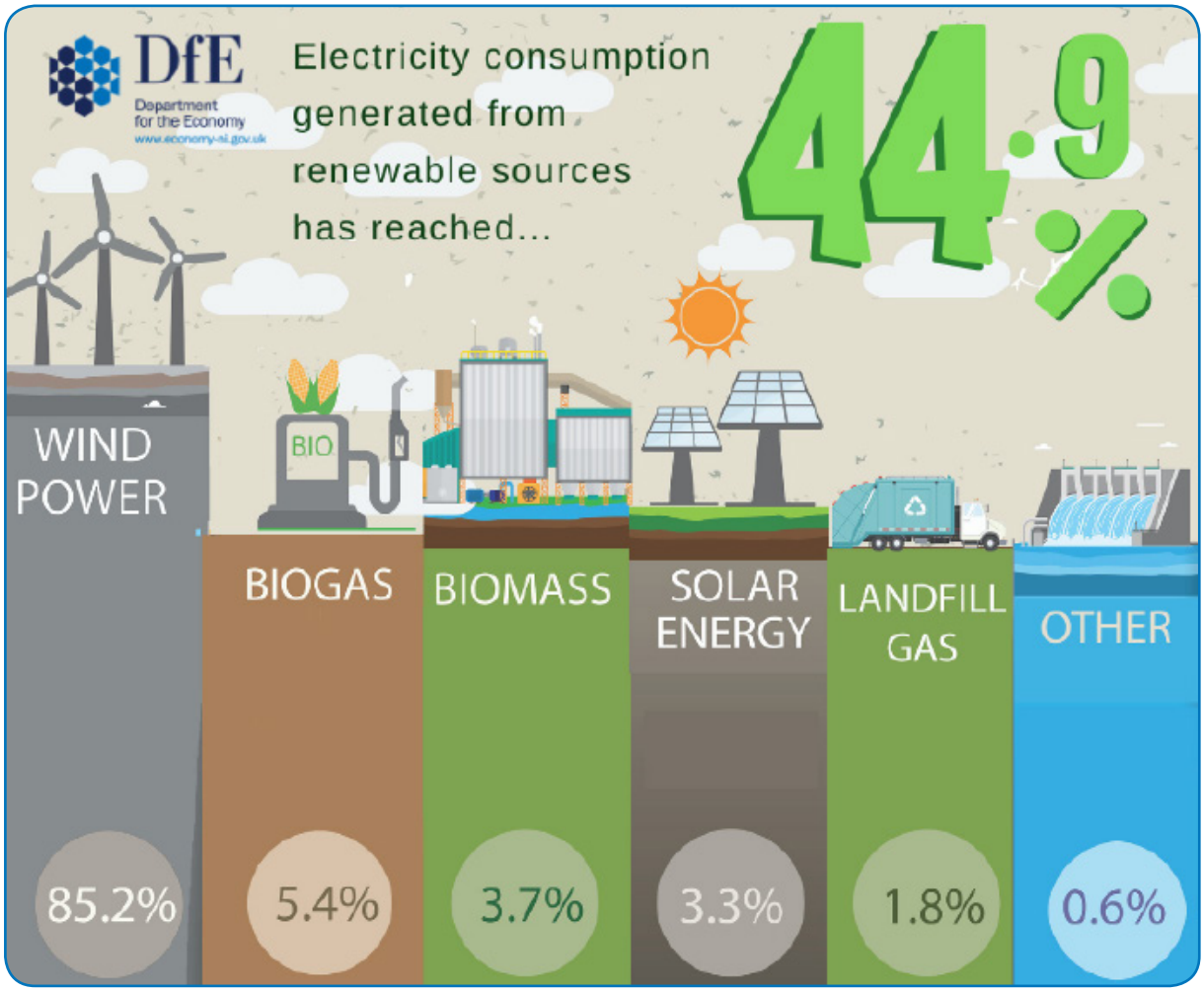
SONI is the electricity system operator for NI and NIE Networks owns the electricity transmission and distribution network, as well as operating the electricity distribution network which transports electricity to over 887,000 customers[57].

Our current electricity infrastructure has around 2.7GW of dispatchable capacity which includes three fossil fuel large scale generators at Ballylumford, Kilroot and Coolkeeragh, and the Moyle interconnector which connects us to the GB energy system[58]. Peak electricity demand in NI is around 1.8GW.

There has been a significant increase in renewable energy capacity installed, rising from 0.3GW in 2010 to around 1.65GW in 2019[59]. The Northern Ireland Renewables Obligation (NIRO), which is now closed, has been the main policy measure for supporting the development of renewable electricity, with around 23,700 stations accredited. This has increased the proportion of renewable electricity consumption from around 3%, when it was introduced in April 2005, to 45% for the twelve month period ended September 2019. The majority of this electricity was generated from onshore wind (Figure 13)[60].

56 https://www.economy-ni.gov.uk/articles/energy-northern-ireland
57 https://www.uregni.gov.uk/sites/uregni/files/media-files/2019-11-14%20Transparency%20Report%20Q3%202019%20FINAL.pdf
58 Eirgrid, All-island Generation Capacity Statement 2018-27
59 Eirgrid, All-island Generation Capacity Statement 2018-27
60 https://www.economy-ni.gov.uk/news/electricity-consumption-and-renewable-generation-northern-ireland-year-ending-september-2019

Figure 13: Renewable electricity generation (October 2018 – September 2019)



Source: www.economy-ni.gov.uk/articles/electricity-consumption-and-renewable-generation-statistics

The SEM's DS3 programme has been a key contributor to this achievement, enabling the grid to accommodate 65% of renewable generation at any given time, whilst NIE Networks has facilitated large numbers of connections to the transmission and distribution networks.

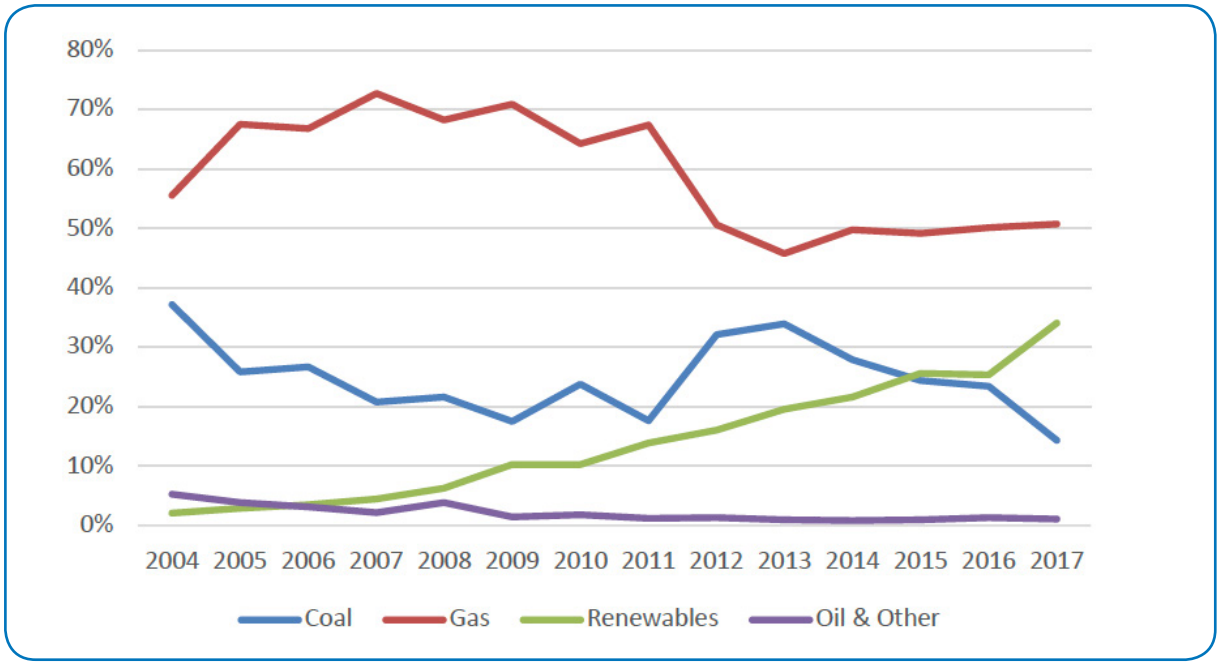
Power has been the major success story in reducing carbon emissions in NI, with energy supply (mainly electricity generation) emissions falling by 59% from 2000 to 2017. GHG emissions per unit of electricity generated decreased by 36% between 2004 and 2017[61]. This has been driven by the growth of renewable generation in NI, a shift away from coal use towards gas for electricity generation, and improvements in energy efficiency.

61 https://www.daera-ni.gov.uk/sites/default/files/publications/daera/northern-ireland-carbon-intensity-indicators-2019.pdf

However, the carbon intensity of electricity in Northern Ireland is approximately 70% greater than the equivalent UK carbon intensity of electricity (406 gCO_2/kWh in 2017 in NI compared to 238 gCO_2/kWh in 2017 for the UK).[62]

This is consequence of the overall generation mix, including the higher proportion of coal and gas-fired generation in NI, and the use of nuclear elsewhere in the UK[63].

Figure 14: Changing Composition of Power Generation in Northern Ireland[64]



Since 2007, NI and Ireland have jointly operated a single wholesale electricity market, known as the SEM. This means that wholesale electricity is traded across the island through a single pool, in order to increase competition, efficiency and security of supply. Optimal operation of the SEM requires effective connection of the NI grid to that in Ireland to facilitate the most efficient flows of electricity across the island. The existing NI to Ireland electricity network connection is proposed to be enhanced by a new North-South Interconnector which will enhance security of supply, put downward pressure on costs for consumers and facilitate more renewables on the system.

62 Northern Ireland: https://www.daera-ni.gov.uk/sites/default/files/publications/daera/northern-ireland-carbon-intensity-indicators-2019.pdf
United Kingdom: UK power emissions were 73,082 ktCO2e (https://naei.beis.gov.uk/reports/reports?section_id=4) and energy produced was 307,504 GWh (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770766/Regional_Electricity_Generation_and_Supply.pdf) resulting in carbon intensity of 238 gCO2/kWh.

63 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770768/Regional_Electricity_Generation_and_Supply.pdf

64 https://www.gov.uk/government/statistics/energy-trends-december-2018

Key issues for consideration

NI has exceeded its 40% renewable electricity consumption target. We now need to set a new target supporting the pathway to lower carbon energy. Ireland and Wales have both set targets of 70% by 2030, with Scotland aiming for 100% by 2020. Our starting point is to consider three options – one the same as Ireland and Wales (70%), one below (60%) and one above (80%). We would request input on what would be a stretching but achievable ambition for an NI target to 2030, taking into account the level of investment required and potential costs and benefits to consumers.

Meeting an ambitious new target will require significant investment in infrastructure. In addition to new or upgraded transmission and distribution infrastructure, there will need to be large-scale deployment of renewable technologies. NIE Networks will likely have to connect many more micro-generators to the distribution network, and a consultation has been published to inform the approach to widening access to this[65].

In relation to large-scale generators that connect to the transmission system, SONI has a legal responsibility to connect parties who request connections and an innovative approach of pre-selecting sites and clustering renewable developments has been trialled[66]. This has the potential benefits of reducing the visual impact of new infrastructure on local communities, speeding up the planning process and allowing both SONI and NIE Networks to more strategically plan connections and upgrades to the network.

Evidence is sought as to what approach would be preferable to balance the need for new infrastructure with costs for consumers and acceptability for local communities. The Strategic Planning Policy Statement for NI[67] provides a strategic planning policy framework on a range of important planning matters, including for 'Renewable Energy' development.

In addition to deploying more renewable technologies, we also need to better utilise what we already have. Constraints on generators and curtailment of wind power more broadly are common occurrences[68] and we need to look at innovative ways to reduce this. Battery storage, for example, offers opportunities to use renewable power when it is needed, rather than when it is generated. Interconnection allows us to export surplus renewables to elsewhere while district heating and wider deployment of heat pumps might offer opportunities for renewable electricity to displace fossil fuel. We would request evidence on innovations and solutions that can help to achieve a future renewable electricity target, in addition to deploying established generation assets.

65 https://www.nienetworks.co.uk/getmedia/c226929a-3d68-4c2e-b5ab-17195267fdba/Greater-Access-to-the-Distribution-Network-in-Northern-Ireland-Consultation.pdf.aspx
66 http://www.soni.ltd.uk/media/SONI-Agivey-Cluster-Project-2017-Brochure.pdf
67 https://www.planningni.gov.uk/index/policy/spps_28_september_2015-3.pdf
68 http://www.eirgridgroup.com/site-files/library/EirGrid/Annual-Renewable-Constraint-and-Curtailment-Report-2018-V1.0.pdf

Significant investment will be needed in the future to deliver higher levels of low carbon electricity. Whilst the SEM provides revenue streams for power generators, with the closure of the NIRO in 2017 there is no support scheme available in NI to support investment and reduce risk for investors. However, this is set within a context where costs have fallen[69] and some subsidy-free projects are emerging. Both GB and Ireland have auction-style mechanisms in Contracts for Difference (CfD) and the Renewable Electricity Support Scheme. Evidence is sought on how to bring forward new renewable electricity projects, whether a support scheme is required, what this might look like and the level of support needed for each technology.

Onshore wind and solar PV may be expected to be the cheapest and most readily deployed technologies for NI in the medium term. However, diversity of technology mix is vital to enhancing security and affordability of supply and minimising levels of system constraints or curtailment of renewable assets. Offshore renewables, in particular, offer a significant opportunity to develop additional large scale renewable capacity. The latest CfD auction results highlight just how far costs have come down, with the subsidy price for offshore wind cheaper than the costs of either gas or nuclear[70]. We invite evidence around what offshore and marine renewables opportunities there are in NI, and what barriers government needs to overcome to realise these.

Questions

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?

69 International Renewable Energy Agency, Renewable Power Generation Costs in 2018

70 https://www.gov.uk/government/publications/contracts-for-difference-cfd-allocation-round-3-results/contracts-for-difference-cfd-allocation-round-3-results

8.

Transport

8. Transport

Introduction

The transport sector is a key consumer of energy and producer of GHG emissions. Our modern and mobile lifestyles have placed an increasing demand on our transportation networks which have largely been developed around the car. Transport accounts for approximately 33% of energy consumed in NI (Figure 5) and contributes 23% of GHG emissions (Figure 4). Therefore, decarbonising energy use for transport, taking into account both the transport of people and goods across NI, is an important consideration within an overarching energy strategy.

Encouraging a modal shift to active travel (walking and cycling) will have a significant impact on reducing energy use from transport, whilst improving health and well-being. However, it is recognised that walking or cycling will not always be a viable option. Reduced reliance on private vehicle use, together with greater use of public transport and ultra-low emissions vehicles (ULEV), will also be key to achieving energy efficient, cleaner road transport.

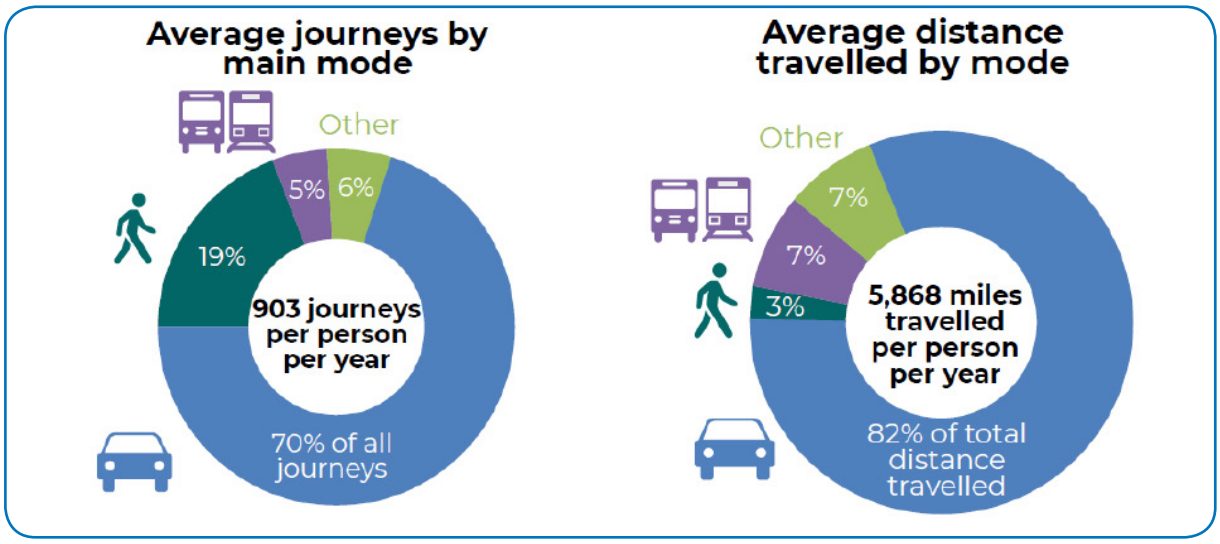
Electrification of road vehicles also has the potential to lower carbon emissions and reduce emissions of nitrogen dioxide, a toxic air pollutant found in raised levels in some of our towns and cities.

Where we are now

Figure 15 illustrates the proportion of journeys made and average distance travelled by the main modes of transport between 2016 and 2018[71]. Of the average 903 journeys made per person per year, just under one quarter (24%) of all journeys were taken by walking and public transport (rising to 25% when including cycling journeys), whilst 70% were made by car (as a driver or passenger). During 2016-2018, 82% of the total distance travelled per person was by car.

71 Department for Infrastructure, Travel Survey for Northern Ireland 2016-18, NISRA.

Figure 15: Journeys made and distance travelled in Northern Ireland, 2016-18



The figures demonstrate that NI is still characterised by high use of private cars. At the end of 2018, there were 1.2 million licensed vehicles in NI, an increase of 1.9% compared to the previous year. Of these, cars account for around 83% and approximately 12% were LGVs and HGVs. It is worth noting that NI households typically spend less on buying a car, but much more in running them, when compared with their GB counterparts. Future transport changes may impact household discretionary income, and therefore consumer affordability measures may need to take into account these changes.

At 30 June 2019 there were 2,794 registered ULEVs in NI. These are supported by charging infrastructure grant aided by the Office for Low Emission Vehicles and a network of 337 publically available charge points owned, operated and maintained by the ESB through the 'ecarni' programme. The UK Road to Zero strategy also aims to deliver cleaner road transport across the UK alongside taking forward major road schemes which have provided traffic flow solutions allowing vehicular transport to move more efficiently to reduce fuel consumption.

As well as this, road transport generates substantial amounts of air pollutants; as in many other cities in the UK and across the EU, the Air Quality Directive annual limit value for nitrogen dioxide has been exceeded. This is primarily due to pollution from road traffic, with diesel engines being particularly to blame in this respect. However, the proliferation of diesel vehicles has lowered carbon emissions from road transport.

Primary responsibility for transport lies with DfI which, in collaboration with key partners, works to deliver a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone's quality of life.

To help achieve this, the Regional Development Strategy 2035[72] provides an overarching strategic planning framework to facilitate and guide the public and private sectors. It does not redefine other departments' strategies but complements them with a spatial perspective.

In its approach to regional transportation, DfI has designed policies and implemented a range of schemes and projects to reduce GHG emissions, reduce noise and air pollution and use more energy efficient ways to move people and goods now and in the future. For example, measures which encourage the uptake of walking, cycling and greenway schemes providing immediate net zero carbon reductions, have been put in place.

In addition, better transport planning, demonstrated by the "Belfast on the Move" project and the development of modern digitally connected conurbations provide opportunities for decentralisation and help to reduce congestion and emissions.

Where use of vehicles cannot be substituted by active travel or digital solutions, major projects such as the introduction of the "Glider" Rapid Transport system in Belfast have succeeded in getting people out of their cars and onto cleaner hybrid public transport.

Translink has continued to develop Ultra Low Emission fleet replacement policies and has been pursuing funding for infrastructure to allow the introduction of hydrogen-fuelled zero emission vehicles in the Belfast Metro Fleet.

Key issues for consideration

The UK Government's "The Road to Zero – Next Steps towards Cleaner Road Transport & Delivering our Industrial Strategy" 2018[73] is designed to put in place measures across the UK to deliver cleaner transport in the future. At the heart of this strategy is a commitment to work in partnership with industry, businesses, academia, environmental groups, devolved administrations, local government, consumers and international partners.

The strategy is technology neutral and therefore, in considering future energy need, key transport issues include:

Future of Mobility

This will include how people choose to travel in the future (which may reduce energy demand) and the commercial introduction of ULEVs. These could both impact on the demand for electricity and in the future provide energy storage solutions through vehicle to grid technology.

72 http://www.planningni.gov.uk/index/policy/rds2035.pdf
73 https://www.gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy

Alternative Fuels in Transport

Electricity in cars and vans, liquefied natural gas (LNG), compressed natural gas (CNG), hydrogen, biofuels in the freight and bus sectors, are all in various stages of development. The cost and availability of battery electric vehicles and lack of a second hand market are barriers to mass introduction. At present the impact on the energy market is low with growth of around 100 vehicles per quarter. Scenario planning within the energy sector will need to play a role in estimating future demand on supply.

Infrastructure

Alternative transport will require provision of appropriate infrastructure which meets the needs of consumers and the market in NI. New infrastructure to support the introduction of alternative fuels such as hydrogen, CNG and LNG will be required alongside public and home charging solutions for electric vehicles.

Technology and Innovation

There is potential to optimise smart technology and innovation in the transport and energy sectors to ensure energy security and maximise the use of renewable energy sources.

The UK government recently clarified that its 2050 net zero target must cover the whole economy, including international aviation and shipping emissions, which are reserved matters**.** Different fuel options can play a role across different modes although their use (and timing) will be dependent on a range of technology and cost factors.

Questions

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?

9.

Other issues for consideration

9. Other issues for consideration

Security of Supply

The fundamental requirement of the energy system is that it is reliable, robust and secure. Higher levels of renewable electricity generation increase security of supply by reducing our reliance on imports, whilst the development of interconnectors in our power system allows us to take advantage of electricity generated elsewhere when needed and cost effective. Nonetheless, a significant proportion of our current power, heat and transport energy needs are still provided from imported fossil fuels such as coal, oil and gas, as well as imported biomass for renewable heat and power.

Our electricity system currently handles high levels of variable renewables generation but increased reliance on these resources will require consideration of better system integration with transport and heat, changes to demand and supply management, improved storage capabilities, and potentially the use of electricity to make hydrogen through electrolysis.

The following key issues should be considered in relation to security of supply:

- **Reliability:** that our physical energy infrastructure (e.g. electricity and gas grids), upon which the energy system is built around, works as intended;
- **Resilience:** that our energy infrastructure can stand up to the greater frequency of extreme weather events[74], and where issues do occur, that these can be quickly responded to and fixed; and
- **Flexibility:** that we can accommodate more intermittent renewables into our energy mix (particularly electricity) without compromising the security of supply upon which consumers rely.

In facilitating the energy transition to zero carbon fuels, opportunities may arise to improve or redefine these three key issues. For example, local smart grids can reduce power outages and make the energy system more resilient. Smart, data-driven tools can be used for design planning, involving consumers and identifying better supply and demand management approaches. We would therefore welcome input to identify new and emerging security of energy supply risks and opportunities arising from a changing energy mix.

74 https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-extreme-events-_heavy-rainfall-and-floods

Security of supply is monitored through close engagement and planning between DfE, the Utility Regulator and a wide range of industry stakeholders. The PfG also includes a formal measure of electricity security of supply[75] from the All-Island Generation Capacity Statement which outlines forecast capacity against demand scenarios. This measure does not cover natural gas or oil products and does not take into account the dynamic nature of demand and 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?

The role of data

The energy transition to zero carbon is not the only transition that society is experiencing. Technology developments such as smart metering are already facilitating the digitalisation of the electricity system and providing a growing range and quantity of data. Through advanced data analytics, energy systems are likely to become more connected and operators will have a better understanding of both energy supply and demand in real-time. This provides opportunities to increase efficiencies and reduce investment requirements.

A modern, digitalised energy system would be hindered by poor quality, inaccurate, or missing data. Further, some of the data that exists often has restricted access or indeed is hard to find. We need to understand the value of data and the changes required to be able to make best use of it in ways which are beneficial to both consumers and the energy system.

Smart Meters and Consumer Data

Whilst some useful data is already available to consumers, energy suppliers and energy system operators, the technologies in our homes and buildings will need to change to facilitate a truly data driven energy system. For example, NI does not have a smart meter programme, such as that being rolled out in GB and Ireland. Smart meters, or indeed other smart technologies which can utilise the internet that already exists in most of our homes and buildings, are potential ways that such data can be gathered and utilised.

Consumers should have the ability to have easier access to their energy data to give them information about their own energy use. This would also allow them to have more control over their own consumption, technologies and self-generation (or third parties to do so on their behalf if they agree), and enable delivery of consumer benefits.

75 https://www.northernireland.gov.uk/sites/default/files/consultations/newnigov/pfg-consulation-document.PDF

We understand that consumer data will also continue to have value for energy suppliers. Supplier innovation is likely, therefore, to go hand in hand with technology innovation.

Energy System Data

Energy system data has significant potential to provide major benefits to system operation and infrastructure, facilitating operational flexibility, innovation and new technologies and delivering benefits to consumers. Maximising access to energy data essentially delivers the ability to ensure that our energy systems and infrastructure are operating efficiently and optimally.

To address some of these issues the Energy Data Taskforce[76] was established to provide the UK Government, Ofgem and the energy industry with a set of recommendations on how data can assist with unlocking the opportunities provided by a modern, decarbonised and decentralised energy system at best value to consumers. The five key recommendations of the taskforce are provided in Figure 16 below.

Figure 16: Energy Data Taskforce recommendations

Energy Data Taskforce Report - 5 Key Recommendations

- **Recommendation 1: Digitalisation of the Energy System** – Government and Ofgem should use existing legislative and regulatory measures to direct the sector to adopt the principle of Digitalisation of the Energy System in the consumers' interest.
- **Recommendation 2: Maximising the Value of Data** – Government and Ofgem should direct the sector to adopt the principle that Energy System Data should be Presumed Open, supported by requirements that data is 'Discoverable, Searchable, Understandable', with common 'Structures, Interfaces and Standards' and is 'Secure and Resilient'.
- **Recommendation 3: Visibility of Data** – A Data Catalogue should be established to provide visibility through standardised metadata of Energy System Datasets across Government, the regulator and industry.
- **Recommendation 4: Coordination of Asset Registration** – An Asset Registration Strategy should be established in order to increase registration compliance, improve the reliability of data and improve the efficiency of data collection.
- **Recommendation 5: Visibility of Infrastructure and Assets** – A unified Digital System Map of the Energy System should be established to increase visibility of the Energy System infrastructure and assets, enable optimisation of investment and inform the creation of new markets.

76 https://www.gov.uk/government/groups/energy-data-taskforce

Data Issues, Security and Privacy

There are a number of important issues relating to energy data. There is a lack of openness and access to data; a lack of awareness of data sources; and a general lack of understanding of the potential benefits of data sharing. If not addressed such issues would become barriers to innovation; impact negatively on our energy research and evidence base; impact negatively on our ability to have an integrated whole energy system; and lead to poorer outcomes for consumers and society at large.

The key issues in addressing the problems identified above are data privacy, protection and security – at both an individual and system level.

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?

Carbon Capture, Use and Storage

A future with net zero emissions will still involve some activities which have the potential to generate CO_2. CCUS is a technology to gather CO_2 emissions (either pre or post combustion) and transport it to somewhere where it can be stored and prevented from being released into the atmosphere. The CCC deems CCUS as being essential in reaching the net zero carbon target[77]. The opportunities for CCUS exist across a range of sectors, not just in energy generation.

77 https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf

Figure 17: Opportunities to Deploy CCUS

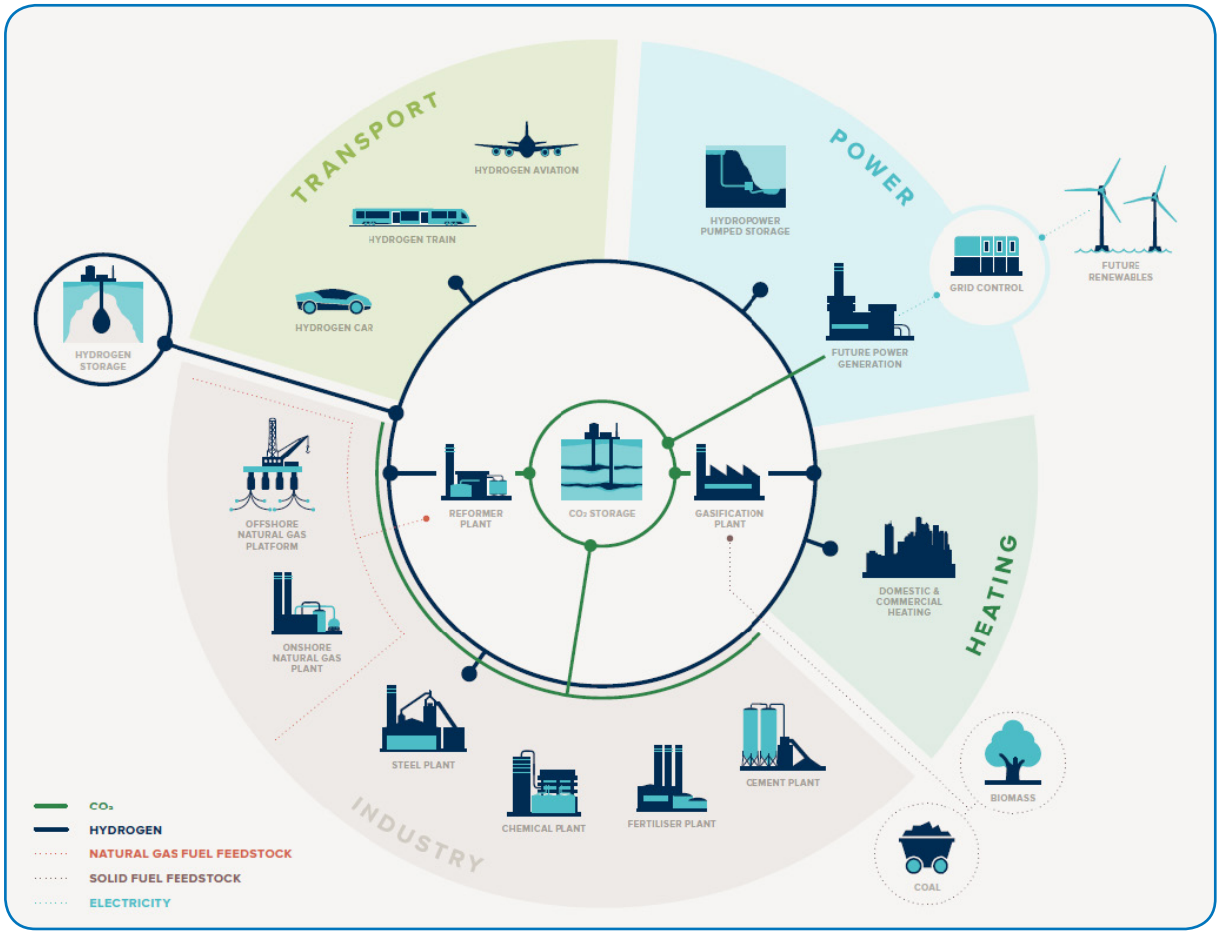


Image Credit: Global CCS Institute (2018)

The UK Government has developed an action plan to deliver the first CCUS project in the UK by the mid-2020s, with the option to deploy at scale from the 2030s[78]. Engagement with industry is taking place on the critical challenges of delivering CCUS in the UK, in particular the cost structures, risk sharing arrangements and market mechanisms.

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

Energy and the Economy

Energy costs can be a significant element of overall costs and therefore need to be competitive. In the transition to a zero carbon energy sector, it is important that this competitive position is protected as much as possible. As noted in section 4, price comparisons for all but the largest industrial and commercial users are competitive within an EU context.

78 HM Government, Clean Growth: The UK Carbon Capture Usage and Storage Deployment Pathway

However, energy is not just an enabler of economic activity, but an economic driver in its own right. The electricity and gas sectors accounted for 1,770 jobs in June 2019 and £2.0bn of turnover in 2017[79].

The transition towards zero carbon energy will present many economic opportunities beyond today's traditional utilities. It is estimated that there were a further 5,900 jobs and £1.2bn of turnover in the 'lower carbon' sectors[80], including energy services, in NI in 2017[81]. The energy services sector will support many of the drivers of economic competitiveness that feature in economic strategies, including:

- More **entrepreneurship and start-ups** will come from new emerging markets, not just for businesses but also for consumers who will be able to sell the energy that they generate;
- It could deliver **regionally-balanced growth**, attracting investment and providing business opportunities in mainly rural areas. This can be seen with the majority of renewable electricity investment to date having occurred in the west and northwest NI where wind resources and land availability are best suited for renewables;
- Significant **innovation and R&D** will occur through developing and adopting new technologies and services. NI already has a strong research base, including the Centre for Advanced Sustainable Energy (CASE)[82] and the Centre for Sustainable Technologies (CST)[83] to build on. Collaborative innovation projects with industry are already progressing, including GENNCOM[84], Belfast Power to X and SPIRE2[85];
- With the decarbonisation of energy happening right across the world, there are many **export opportunities** for local firms to exploit, particularly given our strong engineering base. In addition, renewable electricity being generated is and will continue to be exported to Great Britain and, when the Celtic Interconnector is completed, to mainland Europe; and
- Our energy sector attracts significant **inward investment**, not only in traditional power stations and electricity and gas infrastructure, but through deploying renewable technologies. As more renewable energy is required, this will continue to attract investment from outside NI.

79 NISRA Quarterly Employment Survey, SIC D (also includes steam and air conditioning supply)
80 The lower carbon sectors are: offshore wind, onshore wind, solar photovoltaic, hydropower, other renewable energy, bioenergy, alternative fuels, renewable heat, renewable combined heat and power, energy efficient lighting, energy efficient products, energy monitoring, saving or control systems, low carbon financial and advisory services, low emission vehicles and infrastructure, carbon capture and storage, nuclear power, fuel cells and energy storage systems.
81 ONS Low Carbon and Renewable Energy Economy 2017
82 https://www.case-research.net/
83 https://www.ulster.ac.uk/research/topic/built-environment/sustainable-technologies
84 https://www.nweurope.eu/projects/project-search/gencomm-generating-energy-secure-communities/
85 https://www.ulster.ac.uk/spire2/the-project

In addition to developing the energy strategy, DfE will also be seeking to develop a future skills strategy and economic / industrial strategy. Given the contribution that energy can make to the economy, evidence is sought on what specific economic opportunities will arise from decarbonisation. It is recognised that these opportunities will only be realised if the appropriate skills base is available in NI.

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?

Economic Growth and Energy Demand

Energy demand and economic growth have historically been linked: as economies grow, energy demand increases; if energy is constrained, growth reduces. However, this historic pattern is changing and it is possible to see a decoupling of economic growth and energy demand growth. This is a factor of a decline in the energy intensity of GDP (i.e. the continuing shift from industrial to service economies), an increase in energy efficiency, higher levels of electrification and the growing use of renewables (which can flatten primary energy demand).

Indeed, a 2016 report[86] by the UK Department for Business, Energy and Industrial Strategy shows that energy consumption in the UK is, on average, no higher now than it was in the 1970s. At a European level, it is estimated that gross energy consumption could shrink by 13% between 2015 and 2050 despite a 68% increase in GDP, meaning that the energy intensity of the EU economy nearly halves over this period.[87]

However, both at a UK and European level, there are projected rises in electricity consumption, driven by the potential for significant electrification of heat and transport and potentially industrial processes, which could lead to an increase in electricity demand by 27.5% by 2050 compared to 2015[88]. This could be offset by increased efficiency in the industrial sector, moves towards more service-orientated industries and increased efficiency in the domestic and non-domestic heating sector.

According to SONI, demand for electricity in NI is forecast to remain largely unchanged to 2027[89], while demand is forecast to rise in Ireland as increasing numbers of large energy users, primarily data centres, connect to the grid.

86 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820843/Energy_Consumption_in_the_UK__ECUK__MASTER_COPY.pdf
87 https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/potencia-central-scenario-eu-energy-outlook-2050
88 https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/potencia-central-scenario-eu-energy-outlook-2050
89 http://test.soni.ltd.uk/media/documents/Generation_Capacity_Statement_2018.pdf

However, there are no predictions for overall energy demand in NI to 2050, and we would be keen to hear your views on the expected changes to energy demand.

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?

Delivery framework for an energy strategy

Governance and Delivery

DfE is the NI government's lead department in energy, responsible for providing the strategic vision for the future of energy in NI, as well as key aspects of the energy legislation, including the licensing and regulatory framework and a range of consumer protection issues.

To support the ongoing development of the energy strategy, DfE has established a Government Stakeholder Group to inform and take forward our strategy. It includes representatives from all government departments, local government and Executive Non-Departmental Public Bodies - Invest NI and the CCNI - as well as the independent NIAUR.

A Project Board has also been established, chaired by the DfE Permanent Secretary with representatives from the NIAUR and CCNI.

It is worth noting that other parts of the UK and Ireland have alternative approaches to energy responsibilities. For example, Ireland has established a dedicated Department for Communications, Climate Action and the Environment which incorporates energy within its remit. At a UK level the Department of Business, Energy and Industrial Strategy brings together the business and science policy portfolios of the former Department for Business, Innovation & Skills and the full policy portfolio of the former Department for Energy and Climate Change.

As there are more limited devolved responsibilities for energy in both Scotland and Wales, these also have distinct approaches. The government in Scotland is structured into more than 30 directorates, one of which is Energy and Climate Change, and in Wales energy powers are primarily reserved, with limited responsibilities at the National Assembly and local government. Local authorities in Scotland also have a significant role, for example through developing Local Heat and Energy Efficiency Strategies[90]. Similarly, the increased powers of local government in NI since 2015 could similarly enable a variety of locally-driven solutions.

90 https://www.gov.scot/publications/local-heat-energy-efficiency-strategies-phase-1-pilots-technical-evaluation-report/pages/3/

It is also worth noting that some local councils have declared a Climate Change Emergency. Belfast, for example, has established a Resilience and Sustainability Board as part of its formal Community Planning Structures. The city's draft Resilience Strategy links decarbonisation with the city's growth strategy, emphasising the economic opportunities associated with energy transition.

The development of a new energy strategy will lead to a range of policies which will require new and improved support schemes and interventions, as well as providing information and advice. At present, there is no single organisation with a clear mission that would naturally deliver these. As a result, the current approach of many different organisations delivering a wide variety of interventions is likely to continue. An alternative may be to consider establishing a dedicated sustainable energy authority with a focused mission to deliver existing and new energy interventions to 2050.

Case Study: Sustainable Energy Authority of Ireland (SEAI)

SEAI is Ireland's national sustainable energy authority. It works with householders, businesses, communities and government to create a cleaner energy future. Its activities include:

- **Home energy:** home energy grants to improve energy efficiency; raising awareness and ensuring compliance with EU energy labelling and eco-design of products; information on Building Energy Ratings (BERs) and energy saving tips.
- **Community energy:** supporting sustainable energy communities through capital funding, partnerships and technical support; engaging with schools and teachers to educate about saving energy in home and at school.
- **Grants:** home grants; electric vehicle grants; business grants and support; housing association and local authority energy efficiency; research funding; community grants; help with finding a registered professional and support for contractors.
- **Business & public sector:** public sector energy programme; large industry energy network; energy auditing; SME supports; business grants; EVs for business; renewable biomass heating for business; training and support for energy management and standards.
- **Technologies:** electric vehicles; ocean energy; solar energy; bioenergy; wind energy; mapping of technologies and BERs.
- **Data & insights:** energy statistics; research; research funding; behavioural insights.

Source: https://www.seai.ie/

In summary, it may be appropriate to consider whether existing governance, delivery and departmental responsibilities are sufficient to deliver the net zero carbon target effectively. Input and evidence, particularly drawing from successful approaches in other jurisdictions, is therefore sought.

Legislation and Regulation

The legislative and regulatory framework for energy in NI has evolved in response to NI, UK and EU energy policy. It includes legislation that is the responsibility of other government departments, not only DfE.

DfE is responsible for a body of primary energy legislation, supplemented by a range of subordinate legislation which includes:

- The Electricity (Northern Ireland) Order 1992;
- The Gas (Northern Ireland) Order 1996;
- The Energy (Northern Ireland) Order 2003;
- The Electricity (Single Wholesale Market) (Northern Ireland) Order 2007; and
- Energy (NI) Act 2011.

This legislation is fundamental to future policy direction as it sets and prioritises the statutory duties of both DfE and the Utility Regulator, and the associated policy and regulatory priorities and vires.

EU legislation has had a significant impact on the development of the current framework. NI's energy legislation has been updated through the implementation of EU legislative programmes such as the Third Internal Energy Package[91], Energy Efficiency Directive[92] and Renewable Electricity Directive[93].

The outcome of EU Exit negotiations will have a major impact on the energy framework, particularly within the context of the ongoing functioning of the SEM, implementation of the CEP, and the UK Government's commitment to seeking to maintain the SEM in any scenario including a No Deal exit.

There are dozens of other pieces of legislation impacting on energy in NI, including, for example, regulations for functional or performance requirements of buildings[94] (DoF), enforcement of the requirements of building regulations (local government) and the 2011 Planning Act (DfI). As part of this strategy we will consider what legislative changes may be required.

91 https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation/third-energy-package
92 https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive/overview
93 https://ec.europa.eu/energy/en/topics/energy-efficiency/targets-directive-and-rules/energy-efficiency-directive
94 Building Regulations (Northern Ireland) 2012

Whilst acknowledging that the legislative and regulatory frameworks are influenced to a large extent by wider policy and legislative considerations it would still be useful to gain an understanding of stakeholder views. Any proposed changes will, of course, be subject to fuller consideration, consultation and scrutiny in line with current departmental responsibilities and requirements.

Questions

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?

10.

The Way Forward

10. The Way Forward

Energy presents a unique range of challenges for policymakers and strategists. The SEF 2010 led a significant change to the generation of electricity from renewable sources. Since then the recognition of the importance of addressing the challenges of climate change, providing greater choice to consumers and ensuring greater stability and consistency for the wider economy have increased the scale and breadth of the challenge.

Agreeing a new energy strategy will be a key priority for any incoming devolved administration. This Call for Evidence is the initial stage in gathering the evidence and identifying the key issues that need to be addressed within that strategy. We are eager to ensure that there is transparency throughout the development of proposals for an incoming Minister.

Changes to how departments develop their approach through co-production and focusing on outcomes have been encouraged notwithstanding the absence of a functioning Executive. This strategy development exercise offers an opportunity to highlight the benefits of such an approach.

Contact details for the energy strategy team are set out at the start of this document. We will deliver a range of targeted stakeholder engagement events on an ongoing basis until a Minister has determined the future strategy. Details of these events will be notified on the Department's website (https://www.economy-ni.gov.uk/) and via its Twitter feed (https://twitter.com/economy_ni). We would welcome as many as possible to attend these events and to discuss the issues that need to be addressed and the evidence which needs to be considered.

During this initial phase, we are also keen to respond to invitations to meet key stakeholders. Please let us know if you wish to engage with the energy strategy team.

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

Summary of Questions

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.

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.

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?

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?

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?

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?

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?

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?

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?

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

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?

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Further Information:
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