

Vision 2050: Options for a New Northern Ireland Strategic Energy Framework

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POLICY EYE

Northern Ireland

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Eleanor McEvoy, Energy Policy Lead
at FSB Northern Ireland

Concern about climate change has rocketed up the political agenda in recent years and, for voters under 24, it is second only to Brexit in terms of the issues that they value most. In that context, further political action towards climate protection seems inevitable as politicians court the next generation to bolster their electoral support. The event, held on 11 September at Titanic Belfast, and this associated report are therefore timely and we wholeheartedly support the efforts made to explore and shape new ideas around the decarbonisation of energy.

Some business owners will see multiple threats: the threat of climate change itself, followed by the threat of action to address it using additional levies or burdens to change behaviour. But just as the advent of fossil fuels – coal, then oil and gas – ushered in a previous industrial revolution, with an associated economic and employment boom so, too, could the adoption and growth of new clean energy systems. Embraced properly by policymakers and business, this change could be the dawn of a new industrial revolution that holds out the prospect of great prosperity for Northern Ireland while helping to stave off catastrophic change in the climate.

The way we use energy and live our lives is changing, whether that be how we travel, the food we eat, or the way we heat our homes. The move to carbon-neutral solutions presents a challenge, of course, but it also presents a massive opportunity. Government policy has a huge role to play, as we saw in the successful partnership between previous Stormont Executives, businesses and domestic consumers. The renewables target was adopted, incentives were devised, and industry and consumers responded with investment, so that 44% of

Northern Ireland's energy now comes from renewable sources. Despite the absence of devolved government, Northern Ireland has the potential to be a strong player in this field. Working alongside a functioning Executive, we could become a world leader.

The goal – and our ambition – should be much bigger than simply reducing Northern Ireland's consumption of fossil fuel. It should be to embrace and develop low-carbon innovation, from renewable power generation through to electric vehicles and smart grid services, so that we can become players on the world stage.

The engagement of business, politicians and wider civic society is vital if we are to maximise our potential. The event and this report are a welcome contribution to that important dialogue.

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Will Chambre, Director at Chambré and Editor at Policy Eye Northern Ireland

Our relationship with energy is changing fast as we move to a technology-rich, low-carbon world. Most visibly, the traditional model of centralised generation is being overturned by the proliferation of renewable energy sources, while passive consumers are being empowered by a host of smart technologies. The electrification of transport and the roll out of power storage systems will change the way we live and work, but they will also present a whole new set of challenges to policymakers and regulators.

There are 23,000 generators in Northern Ireland today, compared with just a handful at the start of the decade. How many will there be by 2050 and what new pressures will the power system face 30 years from now? The task ahead of us all is to find the best answers to these and other questions, and to plot a path through the coming energy transition that minimises disruption and maximises opportunities for the economy and citizens, while meeting the UK national target of net zero greenhouse gas emissions by 2050.

We assembled a broad range of high-level speakers to present and debate the various obstacles and opportunities that lie ahead, including the development of a new Strategic Energy Framework. They included senior figures from the civil service, politicians and those that regulate the energy industry, as well as network and system operators and experts in the fields of power, heat and transport – all of whom make a valuable contribution to solving the decarbonisation challenge.



Jamie Delargy, Broadcaster and energy commentator

Conference chair Jamie Delargy opened proceedings with a reminder that the Northern Ireland Strategic Energy Framework 2010-2020 is now almost 10 years old and that, in the absence of a functioning devolved government, there is a pressing need for the Department for the Economy to develop a post-2020 framework.

The civil service, the regulator, industry and the legal profession were represented in the opening session by:

- **Richard Rodgers**, Head of Energy at the Department for the Economy
- **Jenny Pyper**, Chief Executive at the Utility Regulator
- **Declan Billington**, Chair at CBI Northern Ireland Energy Forum and
- **Stephen Cross**, Head of Energy at law firm Cleaver Fulton Rankin.

KEYNOTE ADDRESS



Richard Rodgers, Head of Energy at the Department for the Economy

Richard Rodgers is the senior civil servant with responsibility for energy in Northern Ireland. As such, he is tasked with preparing the new strategic energy policy framework for the region. Given that existing policy is now largely irrelevant, there is considerable interest in a timetable for its replacement.

Before setting out the department's plan of action, Mr Rodgers described some of the features of the wider energy and climate change landscape and reminded the audience of the bearing they will have on any replacement policy for Northern Ireland. These include:

- The United Nations 2015 Paris Agreement to keep the global temperature rise this century below 2 degrees Celsius above pre-industrial levels¹
- The EU's Clean Energy Package, under which EU Member States are required to produce a National Energy and Climate Plan (NECP)²
- UK domestic legislation passed in late June 2019 requiring the UK to bring all greenhouse gas emissions to 'net zero' by 2050 compared with 1990 levels.³

Great progress, but the RHI scandal looms large

Northern Ireland has made great strides in decarbonising the power market in the last decade, said Mr Rodgers. In the 12 months to the end of June 2019, 44% of electricity supplied was from renewable sources – 3,462 GWh out of 7,788 GWh – beating the government's target of 40% by 2020, according to data from the Northern Ireland Statistics and Research Agency.

¹As of September 2019, the UK was an EU Member State and therefore part of the joint EU/Member State Nationally Determined Contribution (NDC) for the period of 2021-2030. This commits the EU to at least 40% reduction in greenhouse gas emissions by 2030 compared to 1990 levels.

²The UK's draft National Energy and Climate Plan. See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774235/national_energy_and_climate_plan.pdf

³<https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>



Rolling 12 month Average % of Total Electricity Consumption Generated from Indigenous Renewable Sources



FIGURE 1: Average percentage of electricity consumption generated from renewables in Northern Ireland

Mr Rodgers contrasted this success with the failure of renewable heat policy to illustrate that “there is massive scope for getting this wrong”. Not only did a serious flaw in the now notorious non-domestic renewable heat incentive (RHI) help to bring down the Northern Ireland assembly in January 2017, the policy failed to achieve its target of 10% renewable heat by 2020.

The journey towards ‘net zero’ carbon

On 27 June 2019, the UK became the first major economy in the world to pass laws requiring it to bring all greenhouse gas emissions to net zero by 2050. This replaced a target to reduce emissions by at least 80% from 1990 levels by the middle of the century.

“We must avoid failure as we have seen the consequences of failure,” Mr Rodgers said. “It hasn’t cost that much to get to 44% renewable energy, but to achieve net zero will take massive changes in the way we eat, travel and live.”

There will be a need for flexibility. “It will have to be a living, breathing strategy as we will be using technologies in 2050 that don’t yet exist,” he said.

Indeed, he calculated there will be plenty of opportunities to adjust the strategy. If the 30-year timeframe is broken into six five-year periods, each with a mid-term review, there would be 12 ‘checkpoints’ after initial direction is set.

“The next phase of the energy transition will require holistic planning and joined-up thinking,” he said. The system needs to be considered as a whole. Traditional silos of power, heat and transport need to be broken down and the grid will need to get smarter, as will the way we use and store power, he explained.

The process: how we plan to make good policy

Mr Rodgers intends to put engagement at the heart of the policymaking process. “A solution generated by the people for the people,” is how he described it to the audience.

He envisages that the new strategy will be developed by The Department for the Economy in three stages:

- 1) a call for evidence in autumn 2019 (after the Brexit deadline of October 31st)
- 2) options for a new strategy, scheduled for spring 2020, followed by
- 3) a draft energy strategy for ministerial approval by the end of 2020.

It is vital that there is strong cross-departmental co-operation, he said. A wide range of departments and bodies will need to play a part, including the Department of Agriculture, Environment and Rural Affairs and the Department for Infrastructure, which has responsibility for transport policy. Local government and Invest NI will also be important.

The importance of stakeholder discussion

In addition to power generation, a Northern Ireland conversation about energy must incorporate representatives from the heat and transport industries, which account for 45% and 36% of energy use in the region, and cover issues such as energy efficiency, fuel poverty, energy prices and security of supply, said Mr Rodgers.

It also needs to include consumers’ representatives such as the CBI and Age Concern, the full range of energy industry players as well as government in all its forms, from elected representatives through to the civil service and the regulator.

PROTECTING AND EMPOWERING: PUTTING CONSUMERS AT THE HEART OF THE ENERGY TRANSITION



Jenny Pyper, Chief Executive of the Utility Regulator

Jenny Pyper is head of the Utility Regulator, a non-ministerial government department responsible for regulating Northern Ireland’s electricity, gas, water and sewerage industries and promoting the long-term interests of consumers. Ms Pyper is also co-chair of the Single Electricity Market Committee (SEMC), which regulates the all-island wholesale electricity market, worth over €2 billion.

“To quote the doyenne of energy commentators, Dieter Helm, the energy transition is nothing short of a revolution,” began Jenny Pyper. “There is no doubt the energy system of the future will not work or look anything like it does today. We really are in the foothills of far-reaching change.”

And with any radical change come huge challenges, she said. These include planning, creating synergies and building collaboration, as well as innovating, developing and harnessing appropriate technologies. The situation is further complicated by the absence of certainty and clarity from both the UK and the Northern Ireland governments.

“The scale and urgency of the challenge facing policymakers today is unprecedented,” she said, before reminding the audience that she once stood in Richard Rodgers’ shoes,

having been director of energy policy at the Department for Enterprise, Trade and Investment (now known as the Department for the Economy) for seven years.

As Chief Executive of the Utility Regulator, Ms Pyper is focused on protecting the interests of domestic and business consumers, both in the short and long-term. “The energy transition will place the consumer at the centre of the action and will start to blur the edges of what the energy industry is,” she said.

Opportunities and bumps along the way

Ms Pyper described how things are going to get more complex for consumers. They will be able to engage in house-level energy storage, real-time usage data, time-based tariffs, self-generation and electric vehicles, among other things, she said. They will also have more freedom to choose and control where their energy comes from, when and how they use it and what price they pay.

“There are huge opportunities for prosumers and huge opportunities for utility services, but all of this comes with a health warning, because as with all far-reaching change, there are going to be bumps along the way,” she said. “Not all the ideas in the energy transition space will work for us here in Northern Ireland and not every consumer will be proactive.”

The scale of consumer disengagement was highlighted as a significant challenge. “Sixty percent of energy consumers are disengaged,” she told the audience. “Almost half don’t understand the information they are given from suppliers and a third never read any correspondence from their suppliers.”

Flexible regulation

“We can’t lose sight of the consumer as we plot a way through a very challenging and complex environment,” she said.

Ms Pyper believes that if the regulator is to protect consumers then it must consider the energy transition from their point of view. Cost is the top priority, she said, followed by social and economic benefits as well as decarbonisation and technology, stressing the importance of engagement with consumers.

Ms Pyper acknowledged that the regulator will have to become more flexible. “The core principles of UK economic regulation stress transparency, predictability and consistency. Maybe we need to live with a bit more looseness around the consistency and predictability pieces, but not the transparency,” she said.

Importance of stakeholder dialogue

“As regulators we have been trying to encourage debate around the energy transition for some years,” she said. “I can’t emphasise enough how important coordination and collaboration between the stakeholders is to achieve the transition.”

The regulator is looking at the next tranche of network price controls. While this will start thinking about the energy transition, Ms Pyper emphasised that the critical piece will be the Department for the Economy’s energy framework. “I am delighted that the Department is now actively engaged in developing this new strategy.”



DRIVING INNOVATION AND DELIVERING CHANGE: THE ROLE OF BUSINESS AS A PARTNER OF GOVERNMENT IN THE TRANSITION TO A LOW-CARBON FUTURE



Declan Billington MBE, Chair of the CBI Northern Ireland Energy Forum

Declan Billington is CEO of Thompsons, a major animal feed firm. He is former chair of CBI Northern Ireland and the Northern Ireland Grain Trade Association. He also represents Northern Ireland on the Board of Agricultural Industries Confederation, and plays an active role in a number of Government Brexit Advisory Bodies.

Echoing the two previous speakers, Declan Billington began by calling for “a close and constructive dialogue” between stakeholders. There is a clear need to “kick-start” the discussion in the absence of an executive and despite the nervousness arising from the RHI scandal, he said.

The CBI Northern Ireland has not sat on the side-lines, he said. Its latest contribution to the discussion is A Balanced Transition, which contains a series of policy recommendations that were welcomed by the DfE permanent secretary earlier this year. This drew on the body’s 2016 policy paper Success Through Smart Choices and on its Northern Ireland Energy Forum, which includes operators, suppliers, consumers and generators.

Mr Billington summarised the CBI’s four key energy policy recommendations as:

1) Create policy certainty and stability

The energy framework for Northern Ireland should align with UK and Irish strategies and with the all-island ISEM. It must deliver long-term policy certainty to encourage investment.

The strategy also needs to align with carbon reduction targets and to encourage collaboration across departments and with industry and the regulator. The CBI recommends creating a cross-departmental energy strategy board.

2) Maximise value to consumers

The strategy needs to balance renewable electricity targets with costs to the consumer. The CBI recommends investment in supporting infrastructure to encourage new renewable technologies, while improving efficiency of existing renewable assets. In addition, the issue of comparatively high energy costs for larger energy users needs to be addressed.

3) Take a whole system approach

Several executive departments will be needed to deliver the future energy strategy, said Mr Billington.

Among its many suggestions, the CBI recommends greater uptake of natural gas as a step towards the decarbonisation of heating, using excess wind power to make hydrogen for transport and wider use of heat pumps.

On agriculture, the strategy needs to look at using carbon sinks more effectively and reducing methane emissions per litre of milk or kg of meat produced. And on transport, it must look at decarbonising vehicles of all sizes.

4) Collaborate with industry

Consensus needs to be built among all stakeholders, he reiterated. The Manufacturing and Energy Advisory Group is a model worth exploring, both for development of strategy and to underpin 10-year action plans, he suggested.

The audience heard how the CBI Northern Ireland has tried to kick-start discussion twice: once with Success Through Smart Choices in 2016, and again with A Balanced Transition in 2019. “Collaboration must start now – Richard, let’s partner up!” he said, addressing Mr Rodgers.



IMPLEMENTING POLICY: EFFECTIVE REGULATION & SUPPORT



Stephen Cross, Director and Head of Energy at law firm Cleaver Fulton Rankin

Stephen is recognised as one of Northern Ireland’s leading lawyers in the financial and energy sectors and has extensive experience advising on many of the most significant infrastructure projects.

1) Policy context

Northern Ireland may have met its 40% renewable electricity target for 2020, but as Stephen Cross reminded the audience, we are now bound by the amended Climate Change Act 2008 to achieve ‘net zero’ greenhouse gas emissions by 2050.

“New policies and determined action are going to be needed to meet the considerable challenges that this will bring,” he said.

“As energy is a devolved matter, Richard and his colleagues across other departments will have to address many issues that are separate from the rest of the UK, in particular connections with the Irish and European energy markets through the Single Electricity Market,” he continued.

Carbon emissions fell by 9% in Northern Ireland between 2008 and 2016, chiefly due to a reduction in coal-fired power generation and an increase in gas and wind generation. However, this was much smaller than the 27% decline seen elsewhere in the UK, Mr Cross said.

2) Unique challenges

“Northern Ireland is the only part of the UK not to have any form of renewables support,” said Mr Cross. The Renewables Obligation subsidy scheme closed in 2016 and while the rest of the UK moved to a system of feed-in tariffs, the executive in Northern Ireland decided not to follow suit because the cost to the consumer was deemed to be disproportionate to the benefits, he explained.

Northern Ireland is also characterised by higher-than-average energy prices (especially for business customers) and the lack of an assembly and devolved government. “Despite the efforts of the government departments and industry, we still need an executive to come in and implement policy,” he said.

3) New policy opportunities

In October 2018, the Integrated Single Electricity Market (ISEM) was created with the aim of integrating the Irish electricity market with European electricity markets. The move was also designed to drive down and stabilise power prices.

“The first year of ISEM has seen some volatility and we are still a long way from achieving the certainty in energy prices that investors need over the longer term,” said Mr Cross. “The new energy strategy policy must therefore support effective interconnection to create the stability that is needed for the ISEM to work effectively.”

Incentives were highlighted as another priority. “Any new energy policy must introduce a set of new renewable energy incentives,” he said. When designing these, it is important to look at what is happening in Ireland to reduce the potential for divergence in terms of future generation between the two countries, he added.

New policy also needs to look at alternative measures to encourage renewable heat, he said. For instance, instead of long-term payment schemes such as the ill-fated RHI, he suggested that loans and grants could be made available to help businesses and consumers become more energy efficient.

Additional policy opportunities include increased usage of ‘private wire systems’ (localised electricity grids linked to a privately-owned generation plant) and development of the biogas sector to help the gas industry decarbonise.

To conclude, Mr Cross praised the regulator’s willingness to adopt a degree of flexibility. “That will be a major boost when we try to make the adjustments to design of new policy,” he said.



QUESTION & ANSWER SESSION

Q Andy Frew, technical innovation manager at the Northern Ireland Housing Executive.

“There are half a million oil-fired properties in this country. We must get a larger percentage of households using renewable electricity for hot water and heat. How we can move in that direction?”

A Richard Rodgers: “Unlike Brazil where there is demand for cooling in summer and heating in winter and you get utilisation of the generating assets across the year, in Northern Ireland peak demand for electricity and heat is in the winter months. Blanket electrification of heat cannot therefore be the answer.

“It can be part of the mix, however. For example, there is a major project underway to look at the potential for electrification of heat in the Belfast Health and Social Care Trust – cooling demand in summer is very significant in a hospital.

“When you switch from an oil boiler to a natural gas boiler you reduce the carbon intensity of the fuel and you also provide significant energy efficiency improvements. There is a 50% reduction in carbon emissions by switching from oil to gas.

Q David Lindsay, director of environment at Ards & North Down Borough Council.

“In light of the calls we’ve heard for a fully integrated, collaborative approach to policy, how can we ensure there is a gear-change in terms of how our buildings are regulated with regard to heat?”

A Jenny Pyper: “It is a question about who has the knowledge and the levers. Local government, the regulator and the department have a lot of those levers. I also think markets will drive change as they have done in electric vehicles and mobile phones.

“The key is to ensure that we get high level dialogue. We need to have a debate about a target to get rid of oil boilers, as we saw in Great Britain in relation to coal generation. There must be a dialogue to get consensus.”

Richard Rodgers: “There is a real commitment among permanent secretaries to be properly joined up. As part of this effort we have set up a government stakeholder group. Local authorities will be represented – it is important that their new powers and responsibilities are brought into the mix.”

David Lindsay: “As an authority we have tried to incentivise developers to up their game in terms of energy efficiency in buildings. But that is not really going to cut it. We need a statutory regime that controls and governs how our buildings are put up.”

Q Pat Austin, director of National Energy Action Northern Ireland:

“Will the Department for the Economy set a statutory target for energy efficiency in Northern Ireland?”

A Richard Rodgers: “There is an opportunity to really do something innovative and revolutionary about tackling fuel poverty. I look forward to proper engagement about what those statutory targets should be to ensure energy efficiency is targeted properly and to ensure fuel poverty becomes a thing of the past.”

Jenny Pyper: “There is a Northern Ireland Sustainable Energy Programme (NISEP) scheme in place and it is in the process of being reviewed – the review is giving us good information and will inform the targets. It is not as if we are sitting with a blank sheet of paper and we have not got any pieces of the jigsaw.”

Q Jamie Delargy, conference chair:

“People feel that decisions are made behind closed doors. To what extent can you promise that your policy papers will be published so people can see where the CBI is going?”

A Declan Billington: “What we need to do is grow the economy and that will share the cost of our networks – greater usage will reduce the cost of the network per person. The CBI’s strategy is win-win for all.”

Jenny Pyper: “We need to get a clear and agreed a picture of the reality of the energy costs. The Utility Regulator’s market monitoring and transparency reports give factual benchmark information about energy costs. It concerns me that we continue to hear the narrative that energy prices in NI are higher than in Ireland, the rest of the UK and Europe. That is not factually correct. One of the major challenges we face is identifying the real data, the truth.”

Q David Little, chair of Forum for Better Housing Market NI.

“Is there any discussion in government about stopping the proliferation of single dwellings in the countryside, which is unsustainable?”

A Richard Rodgers: “This will not be easy because we all want the right to live where we want to live. Economic incentive is the greatest driver that we know. Think of the impact of the carbon tax and taxes on diesel and petrol. When things become too expensive, we change our behaviour.

“We want to set up structures that allow this to be part of the agenda. We will not get answers quickly, but we will get them eventually by having a joined-up discussion. It is part of the debate but not top of the agenda.”

Q Jamie Delargy, conference chair.

“There may be some merit in trying to align the incentives North and South, after all, whether we stay or leave the EU there is probably still going to be a single market for electricity. Is there an argument for further alignment of the two systems?”

A Stephen Cross: “You could say it is an obvious step to look at the incentives that have been put in place in the South and that it would be a simple idea to align our incentives so there is uniformity across the market. But the disadvantage might be that we do have different policies, governments and regulations. It would be a lot of work to design something similar to what has been put in place in the South and it would be a long time coming as well.”

Jenny Pyper: “One of the advantages of being in the EU has been the consistency of energy policy and one of the great things about the Single Electricity Market is that it is European-compliant. I have no reason to think that the Clean Energy Package, which is Europe’s next tranche of challenging legislation, and directives to help move the energy transition forward, will not be adopted and applied both North and South.

“Europe’s energy and climate change policy allows us to have the best of both worlds – to have consistency at the high level and to tailor for separate jurisdictions. The advantage is that we can look at it on an all-island basis, but then if we need something to be different North and South we can adapt and tailor it, thus avoiding the debate about whether to align every aspect of energy policy.

“I think the Clean Energy Package will be adopted and that it will set a lot of the policy framework that will help all of us in terms of setting the direction of travel.”

SESSION 2. WHOLE ENERGY SYSTEM TRANSITION: WHAT IS THE GOAL?



Decarbonising the power system will require technologies such as carbon capture & storage and grid services that allow 100% penetration of renewables. It will also require integration of the electricity, heat and transport sectors and using cutting-edge 'power-to-X' technologies that convert electricity into hydrogen or heat.

Jo Aston, managing director of of SONI (System Operator for Northern Ireland)



In this session we took a closer look at the main considerations in planning for the energy transition. The speakers addressed how the grid infrastructure and all-island electricity market will cope with the changing energy landscape, the options for decarbonising heat, what changing transport technologies mean for energy and emissions and the future of gas networks.

The electricity transmission system, the heat and transport sectors and the local gas industry were represented in the second session by:

- **Jo Aston**, Managing Director at at SONI (System Operator for Northern Ireland)
- **Andrew Cripps**, Regional Director at multinational infrastructure firm AECOM
- **Charlie Simpson**, Partner and Head of Mobility at Global Strategy Group, KPMG UK and
- **Michael McKinstry**, Group Chief Executive Officer at Phoenix Natural Gas.

DECARBONISING POWER: CONSIDERING CLEAN LOW-COST POWER GENERATION OPTIONS FOR THE FUTURE



Jo Aston, Managing Director of SONI (System Operator for Northern Ireland)

As head of SONI, Jo Aston is responsible for the smooth running of Northern Ireland's electricity transmission system, including the interconnectors, as well as the all-island wholesale electricity market, the Single Electricity Market or SEM.

What does the energy transition mean for Northern Ireland? asked Jo Aston, who joined SONI from the Utility Regulator in May this year. In answer to her own question, she said it will mean decarbonisation, decentralisation and digitalisation.

Decarbonising the power system will require technologies such as carbon capture & storage and grid services that allow 100% penetration of renewables. It will also require integration of the electricity, heat and transport sectors and using cutting-edge 'power-to-X' technologies that convert electricity into hydrogen or heat. The latter will decouple electricity generation from demand, thus facilitating the integration of high shares of variable renewable energy.

Scenario consultation launched

On September 11, 2019, SONI launched a consultation inviting views on credible pathways for Northern Ireland's clean energy transition, with a specific focus on what this means for the electricity system over the next thirty years.

The consultation document, Tomorrow's Energy Scenarios Northern Ireland 2019 Consultation, sets out three potential scenarios to 2030 and beyond categorised as 'least effort', 'modest progress' and 'addressing climate change', said Ms Aston.

The scenarios were developed in conjunction with key stakeholders.

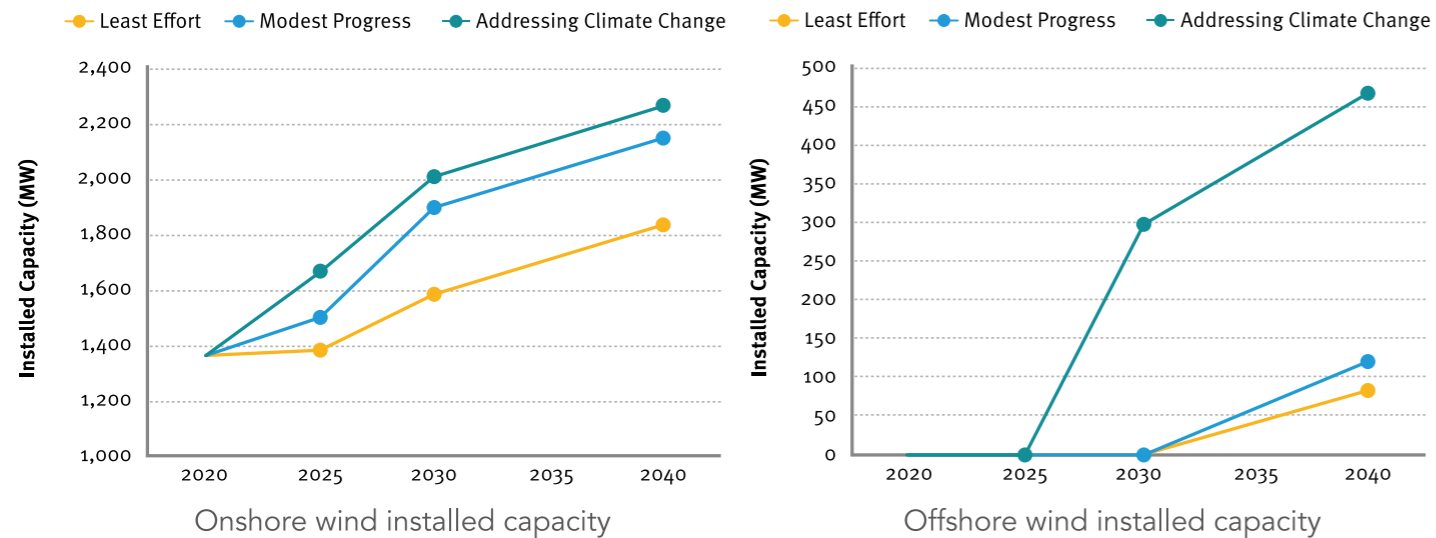


FIGURE 2: SONI's wind energy scenario planning for Northern Ireland

Scenario planning

Modelling is based on numerous assumptions, explained Ms Aston. For instance, electricity demand in Northern Ireland is forecast to rise by more than 20% by 2040 to 10-11.5 TWh, while in Ireland it will grow by more than 50% to 43-50 TWh. Given that circumstances change, SONI has recognised the need to revisit these scenarios every two years.

"It is important that scenario modelling is done on an all-island basis," she said. This reflects the need to plan for the single electricity market and to take account of interconnector flows, among other things.

Challenges of new infrastructure

The energy transition will also present some real societal challenges. A lot of new transmission infrastructure will be required if we are going to reach our 70% renewable electricity target and this will not always be welcomed by communities, she said.

The need for a North-South interconnector is more pronounced today than it was when first recognised back in 2006. This is because "significant constraints on an all-island basis" are resulting in curtailment of wind power. The situation is only going to get worse as more renewable power is added, Ms Aston concluded.

SONI launched its strategy on 8 October 2019.



DECARBONISING HEAT: IMPLICATIONS FOR THE WIDER ENERGY SYSTEM



Dr Andrew Cripps, Regional Director at multinational infrastructure firm AECOM

Dr Cripps heads up AECOM's sustainability team based in St Albans. He is also technical lead for the Heat Networks Investment Project, which is seeking to deliver more low-carbon heat networks across England and Wales.

"To get to net zero carbon we are going to have to take radical action," he began. "Obviously, we are going to have to phase out the use of all

fossil oil and gas." Carbon capture and storage might need to be used for a period but as it is not a proven technology, he is not convinced we should be relying on it.

In summary, he said that decarbonising heat will require lots of electricity, a role for hydrogen, biomass and biogas and more district heating. It is not so much a technical challenge, unlike decarbonising aviation or cement manufacturing, rather it is more an infrastructure challenge.

Options for decarbonising heat

There has been some progress on efficiency of heat production but not enough, he said. "We need to redouble our efforts to find ways to incentivise people to take more steps."

Dr Cripps outlined five options that will help to decarbonise heat in the UK.

1) Direct electric

The 'passive house' approach to building homes reduces heat demand. As a result, housing developers argue that it is possible to heat such houses using 'direct electric'. This is an expensive option but not outrageously so, said Dr Cripps.

"We must fight against this. They are doing it because it is cheaper, not because it is the right thing to do. If we all switched to 'direct electric' next week there would need to be about five times the electricity-generating capacity that we currently have. This is simply not possible," he said.

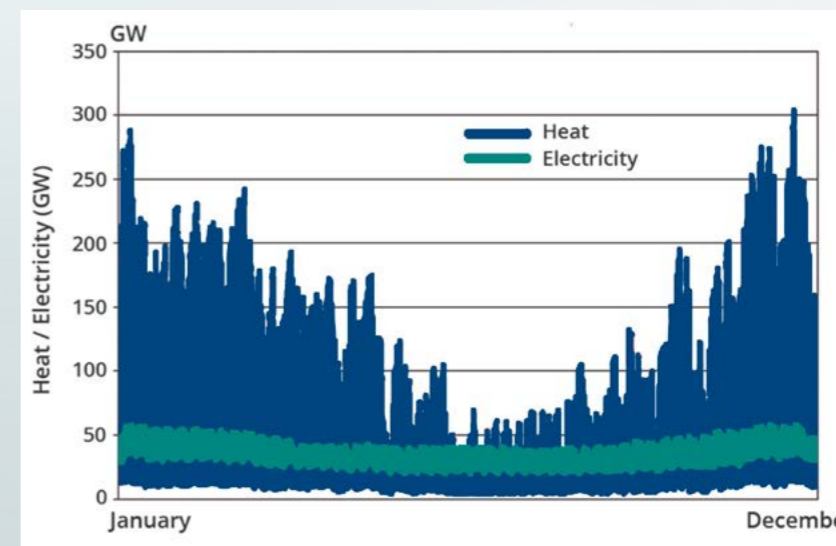


FIGURE 3: Average annual heat and electricity generating capacity required



2) Heat pumps

Heat pumps consume power and so will have an impact on the grid, but the effect is reduced if they have a high 'coefficient of performance' rating and are combined with heat storage systems, he explained.

The challenge with heat pumps is the relatively high capital cost. "If we phase out gas the likelihood is that the overall cost of heat is going to rise. It is naive to imagine that we are going to come up with solutions that are cheaper," he cautioned.

3) Replacement gases

Dr Cripps described how hydrogen is attracting a lot of interest and that Leeds, Manchester and Liverpool are talking about rapidly increasing the amount of hydrogen in their gas grids. "It is mainly a question of cost and timing," he said.

Another important area is biogas. "There are many questions that we will need to answer, such as whether to use it directly where it is generated or to feed it into the grid, and how much more can be generated," he said.

New technologies coming into view include using renewables to generate gases such as methane and hydrogen, he added.

4) Biomass

Dr Cripps does not think biomass is the entire solution, but that it could form part of it. He raised concerns about air pollution and the issue of competing with land used for food production.

5) District heating

Dr Cripps believes district heating needs to be part of the mix. As a means of heat distribution from a centralised generator, it allows flexibility in terms of heat source. In Denmark for instance, they started with oil, switched to gas and are now adding heat pumps, he explained.

More use could be made of heat generated by energy-from-waste (EfW) projects and from industrial sources such as data centres, he said. "In my view it should be illegal to build a thermal power station or an EfW plant without a district heating system attached," he said.

Heat networks investment project

Aecom is involved in the delivery of the £300 million Heat networks Investment Project in England and Wales. The aim of the project is to provide funding to boost the historically low rate of return from investment in heat networks. Over time, it is hoped that experience will drive down costs and that heat networks will emerge as a sustainable sector that does not require subsidies, he said.

Which option to take?

There is a lot of uncertainty about cost, he said. "My view is that a mixed solution will emerge as the best outcome. I think we will see heat pumps and solar thermal and biomass in rural areas. I think you'll have some cities with heat networks, and some with hydrogen and biogas."

Impacts of decarbonisation

Decisions will need to be made if any of the solutions outlined above are to become reality, he said.

"If we go in for electric in a big way, we are going to have to double the grid. We need to decide about carbon capture and storage, and about the extent of our gas networks and potential generation of alternative gases. Do we want to build heat networks and where? And, just a minor detail, how are we going to pay for it all?"

DECARBONISING TRANSPORT: VEHICLE ELECTRIFICATION AND CONNECTIVITY



Charlie Simpson, Head of Mobility Group 2030, Global Strategy Group, KPMG UK

Mr Simpson works with clients across the automotive, broader transport, finance, energy, technology and public sectors to build a smarter, greener, cleaner, more connected and more efficient transport ecosystem.

Vision of city mobility 2030

Mr Simpson began by setting out an example of a vision of city mobility in 2030 that mayors of many major cities, including Berlin, Paris, Madrid, Shanghai, London and many US cities, are working towards. Highlights include:

- An 80% reduction in air pollution in major UK cities compared with 2019 levels
- Last-mile deliveries are made by drone, bots and drop boxes, cutting cost of delivery by 50%
- Several city mayors announce ban on petrol and diesel cars by 2050

- 50% of public transport journeys are delivered by smart, integrated transport apps, and
- It is four times cheaper to use a mobility services than own a private vehicle.

"This looks ambitious, but we are already on this journey. It is being driven by mayors in response to air pollution and associated health impacts," he said.

Trends that are transforming society

KPMG has identified four trends – mobility, electrification, connectivity and autonomy – that, when layered together, will become transformational on a system level.

"Modelling undertaken by KPMG suggests that we could see a 40% drop in the cost per kilometre of moving people and goods by 2030. This would transform the business models of pretty much all the sectors we are talking about," he said.

We are seeing several fundamental changes in the way society thinks about mobility, he said. "Automotive industry executives believe that up to 50% of consumers will not want to own a vehicle as new mobility services will meet their needs. Uber is the shorthand example of this."

Other trends include an increase in the number of passenger miles travelled, a fall in the cost per kilometre and more efficient use of cars. There will also be massive consolidation in the car market. "There are about 23 major global car companies today. By the late 2020s, there will be five or six."

The electric and autonomous vehicle revolution

Norway is leading the way on electric vehicles (EVs). "In the year-to-date, 75% of total car sales in Norway are either fully electric or plug-in. However, the Tesla 3 was the third best-selling car in the UK in August," he said. KPMG forecast that EVs could reach 10-27% of total sales in Europe by 2025. "The next few years will be interesting as mid-to-low priced EVs will come to the market at scale."

The autonomous vehicle market is also developing. "It isn't science fiction; it is happening now." Most autonomous vehicles or AVs coming to market in the next few years will have a driver-assist functionality, rather than be fully autonomous. The driver here are freight logistics applications, where globally the demand for miles travelled is increasing due to e-commerce.



Uberization, or Mobility as a Service (MaaS)

Vehicle ownership is expected to shift away from personal to fleet ownership. We expect to see growth of heavily utilised fleet vehicles – up to 25% of new vehicle sales by 2030 – which will result in an overall decline in new car sales.

We will see integration of services in automotive, finance, energy and technology, he explained. “One of the key battles in future business model concepts is ‘who is going to integrate these services onto a single platform and aggregate services behind it on behalf of consumers?’”

Impact of EVs on power demand

The impact of EVs on overall power demand should be manageable. Indeed, it represents a small fraction of the forecast demand in 2030. However, regional pinch points are likely to emerge.

To conclude, Mr Simpson echoed earlier speakers when he said: “If we are going to get to this vision of a cleaner, smarter, more connected, more efficient transport infrastructure there will need to be collaboration between government, energy, the car companies, technology that we have not been very good at.”

Data point	2017	2030 (forecast)
Total new car sales (units, m)	2.6	2.2
Of which:		
- Personal (B2C)	44%	25%
- Fleet/Commercial (B2B)	56%	75%

TABLE 1: UK new vehicle sales in 2017 and 2030 forecast

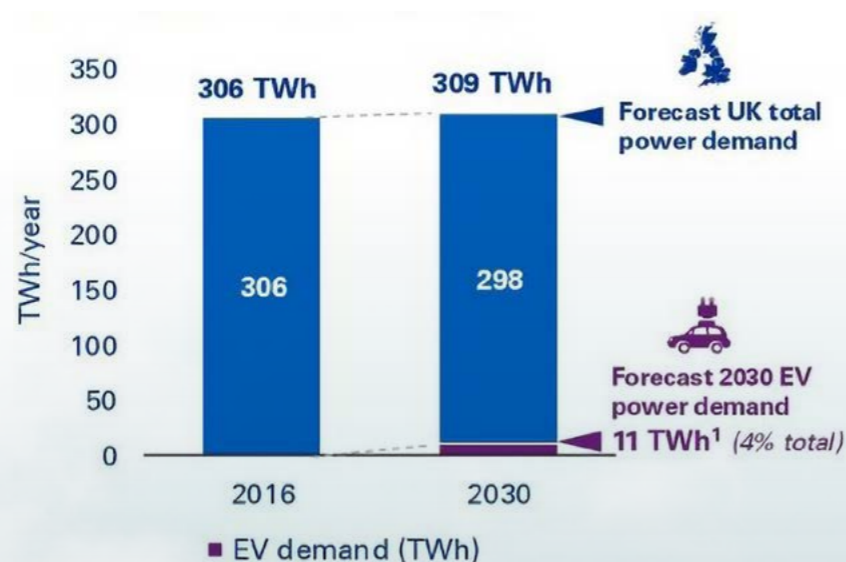


FIGURE 4: UK forecast power demand 2016 versus 2030

THE ENERGY TRILEMMA: THE ROLE OF GAS IN TRANSITIONING TO A LOW CARBON FUTURE



Michael McKinstry, Group Chief Executive at Phoenix Natural Gas

Mr McKinstry heads up the largest gas distribution network in Northern Ireland. Extending to more than 3,800 kilometres, it covers the Greater Belfast area.

There are three separate distribution areas for natural gas: Greater Belfast, the Ten Towns and the West. Greater Belfast is served by Phoenix Natural Gas, Ten Towns by Firmus Energy and the West by SGN Natural Gas.

Phoenix has the largest network with 200,000 properties, Firmus Energy is connected to 30,000 properties, while SNG Natural Gas, which was only granted a license in 2015, has just 30 km of pipeline so far.

Substantial expansion is underway. By December 2022, at the end of the current price control period, the regulator forecasts that a further 130,000 properties will have been connected, bringing the total to 319,000, or 58% of all properties. That will leave 231,000 unconnected.

“Natural gas is the least polluting fossil fuel, however in the longer term there is acceptance that it needs to be decarbonised over the next 30 years,” said Mr McKinstry.

He described how this might be achieved:

- 1) Injection of biogas or synthetic natural gas (bio SNG) into the network. This will not require a change to consumer appliances
- 2) Blending of hydrogen (20% by volume) with natural gas. No change to consumer appliances required
- 3) Production and injection of 100% hydrogen into the network. Will require a change of consumer appliances.

Role of gas networks in transport

Approximately 25% of greenhouse gas emissions in the UK come from transport, and around 25% of this is produced by HGVs and buses, which only account for 1.5% of all UK traffic. Gas-powered vehicles produce 10-30% less CO₂ than diesel vehicles, more than 30% less NO_x and a 99% reduction in particulates. They are also much quieter.

“If electricity is seen as a practical solution for cars, gas could be the lower carbon alternative for larger vehicles. Compressed natural gas is already extensively used across Europe and the infrastructure network is being developed.

“The gas network could form the backbone of the filling station infrastructure in NI, providing a clean, quiet and cheap alternative to diesel. There will also be an important role for hydrogen as a future transport fuel as it produces no harmful emissions, emitting only water vapour,” said Mr McKinstry.

Biomethane and hydrogen alternatives

There are more than 80 anaerobic digestion plants in Northern Ireland generating biogas that is being used to generate electricity. This is highly inefficient, says Mr McKinstry. “A regime needs to be developed to encourage gas injection as this is the most efficient solution instead of being injected into the gas grid”.

The regulator has engaged consultants to provide a regulatory implementation plan to facilitate biogas injection.

Hydrogen is widely seen as a long-term enabler for a low carbon economy, but significant economic and technical challenges remain. It is the least disruptive long-term low carbon option as it does not require significant change in energy users’ systems and behaviours, explained Mr McKinstry.

“It is important for existing gas users in NI and those converting to natural gas to understand that the infrastructure they are investing in today is likely to be the same infrastructure that will be transporting a low-carbon alternative in the long term,” he said.

Several important initiatives and demonstration projects such as HyNet NW and H21 are underway in the UK.



Grainia Long, Commissioner for Resilience at Belfast City Council

QUESTION & ANSWER SESSION

Q Andy Frew, technical innovation manager at the Northern Ireland Housing Executive.

“There is often extra capacity on the grid that could be used for direct electric heating. For example, properties using oil generally have a hot water cylinder and an immersion heater. How might this be used as a transition mechanism to encourage the use of electric heat?”

A Dr Andrew Cripps: “This is a problem with a lot of new homes in England. Many have combi-boilers that have no storage at all. We need to find incentives. It is important to ensure that emissions are as low as possible and to take advantage of the storage that is available.”

Q Paddy Larkin, chief executive of Mutual Energy.

“How do we expect that customers will make the retrofit change en masse to heat pumps, which is disruptive, expensive and probably less effective at heating their homes by 2050?”

A Dr Andrew Cripps: “This is a really big challenge. We need to find ways to incentivise and encourage people. But it may require an external ‘push factor’, such as making some oil boilers illegal. This may sound a bit more draconian, but maybe that is what needs to happen to force change.”

“Carbon tax is another option. Overall, we need a mix of drivers and a mix of incentives to make these changes happen.”

Michael McKinstry: “It is a big decision for customers to retrofit homes. We must make retrofitting projects more effective at heating homes so customers can see it is worth their while.”

“Consumer behaviour is a huge factor. They need to be made more aware of their energy usage and its environmental impact, and the industry must find ways to encourage consumers to change their consumption habits.”

Q Brian Rankin, energy manager at Choice Housing Ireland:

“Technologically, we can find solutions. But consumer attitudes also need to be addressed. Customers consider what is the cheaper fuel source at the time and what is cheapest to maintain.”

“We must consider how we formulate energy policy and, indeed, acknowledge the need for inter-departmental government policy. There also needs to be separate strategies to address fuel poverty.”

A Dr Andrew Cripps: “There should be an integrated programme of retrofitting, whereby more energy efficient heat sources are installed in homes and the quality of buildings is improved (so homes stay warmer in the first place and work better with heat pumps). You want as little waste heat as possible.”

Q Paddy Larkin, chief executive of Mutual Energy.

“At a local level, how will the electrification of transport work? For example, many households have more than one car – how will they all charge at once etc?”

Charlie Simpson: “At a regional level, there will be pinch points. This is one of the issues that is being worked through the system. Everyone fills up their car at a petrol station, but we are looking at a different refuelling model – a balance of home charging, transient charging and destination charging. Work needs to be done at the local level regarding supply and demand.”

Jo Aston: “It is crucial we work in partnership with those at the distribution level and how this trickles down to local level. Another question is, ‘do we want to influence location?’ Should wind farms pop up everywhere, if so, how do we get it onto the network etc.”

Q Seamus Hegarty, head of development at Energia Renewables.

“Following on from what Jo said about location, this issue needs to be addressed regarding the future demand of electric vehicles. Is that something that SONI is looking at in future capacity auctions?”

A Jo Aston: “In relation to the system services, there is already provision for scales to be introduced to the tariffs to create those locational signals. If we are going to go higher than 65% [of power coming from renewable energy sources] I believe this will be a key factor. What do we need and where do we need them on the system? This brings us back to incentivising energy stakeholders to invest in the services that we will need in the future.”

Chair of the session was Grainia Long, Belfast’s first Commissioner for Resilience. Her role during the two-year grant-funded appointment is to address stresses such as fragile aspects of the city’s economy, economic exclusion, segregation, health inequalities and climate change.

On the panel were:

- **Pat Austin**, Director of National Energy Action Northern Ireland
- **Karl Purcell**, Programme Manager of the Behavioural Economics Unit at the Sustainable Energy Authority of Ireland, and
- **Professor Tom Woolley**, Visiting Professor at Anglia Ruskin University.

PANELLIST: PAT AUSTIN, DIRECTOR OF NATIONAL ENERGY ACTION NORTHERN IRELAND



Pat Austin, Director, National Energy Action Northern Ireland

Pat Austin is the Director of National Energy Action Northern Ireland, a post she has held for fourteen years. During this time, she has been a tireless campaigner on fuel poverty, raising awareness of the issue in both the political and social arena. Prior to joining NEA, Pat spent 10 years at Help the Aged, managing their SeniorLine advice and advocacy services.

National Energy Action (NEA) helps fight fuel poverty. There are two frameworks for tackling fuel poverty, namely:

- The Department for Communities’ (DfC) out-of-date A New Fuel Poverty Strategy for Northern Ireland issued in 2011, and
- The Northern Ireland Sustainable Energy Programme, known as NISEP, a grant scheme funded through levies on bills.

“We must work together to meet our energy efficiency target. If it’s not measured, it’s not managed,” she said.

Ms Austin highlighted some of the key issues facing Northern Ireland:

- **Fuel poverty.** NEA is behind the Fuel Poverty Coalition, a group of 150 organisations, aiming to combat this issue. Investment in domestic

energy efficiency infrastructure is a priority and the government needs to intervene, she said.

- **Means testing** is needed to help programmes target those most in need. Ms Austin called for a re-evaluation of bill distribution.
- **Health.** There were 1,500 ‘excess’ winter deaths in 2017-18, the highest number since the major flu epidemic of 1989. “This is the 21st century and should not be happening under any circumstances,” said Ms Austin.
- **New fuel poverty strategy.** “It is imperative that the fuel poverty strategy must dovetail with the energy policy to make sure no consumer is left behind,” she insisted.



PARALLEL SESSION 1. QUESTION AND ANSWER SESSION



PANELLIST: KARL PURCELL, PROGRAMME MANAGER OF THE BEHAVIOURAL ECONOMICS UNIT AT THE SUSTAINABLE ENERGY AUTHORITY OF IRELAND



Karl Purcell, Programme Manager of the Behavioural Economics Unit at the Sustainable Energy Authority of Ireland

Karl uses behavioural insights to deliver programmes that are carefully tailored to make it easy and attractive for citizens and businesses to avail of the advantages of clean energy. Prior to his current role, Karl worked in the

Department of Public Expenditure and Reform in Ireland applying behavioural economics to public policymaking.

Mr Purcell questioned the over-reliance on the consumer's role in the energy transition in the assumptions used for policymaking. "Only 14% of people in Ireland change their energy provider each year. And even then, it is always the same people switching," he said.

Because consumers tend to participate in 'status quo' behaviour, we cannot rely on 'active consumers'. Instead we need policies and products that work along the lines of human behaviour, he said.

Taking the example of home retrofits, he believes many will not choose to retrofit their home without an external factor pushing them towards doing so, such as a government subsidy. In addition, he says people will be slow to utilise 'time of use' tariffs even when they are actively encouraged to do so.

However, according to an EirGrid field study, consumers are willing to turn off their high energy appliances at peak times if they get a text to remind them to do so, or if they are given feedback that compares their own usage to their neighbours'.

PANELLIST: PROFESSOR TOM WOOLLEY, VISITING PROFESSOR AT ANGLIA RUSKIN UNIVERSITY



Professor Tom Woolley, Visiting Professor at Anglia Ruskin University

Tom Woolley B.Arch, PhD is an architect and environmental researcher at Rachel Bevan Architects. He is known for his work on sustainable construction and hempcrete. He is a visiting Professor at Anglia Ruskin University. Books include the Green Building Handbook, Natural Building, Hemp and Lime

Construction, Low Impact Building, Building Materials Health and Indoor Air Quality. He has a new book coming out in 2019, titled A guide to Insulation Materials.

Professor Woolley advocates the use of bio-based materials to tackle climate change. They represent a huge business opportunity, he said. "One such biomaterial is hemp – indeed, Belfast was once a major hemp processing hub.

"However, there needs to be a market for bio-based materials. They need the bio-economy industry to take off. There needs to be less reliance on plastics and petrochemicals."

Professor Woolley urged Northern Ireland not to miss out on the 'bio-based revolution'. Planes, cars, corrugated roofs and more are now being made from bio-based materials, while petrochemicals have proven to be dangerous. For example, the Grenfell disaster was due to the unrestricted use of flammable plastic foam. Bio-based fuels can be non-flammable and non-toxic, he said.

In July 2019, the House of Commons Environmental Audit Committee published 'Toxic Chemicals in Everyday Life' setting out the growing problem of chemical pollution. It identifies a range of measures the government should act upon together with key recommendations.

QUESTION & ANSWER SESSION

Q Meabh Cormacain, energy advisor at the Strategic Investment Board.

"Would wholesale energy price reduction be the best avenue to tackle fuel poverty?"

A Pat Austin: "This might be an option, but retrofitting homes is costly and these costs will need to be distributed evenly."

Q Grainia Long

"Do we talk about the energy transition enough?"

A Karl Purcell: "No. Consumers do not notice changes in their energy bills in general," he said. "There have been some positive developments, including the Climate Change Citizens' Assembly. Consumers tend to be in favour of carbon tax, but only on the condition that some of the revenue is ringfenced and used for people most in need. Acceptability depends on whether consumers know exactly how the money is going to be spent."

Tom Woolley: "The cost of retrofitting may have been exaggerated. Retrofitting is mainly done by the middle class," he observed. "The use of bio-based materials should lower the cost."

Q Meabh Cormacain

"Who does the energy sector see as 'consumers' now and in the future? Are we framing 'consumers' in the right way? Why, for instance, do we notice petrol prices going up, but not our energy bills?"

A Karl Purcell: The way we pay for petrol and diesel is different, he said. "We physically see it going into the tank and the price increasing on the meter. There is no accessible comparable data available for consumers regarding energy prices. People don't know how much they are using. For example, is 4,000kW a lot?" Home energy report programmes, where feedback on your usage is sent in the post, and pay-as-you-go metres may increase salience, he added.

Pat Austin: "Most of the consumers that I see are under stress and not in a position to shop around for energy suppliers."

Q Audience member:

"The retrofitting programme is running out of money. Is the money being well spent?"

A Karl Purcell: "Retrofitting programmes in Ireland are not running out of money. There are a number of grant programmes available to support homeowners upgrading the energy efficiency of their home. Another important thing to remember is, "how many people would have conducted a retrofit without the subsidy?" Counter-factual impact evaluations are helpful for assessing this."

Q Michael Scott, managing director of Firmus Energy

"The oil industry cannot be regulated but there should be certain obligations from companies. Is oil the elephant in the room?"

A Pat Austin: "Yes. Unlike with gas there isn't the same consumer protections for oil. There needs to be an appropriate response to this problem."

Q Audience member:

"15% of houses in Northern Ireland are more than 100 years old. Is it worth the time and money to retrofit these homes?"

A Tom Woolley: "Northern Ireland must not be left behind in the energy transition or the 'bio-based revolution'. People tend to be more risk-averse in Northern Ireland. It is all about getting more organisations on board, such as Invest NI, to drive the transition and thus provide more subsidies for retrofitting programmes," he said.

Grainia Long: "There is a skills shortage and a recession in the new-build industry. This needs to be acknowledged."

Q Brian Rankin, energy manager at Choice Housing

"Is carbon more important than cost? Electricity prices are going up while gas is coming down – this is the opposite direction to policy."

A Karl Purcell: "Carbon is a hard thing to relate to. It is not tangible or visible. Other incentives will be more important, such as giving examples of benefits like keeping a steady temperature in your home," he said.

PARALLEL SESSION 2. EYE ON ENERGY PRODUCTION: DECARBONISING OUR ENERGY SUPPLY



John Young, Head of Policy at SSE Ireland

The session was chaired by John Young, Head of Policy at SSE Ireland. The FTSE-listed company has invested more than half a billion pounds in energy infrastructure in Northern Ireland since 2008.

On the panel were:

- **David Smith**, Chief Executive at Energy Networks Association
- **Dara Lynott**, Chief Executive at the Electricity Association of Ireland
- **Chris Johnston**, Principal Scientist & Project Leader, Agri-Environmental Technologies Unit at Agri-Food & Biosciences Institute, and
- **Professor Neil Hewitt**, Director of the Centre for Sustainable Technologies at Ulster University.

PANELLIST: DAVID SMITH, CHIEF EXECUTIVE OF THE ENERGY NETWORKS ASSOCIATION



David Smith, Chief Executive at Energy Networks Association (ENA)

David joined ENA in July 2003 as Director of Policy and was then appointed Chief Executive in October 2007. Previously he was Director of Corporate Affairs at the British Retail Consortium. He is Vice President of GEODE, the European association for the electricity and gas distribution networks. In the UK he chairs the Energy Emergency Executive Communications Group and sits on the Government Industry Contact Group on Distributed Energy.

The Energy Networks Association (ENA) represents transmission and distribution network operators for gas and electricity in the UK and Ireland.

Mr Smith described how ENA is behind the Open Networks project that brings together stakeholders from across the industry and the wider community to help develop a smarter and more flexible energy system.

As part of this initiative, ENA helps to put together demand-side response deals, whereby businesses strike agreements with distribution network operators (DNOs) to use electricity at times of day when they least need it. This reduces the need to build new infrastructure which reduces cost, he said.

Next, Mr Smith talked about battery storage. "DNOs are managing a rapidly changing grid, where electricity is now flowing in many different directions. Battery storage is a tool to help us do that," he said.

In June this year, DNOs in Great Britain signed up to a new voluntary flexibility commitment that will shape the way the network infrastructure will be run. We have 947MW currently being tendered for flexibility services.

In the gas industry, ENA is looking at sectors that have big decarbonisation challenges such as heat, agriculture and transport. "In Northern Ireland methane production can take a lead but first it must overcome problems of access to the gas grid," he said. The ENA is taking an active lead in the Hydrogen Transformation Group, which has just been established.

"The energy networks are going to play a pivotal role in the journey to net zero. It is vital that we take that whole system approach and look at gas, electricity, waste, transport and water to deliver the best outcomes," he said.

Q Grainia Long

"Is carbon tax effective?"

A Karl Purcell: "On a macro-scale, yes, it is effective," he said, citing research from British Columbia.

Q Alan Bryce, non-executive director, NIE Networks

"Is smart-metering money well spent?"

A Tom Woolley: "No. Consumers think of them as a 'spy in the house'. They are difficult to use, and people are worried about electromagnetic radiation etc," he said.

Karl Purcell: "I disagree. In California, smart meters work really well because the industry is vertically integrated and useful feedback data is provided to consumers. They leverage data from smart meters to incite change. What matters is what you do with the data. It is all about making information available to customers," he said.

"It is also important to point out that concerns about electromagnetic radiation from

smart meters is unfounded. Health authorities around the world, including the World Health Organization (WHO), have assessed the scientific evidence and there are no established health effects from smart meters which use similar technology to that used in your mobile phone."

Pat Austin: "I have heard mixed reviews from customers on smart meters. They work for some people and not for others," she said.

Q Paul Frew, economy spokesperson for the DUP

"What role does education have to play in the energy transition?"

A Karl Purcell: "Awareness and education do not necessarily lead to behaviour change. Perhaps something like an energy-saving competition might incite change. However, people should not underestimate the 'pester power' of children. If children keep telling their parents to turn off high-energy appliances at peak times, this could lead to behaviour change," he said.

Q Grainia Long

"What are your hopes for the future of energy policy?"

A Pat Austin: "There needs to be an official energy efficiency target in place."

Karl Purcell: "I hope behaviour change will be at the forefront of every policy, not just energy."

Tom Woolley: "I hope everyone joins Extinction Rebellion! Big companies should act first, not poor consumers."



PANELLIST: DARA LYNOTT, CHIEF EXECUTIVE OF THE ELECTRICITY ASSOCIATION OF IRELAND



Dara Lynott, Chief Executive at Electricity Association of Ireland (EAI)

Dara represents the electricity industry and gas retail sector operating within the Single Electricity Market on the Island of Ireland. Prior to his current role he was a Director of the Environmental Protection Agency from 2004 and in that period had responsibility for EPA licensing, Greenhouse Gas and Waste Inventories, Carbon Emission Trading, Circular Economy and the Office of Environmental Enforcement.

The Electricity Association of Ireland represents more than 90% of the electricity generated on the island of Ireland. "Our objective is a cost-effective transition to a decarbonised electricity system. We are technology neutral and so are interested in a holistic view of the electricity system," Mr Lynott said.

The electricity system is at the heart of decarbonisation. He highlighted that 75% of carbon reductions to date in the UK have come from the electricity sector, and cited McKinsey research that says a 1.5% increase in electrification and a 1% decrease in energy use year-on-year to 2050 will be needed if decarbonisation is to be achieved.

McKinsey also highlighted the need for electricity efficiency and zero-carbon technologies such as hydro, nuclear and biomass, while 6% of electricity produced in 2050 will still be generated by gas and will therefore need carbon capture technologies. "The challenge for Northern Ireland is that it has none of the crutches available to Europe," he said.

Mr Lynott highlighted two major issues: wind curtailment, and a lack of incentive for demand-side services.

Looking first at wind curtailment (when turbines are temporarily shut down). In 2017, 4% of wind energy on the island of Ireland was 'dispatched down' due to grid constraints, which was double the 2016 level. According to the transmission system operator there will be higher levels of curtailment in the future if there is no change in demand and interconnection policy, he said.

This highlights two things: the absolute importance of the North-South Interconnector to reduce curtailment and the need to ramp up the demand. "If 90% of wind curtailment happens between midnight and 6am, there needs to be a way to stimulate demand during those periods," he said.

Mr Lynott highlighted the paradox in the system; wind penetration is set to increase to meet renewable objectives and yet without interconnection and without any change in demand, there will be further curtailment. "Public money is going to be used to generate electricity that is not going to be available," he said.

The second issue is that the power procurement system needs to deliver more demand-side services. In the recent T-4 capacity auction, which procured 7.6GW of de-rated capacity for 2022/23, only a very small amount went to demand side services, such as batteries, he said.

"If we are to get to where we need to be on decarbonisation then innovation and creativity in terms of demand-side services needs to increase rapidly. There is going to have to be a stimulus for people to change their behaviour," he said.

Mr Lynott also underscored the urgency of long-term policy clarity for investors. "Waiting until the end of 2020 for a Northern Ireland energy strategy is too late. The National Energy and Climate Plans will be finalised in Ireland and the UK by the end of this year. Bringing that forward six months would be significant in terms of alignment."

PANELLIST: CHRIS JOHNSTON, PRINCIPAL SCIENTIST, AGRI-ENVIRONMENTAL TECHNOLOGIES UNIT AT AGRI-FOOD & BIOSCIENCES INSTITUTE



Chris Johnston, Principal Scientist and Project Leader at the Agri-Environmental Technologies Unit, Agri-Food and Biosciences Institute (AFBI)

Chris heads up a project team that carries out R&D on production of bioenergy, the associated recycling of wastes to biomass crops, nutrient management, environmental protection, biomass processing and combustion systems and the resulting emissions. He has over 12 years' experience in the sector in both a private SME and a public sector capacity.

The Agri-Food & Biosciences Institute (AFBI) is a non-departmental public body sponsored by the Department of Agriculture, Environment and Rural Affairs (DAERA). One of its functions is to research and develop agri-environment technologies, including biomass combustion, anaerobic digestion (AD), combined heat and power (CHP) and biomass production.

Part of Chris Johnston's work at AFBI is focused on the potential for agriculture and other land-based sectors to contribute low-carbon heat. "District heating opens up enormous opportunities in the agri and land-based sectors. This includes plant waste, as well as slurry from animal production," he said.

However, there are challenges. "District heating networks have not materialised as expected in recent years. There are perhaps three in Northern Ireland, and while others have been planned, they have not materialised," he said.

Technologies that can produce heat include large biomass combustion plants. "They are quite efficient and can use a range of materials, which means they can be decentralised and use local materials. However, this is not something we are seeing much of," he said.

AD plants are another source of biomass heat. There are perhaps 60 AD plants in Northern Ireland, but the majority are not using their waste heat. "This heat should be used, but it is largely a question of getting it to the right place," he said.

The Centre for Advanced Sustainable Energy (CASE) is also working in this area. Mr Johnston described how one CASE project showed that exploiting underused biomass resources is a viable business model for SMEs.

"The NFU [National Farmers' Union] said that to reach the 2040 goal to try to neutralise carbon from agriculture, we will need forestry, more hedges and energy crops. We have tried this in the past – the production incentive was there, but the incentive for use was not," he said.

AFBI is also trying to demonstrate that biomass resources can deliver environmental protection. "For instance, we are involved in European projects trying to protect water quality on farms by using tree species, which in turn become bioresources that can be used in decentralised energy systems," he said.

PARALLEL SESSION 2. QUESTION AND ANSWER SESSION

PANELLIST: PROFESSOR NEIL HEWITT, DIRECTOR OF THE CENTRE FOR SUSTAINABLE TECHNOLOGIES AT ULSTER UNIVERSITY



Professor Neil Hewitt, Director of the Centre for Sustainable Technologies, Ulster University

Neil was appointed Professor of Energy and Director of the Centre for Sustainable Technologies in 2008. He is a Chartered Physicist and Chartered Engineer and is a member of the Institute of Physics, Institute of Refrigeration and the Energy Institute. He is an acknowledged expert in the field of heat pumps, both in their development and in their end-use, especially with energy storage in the emerging sector of demand side management.

Over the last 30 years we have seen enormous improvement in the performance of heat pumps. They have gone from 'co-efficient of performance' (COP) ratings of about 2 to over 7, explained Professor Hewitt. COP describes the ratio between energy usage and the amount of useful cooling or heating.

He described a few of the challenges that heat pumps face. First, there is no dedicated heat pump policy, as in other European countries. On a technical level, COP levels are deemed not to be high enough and electricity demand increases if the temperature drops outside – heat pumps don't work as well when the air gets colder.

Professor Hewitt also discussed the challenges of integrating heat pumps into a low-carbon house – he asked how they might work alongside electric vehicles, whether they could be powered using PV and if they might be coupled with thermal storage solutions.

The research he is doing at Jordanstown is looking into these and other questions. He told the audience how his department is testing heat pumps, PV systems, thermal stores and batteries in houses that are occupied as family homes, and that an electric vehicle has recently been added to the mix.

In addition, as 50% of our homes will still be here in the year 2050, we need to have an affordable retrofit programme in place, he warned.

"Heat pumps work perfectly well, but if you bring in thousands of them what impact will that have on the electricity network?" he asked. "Heat pumps are one pathway, but there are other pathways. We have run them on gas and they work perfectly well. Could this be another use for biogas and hydrogen?"

"We need to take a big system approach," he concluded. "Heat pumps are part of it, EVs are part of it and you and I will be part of it."

QUESTION & ANSWER SESSION

Q Andy Frew, technical innovation manager at the Northern Ireland Housing Executive.

"If we don't increase demand to match wind generation and we get more curtailment, will this damage the social acceptance of this source of renewable energy?"

A Dara Lynott "Much of the electricity being generated between midnight and 6am cannot be used. A way around this is to look at where demand-side services can use this power. I think that electric vehicles, for instance, could use up lot of the current capacity, as cars can be charged during the night. Also, power-to-X is a possibility, but it is quite expensive to make hydrogen from renewable sources.

"However, these types of innovations need to be part of the capacity auctions of the future. At the T-4 auction only 10% was for new capacity and only a small fraction of that 10% was for demand side services such as batteries. Innovation needs to ramp up to match the problem of wind being generated at night when the demand is not there."

Q Audience member.

"What are the running costs of heat pumps?"

A Professor Neil Hewitt. "Heat pumps beat oil comfortably but are matched by gas."

Q Audience member

"You mentioned you are testing an electric vehicle alongside the heat pumps. Could you expand on that?"

A Professor Neil Hewitt. "The project is looking at the clash between demand to electrify space heating and electrification of transport at the domestic level. Household charging is not wholly acceptable because a lot of people don't have driveways and some households may have several cars. We will need storage to offset this peak demand and we will need PV. But if you have a car in a quasi-charged state you could use a bit of that power at peak times and defer charging to the night."

Q Dr Andrew Cripps, regional director, AECOM.

"Where in the network should storage facilities be?"

A Professor Neil Hewitt. "In Northern Ireland, where we have a long thin network, ergo grid support is important at numerous points. We looked at large-scale energy storage in the form of compressed air storage, but that idea has died. Large-scale arbitrage may not have a role at the system level but it is relevant at distributed level for grid support along with aggregated services."

Dara Lynott. "Eirgrid talks about a centralised system vs a community action system. The latter includes everything from an EV plugged in at your house to microgeneration.

"There will never be a global catch-all solution, but storage can be used to avoid more expensive generation. System services and frequency modulation will have a huge impact on the efficiency of the energy system."

Chris Johnston. "Bioenergy is the natural way of storing energy. It is stable and can be released through whatever technology you want to employ. Three kilograms of wood is the same as about one litre of oil and there is waste wood everywhere."

Q Audience member.

"How might existing resources such as oil tanks and hot water cylinders be better used store power?"

A Professor Neil Hewitt. "An oil tank is a space that could be utilised, but the downside is that it is outside. There are research projects using salts that show virtually no heat loss. As regards hot water cylinders, in theory a 200-litre tank would give you some storage, but we now have an issue that people are decommissioning hot water cylinders to free up space in their homes."

John Young. "SSE, Eirgrid and Glen Dimplex undertook a Horizon 2020-funded project called RealValue that tested whether using smart domestic electric radiators and boilers to store heat brings cost-reductions to consumers and whether it could help increase the use of energy generated from variable renewable sources."



POLITICAL PANEL DISCUSSION: PRIORITIES FOR A NEW STRATEGIC ENERGY FRAMEWORK

Facilitated by FSB Northern Ireland



Eleanor McEvoy, Energy Policy Lead at FSB Northern Ireland and CEO at Next-Gen Power

Q Dr Inna Vorushylo, Ulster University

“Have there been any studies to estimate the amount of agricultural waste in Northern Ireland?”

A Chris Johnston. “To put a figure on quantities is tricky. As a centre for agricultural livestock we have copious quantities of slurry and sewage sludge. Some of this material makes its way through anaerobic digestion (AD). There is an argument that it all could be sent to AD plants, but we also need the nutrients it contains. AD is not a particularly efficient process.

“There is also green waste from hedgerows and other waste materials. I have worked on a project that started a company and built it up based simply on using these materials. The potential of our island to produce even more biomass in conjunction with agriculture for a sustainable green future is exponential.”

Q Audience member.

“Has there been much analysis of cost-saving, satisfaction levels and challenges of commercial-scale heat pumps?”

A Professor Neil Hewitt. “There has been a lot of research into industrial heat pumps in conjunction with BEIS, and yes, there are some great examples such as Nestlé’s chocolate factory. Most are space heating heat pumps at industrial units. In terms of the Northern Ireland domestic market we don’t have the skill sets to operate consistently high-performing heat pumps.”

Q Audience member.

“In terms of farm AD, what is your preference – feed-in tariffs versus NI ROCs? What do you think the industry’s preference is and do you think there be one scheme for the entire island? What’s your view of the time costs into the grid for farm AD - is that too significant a barrier to promote the industry?”

A Chris Johnston. “One regulatory instrument across the entire island would make great sense in many respects.”

Dara Lynott. “Design of the new renewable energy support scheme has just begun in Ireland. As Jenny Pyper said earlier, we need to be mindful of regulatory alignment. One big issue is divergence in the price of carbon between the UK, Northern Ireland and the Republic.

“There are huge ambitions with regard to linking AD to the gas networks. AD is also being looked at as a source of hydrogen to increase the purity of biogas. There are many uses for AD and when they are fully expanded upon, the true price will come to the fore, but I think we are some way off that yet.”

Q Audience member.

“How do you think consumer behaviour can be changed, given that smart meters appear to have failed?”

A Dara Lynott. “I don’t accept your premise that smart metering hasn’t worked. We have an entire legislative agenda and Europe has set a comprehensive policy framework. The Electricity Directive and electricity

regulations are demanding that smart tariffs be put in place. That will happen right throughout Europe and will be promulgated with in the next 12 months. To say that smart metering has failed even before the legislation has come in is a bit premature.

“Smart meters are not smart or dumb, they just provide a lot more data – it is what we do with the data that matters. Data must be gathered on an hourly or daily basis to influence behaviour. At the moment it is only collected every two months. The first step is getting meters digitised. Tariffs can then be used to move customer behaviour from expensive times to cheap times.

“All this is ahead of us. There is a significant smart metering programme about to start. There will be a consultation in the North on smart metering. It is the only game in town in terms of shifting behaviour.

“We all have to change. How we integrate all the systems and sources of energy represented here today is the only way we will succeed in achieving a net-zero carbon economy.”

Eleanor McEvoy chaired the session. She is CEO of Next-Gen Power and chair of the energy group at the Federation of Small Businesses Northern Ireland. Previously, she was CEO of Budget Energy.

On the panel were:

- **Clare Bailey** MLA (Belfast South), Green Party NI
- **Caoimhe Archibald** MLA (East Derry), Sinn Féin
- **Daniel McCrossan** MLA (West Tyrone), Social Democratic & Labour Party
- **Dr Steve Aiken** MLA (South Antrim), Ulster Unionist Party
- **Paul Frew** MLA (North Antrim), Democratic Unionist Party.

PRIORITIES FOR A NEW STRATEGIC ENERGY FRAMEWORK

Steve Aiken explained that he had been a nuclear submarine commander in the Royal Navy and that in 1986 he had been operating for a period near Greenland under ice that was thousands of years old. He returned to the area in 2015 to find the ice had gone. We are experiencing a “climate emergency” and we must act now – by 2050 it will be too late, he said. The Ulster Farmers Union wants farming to be carbon neutral by 2040, but he urged MLAs to achieve such goals by 2035.

Daniel McCrossan highlighted the issue of energy poverty, saying that some of his constituents in West Tyrone are sometimes forced to decide between “heat or eat?” He then highlighted the need for a functioning assembly and cooperation among MLAs.

Caoimhe Archibald agreed that there is a climate emergency and an urgent need to cut carbon emissions. But the transition to a zero-carbon economy must be fair and just, she said.

Ms Archibald highlighted some policy proposals, including divesting from fossil fuel companies and legal obligations on energy producers to produce a set amount of renewable energy. Alongside this, there must be a mix of renewables that must be sustainable, secure and affordable.

Clare Bailey said that the skills and resources and innovation needed to change the energy sector for the better are present. However, she questioned whether we can mitigate the worst impacts of climate change without changing our economic system? The changes needed are beyond individual or market-level changes, they require systemic, global changes, she said.

Ms Bailey questioned calls by Mr Aiken and Mr McCrossan for the Stormont assembly to be recalled, as she questioned whether any of these changes were being called for by the last executive.

Paul Frew acknowledged that most politicians, if not all, are not experts in energy. Therefore, the interaction between policy makers and energy experts is vital. Mr Frew highlighted a new ‘trilemma’ of energy policy/ political direction, governance and market reforms.

Eleanor McEvoy argued that entrepreneurs are going to be crucial in leading changes in the energy sector. She also highlighted the potential of solar power to provide most of the electricity needed in housing at an affordable rate but drew attention to the lack of necessary skills in the labour force. Due to the manageable size of Northern Ireland, it will be possible to make the necessary changes if all stakeholders are on board, she added.

POLITICAL PANEL DISCUSSION: QUESTION AND ANSWER SESSION



QUESTION & ANSWER SESSION

Q James Carson, energy manager, Northern Health and Social Care Trust.

"We need the new Strategic Energy Framework to put forward a clear, coherent strategy. Will consideration be given to the funding needs of supporting infrastructure, checks to monitor progress and accountability for the success in the absence of an assembly?"

A Steve Aiken. "We need legislation declaring a climate emergency for Northern Ireland. I do not think the Department for the Economy is 'fit for purpose' as will be shown by the RHI enquiry report. I question whether there is the expertise in our government and utility regulator to resolve the problems we face. I want to see the Northern Ireland assembly restored, but if we revert to direct rule, it is likely that our energy sector will fall under the remit of wider UK energy strategy and regulations."

James Carson. "I agree that the RHI enquiry highlights the mismanagement by the Department for the Economy. It raises the question as to whether we have the institutional capacity to implement the changes needed and reinforces the need for scrutiny of the Strategic Energy Framework and policies arising from it."

Paul Frew. "Most of the targets set for Northern Ireland will reflect global targets, which

is appropriate as the climate emergency is a global issue. Democracy is short-term, but the climate crisis is long-term. Therefore, the politicians who implement policies now may not ultimately be those held responsible."

"When changes are being considered within the energy sector and amongst policymakers, they must ask themselves two questions: how much will this cost? And how much will it cost if we don't do this?"

Q Conference chair Jamie Delargy.

"Could Caoimhe Archibald tell us whether she has reservations about the North-South interconnector going over ground, and what Sinn Féin's position is on the interconnector?"

A Caoimhe Archibald. "The North-South interconnector is necessary infrastructure. Sinn Féin's position is that it should be underground as the public is strongly in support of this."

Q Session chair Eleanor McEvoy.

"What is the cost of an underground interconnector versus over-ground?"

A Jamie Delargy. "Putting the interconnector underground would cost many times more than over-ground. The project will not be viable if Sinn Féin continues to oppose its installation over-ground."

Q Steve Aiken:

"An audience member pointed out that we do not need a 100kVA line but only a 50kVA line, which would significantly reduce the costs. Does anyone have any views on this?"

A Alan Campbell, head of grid development and interconnectors at SONI. "The proposal is for a 1,500MVA connection as opposed to 1,500kVA. Modelling has been done by SONI at regular intervals on the current connector, which operates at 1,500MVA, and so the capacity of the new infrastructure will be similar to what is in place."

"The Irish government commissioned a report last year that claimed the cost of underground would be an extra £450 million, or about three times the cost of over ground."

Clare Bailey. "It has been known for years that the North-South interconnector is needed. Although there are questions over the initial investment, the cost of not investing in the interconnector is greater. The initial investment will be worth it in the long-term."

Q Paddy Larkin, chief executive of Mutual Energy.

"Has any thought been given to the costs of decarbonisation and who is going to pay?"

A Eleanor McEvoy. "Funding should be made available to people, or payment of energy bills should be spread over a longer period."

Paul Frew. "In reality, the burden falls on the individual through taxes or energy bills. We must find a way to incentivise people to save energy and money. We may need to educate people as to what is energy-intensive and what is not, and how we can change our lives in the home."

"Northern Ireland industry is paying far too much for energy because the market is not functioning correctly, regulation is not working, and policies are not effective."

Eleanor McEvoy. "There are many layers of costs on an electricity bill, which effectively works as a tax and sits at around 60%. Renewable technology is available that enables people to reduce their energy costs and gain access to energy without using fossil fuels. The issue is finding a way to finance the installation of this technology in people's homes and the labour skills to carry it out."

Caoimhe Archibald. "People must be incentivised to change their behaviour, but there needs to be schemes for those unable to afford a zero-carbon lifestyle, whether by retrofitting homes or switching to electric vehicles."

Clare Bailey. "Many constituents have raised the issue of climate change with me. However, people may not be able to afford to make the changes necessary. What is needed is wider system change. We cannot keep producing and keep incentivising people to consume more and more, while also tackling the energy and climate emergency."

FINAL WORD: REFLECTIONS ON THE DAY'S DISCUSSIONS



Paul Stapleton, Managing Director at NIE Networks

Northern Ireland Electricity Networks is the owner of the electricity transmission and distribution networks in Northern Ireland. Paul Stapleton joined as managing director in 2018 from ESB where he was ESB Group Treasurer before being appointed General Manager of Electric Ireland.

Mr Stapleton began by looking at how far Northern Ireland has come in a relatively short time.

"What we're discussing today is the biggest challenge facing us, bigger than Brexit. It'll be with us much longer than Brexit and it'll be a huge focus for our society and our economy over the next 30 years.

"We're not starting from a bad place. We have great certainty on where we need to go. We have a very clear, unambiguous goal to achieve net zero carbon by 2050. This is a long way off, but we will need those few decades to get there.

"The second positive is that we have consensus on that goal. That's really changed, even over the last six or twelve months. There are no dissenters. In fact, even the politicians were saying there is a climate emergency.

"The third positive is that we've shown we can deliver. The achievement of 44% renewable electricity is a great example of that. When there's policy clarity, the energy sector in Northern Ireland can deliver."

Next, he drew out several themes that emerged from the day's discussions.

"The first one is collaboration. There is no one technology that's going to solve all problems. There is no one organisation or government department that's going to solve all these issues. So, there needs to be cross-sector, cross-community and cross-department collaboration across the traditional siloes of electricity, gas, oil, power, heat and transport. There needs to be a more holistic approach.

"The second thing we discussed was around cost, and particularly who pays. The positive aspect is that it is accepted we need to do this and we're up for it as an industry and as a society. We now critically need to find the lowest-cost route to doing that, so that we minimise the impact on customers.

"For us, as the custodian of electricity networks, we need to look at how we charge for networks. Who should pay for infrastructure in the future, whether people are drawing from the network or maybe exporting on to the network? Should it be a fixed cost, as a service?

"In relation to the north-south, interconnector, we fully support the need for it and analysis in relation to the need for the overhead option. It is the only feasible and most economical way to do it. We just need to get on with it now and make that decision and move on.

"The third main thing I took from the discussion was around the customer being at the heart of this journey. There were lots of comments about how we need to engage, incentivise, maybe direct customers with policy measures. Particularly, we need to be mindful and look after vulnerable customers."

In light of these themes, Mr Stapleton looked at what policy developers might take from today's discussion.

"We need to set a new target that will drive renewable electricity far beyond the 44%. What that number should be needs to be the subject of detailed analysis. We can then use that clean electricity to de-carbonise heat and transport in the appropriate areas – not entirely, but in the appropriate areas.

"In relation to transport, there's a fair degree of consensus. Electric vehicles are the way to go for lighter vehicles. There's a mix of potential solutions for heavier vehicles, including hydrogen.

"On heat, I think there's less consensus. It is clear we need to move away from oil. 67% of homes in Northern Ireland are using oil to heat their homes. There are different views on how to do that. I would suggest that for homes which are on the existing gas network, it probably makes sense to convert them to gas in the short term.

"For new homes, and for homes that are not on the existing gas grid, heat pumps are probably the leading option. They've worked very well in other markets, particularly in GB and the Republic of Ireland. They work particularly well for new builds, when the right building standards are in place. There are more challenges for retrofitting to existing homes but there is no doubt they can work effectively, along with investment, in improving the insulation and energy efficiency of the building.

"The most obvious area where we can make quick wins is with new development. It makes no sense to be planning, designing or building today in a way that is going to have to be revisited before 2050. So, our building regulations, our planning guidelines, how we plan the existing network, we need to be doing that with a zero-carbon objective in mind.

"The final area is around support for the exploration and development of the many new technologies that are going to play a role over the next three

decades. Areas such as hydrogen have the potential to make a significant contribution eventually, but probably not for another 15 years. Technologies and solutions such as battery storage and district heating might also form part of the longer-term answer."

Mr Stapleton acknowledged that NIE Networks will play a critical role in the transition.

"As a regulated, licensed business providing a common service to everybody, we have to be technology neutral. We would like to see a diverse range of technology solutions emerging, so that we are not dependent on any one solution.


"The transition will place new demands on the network – how we plan the network, how we develop it and how we operate it. As an example, the achievement of the 44% renewable electricity involved an investment from us in the network of £365 million over the last decade or so. Most of that was funded directly by the renewables industry, but some of it was socialised across all our customers. That is probably a sensible model for future investment.

"We will need a lot more investment in the network as we progress through this transition, but we can increasingly deploy new smart technologies to minimise that investment and maximise the utilisation of existing infrastructure."



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