



Department for the
Economy
www.economy-ni.gov.uk

TRANSITIONING TO A NET ZERO ENERGY SYSTEM: CONSULTATION ON DESIGN CONSIDERATIONS FOR A NORTHERN IRELAND SMART SYSTEMS AND FLEXIBILITY PLAN



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Introduction

Purpose and Scope

The Department for the Economy (**DfE**, or **the Department**) published the NI Executive's [Energy Strategy](#)¹ for Northern Ireland in December 2021. The Strategy sets out how we will achieve net zero carbon and affordable energy, in line with UK Government commitments, by 2050. The Energy Strategy set a target of 70% of electricity consumption to be from a diverse mix of renewable sources by 2030. This target has since increased to 80% through the [Climate Change Act \(Northern Ireland\) 2022](#)² (**CCA**). The [Energy Strategy Action Plan for 2022](#)³ followed in January 2022, and the [Energy Strategy Action Plan 2023](#)⁴ in March 2023. They set out the main actions to be taken forward each year by government and our partners. This included an action to prepare a Northern Ireland Smart System and Flexibility Plan (**SSFP**): to set a path for developing Northern Ireland's energy systems to meet the needs of a decentralised, renewable energy system, and to meet the Energy Strategy and CCA target.

This public consultation sets out, and seeks input on, the design considerations on which DfE will base the development of a Smart System and Flexibility Plan for Northern Ireland. This includes policy options which may be taken forward by DfE and other bodies, as they develop more granular aspects of the policy areas which the SSFP identifies as necessary for delivering the Energy Strategy.

The work streams coming from the SSFP will not be developed in a vacuum. All of the existing developments and structures will form part of the environment in which the workstreams are considered and developed. There are large areas where NI has developed well-functioning procedures and structures, which will allow us to focus on those areas where improvement or change is needed. The Department recognises that networks and technology will advance during the period we develop these policies. We expect the relevant stakeholders to progress as rapidly as possible towards the goals of decarbonisation and a just transition. All of the proposed workstreams will need to take account of the ongoing change and ongoing work that is planned by our stakeholders.

Please keep in mind that the SSFP will not be a policy document in itself. It will set out a roadmap for developing policy. We are most interested in whether:

- **the subjects proposed for future policy development are the right ones;**
- **there are any missing elements/topics;**
- **the proposed direction of travel is right for delivering the 2030 and 2050 targets.**

1 [The Path to Net Zero Energy - Department for the Economy website](#)

2 [Climate Change Act \(Northern Ireland\) 2022 - legislation.gov.uk](#)

3 [Path to Net Zero Energy - Action Plan - Department for the Economy website](#)

4 [Energy Strategy - Path to Net Zero Energy. Action Plan 2023 - Department for the Economy website](#)

The Department realises that this is a long consultation document, with many questions. This is largely because it seeks to cover a very wide area. The Department does not expect all respondents to address every question posed. In addition, many of the questions relate to issues which are in only their very early development, and specific or detailed responses may not be feasible.

However, the Department is keen for as wide a spectrum of stakeholders as possible to respond on issues in their areas of expertise, in order to develop the most widely accepted and supported SSFP for NI.

How to Respond

This consultation will be hosted online at the [Smart System and Flexibility Plan Considerations](#)⁵ page on the nidirect website (consultations.nidirect.gov.uk).

The Citizen Space website has been specially designed to be as user-friendly and welcoming as possible for those who wish to complete the consultation. It also allows the Department to collate results faster. For this reason, we would particularly encourage anyone who is interested in responding to utilise Citizen Space. However, if this is not possible, you can respond to this consultation via email to SSFPConsultation@economy-ni.gov.uk or you can respond in writing to the DfE Electricity Networks Team address:

SSFP Consultation
DfE Electricity Networks Team
6th Floor, Adelaide House
39 – 49 Adelaide Street
Belfast, BT2 8FD

When responding via email or in writing, please state whether you are responding as an individual, or representing the views of an organisation - and if so, please state the name of the organisation. Also, quote the following: Consultation Reference: Consultation on Design Considerations for a Smart Systems and Flexibility Plan for Northern Ireland.

Unless specified, DfE will treat all responses as public and will post them on its website. Therefore, it is your responsibility to mark any confidential submissions clearly.

DfE may contact some respondents directly to clarify issues raised in the responses, and may not publish such clarification correspondence.

Background

The [Energy Strategy](#) for Northern Ireland sets out a vision for a flexible, smart and digitised energy system that integrates renewables across heat, power and transport, creates value for consumers and enhances security of supply.

The Energy Strategy set a target to meet at least 70% of electricity consumption from a diverse mix of renewable sources by 2030. That target has since been succeeded by the [Climate Change Act \(Northern Ireland\) 2022](#) which sets a legislative target of 80% within that same timeframe. This is challenging, particularly when you consider that even with energy efficiency measures, our demand is set to increase materially within the next decade as we increasingly change from fossil fuels to electricity-based heat and transport. In NI currently, heat and transport each consume more primary, fossil fuel energy than the current electricity system generates⁶ (heat 4 times and transport 2 times). This implies a multiple times increase in electricity demand if heat and transport are electrified. However, even though the amount of electricity needed will increase, the relative efficiency of electricity for heat and transport compared to fossil fuels will reduce the energy output required from a fully decarbonised energy system compared to a fossil fuel system. Energy efficiency from improved building energy efficiency, and the inputs from a decarbonised gas industry, will also reduce the total amount of electricity needed in a fully decarbonised energy system.

In order to support this transition, and to accommodate renewable electricity generation which is intermittent, we need a new emphasis on flexibility and demand side services, with access to energy data for system planning and operation, as well as increasing amounts of renewable generation.

In line with the focus of the Energy Strategy, the consumer will be central, and energy efficiency will be the preferred first choice.

The energy transition will also require a workforce with new and enlarged skill sets, and it will require a significant body of these newly skilled workers. Under Action 5 of the 2022 [Energy Strategy Action Plan](#) DfE carried out an [Energy Skills Audit](#)⁷ for energy decarbonisation. The [2023 Energy Strategy Action Plan](#)⁸ built on this through DfE commencing implementation of a skills development plan based on the findings of the skills audit.

6 [Energy in Northern Ireland 2022 - Department for the Economy website](#)

7 [Investigating the skills required for a transition to an advanced zero emission, indigenous diverse energy secure and circular economy in Northern Ireland: Summary Report - Department for the Economy website](#)

8 [Energy Strategy - Path to Net Zero Energy. Action Plan 2023 - Department for the Economy website](#)

The [Energy Strategy Action Plan 2022](#) Action 19 sets out the requirement for a Northern Ireland Smart Systems and Flexibility Plan to set out how the Department will achieve this transition of Northern Ireland's energy system. It is important to note that this is an energy plan, not simply an electricity plan. It looks to an holistic view of Northern Ireland's energy system, including NI's recently installed gas network and its potential for delivery of low carbon gas.

The SSFP will largely follow the structure of the GB [Smart Systems and Flexibility Plan 2021](#)⁹, but with a Northern Ireland focus. It will examine where we currently are, set out what programmes, policies and services are already in place, and look at what needs to happen over the next 5-8 years, identify the barriers to this happening, and set out a roadmap for future policy development.

It will also take account of the future role of electricity smart meters following the positive [Cost Benefit Analysis](#)¹⁰ (CBA) and the work DfE is currently undertaking¹¹ to develop a plan for the implementation of electricity smart meters and systems.

Many of the issues which the SSFP will need to address are already addressed in the recast 2019 [Electricity Directive](#) on common rules for the internal market for electricity¹² and in the [Regulation on the internal market for electricity 2019, recast 2019/943 \(Electricity Regulation\)](#)¹³ and in the [Network Codes](#)¹⁴ and Guidelines developed by ENTSO-E and applicable in NI via Articles 58 and 61 of the Electricity Regulation. DfE's current work transposing the Electricity Directive will provide a statutory basis for much of the SSFP work. This workstream is being undertaken in tandem with the SSFP.

Scope and Direction

1. Are the subjects for future policy development set out in this SSFP proposal the right ones?
2. Are there any missing elements/topics?
3. Are the proposed outputs appropriate?
4. Does the proposed SSFP set the right direction of travel for delivering 2030 and 2050 targets?
5. What are the main barriers to NI developing a smart and flexible energy system which will be able to deliver NI's 2030 and 2050 energy and carbon targets?
6. Should the SSFP relate to all energy sources in NI, or would it be appropriate to focus mainly or solely on the electricity system?

9 [Transitioning to a net zero energy system: Smart Systems and Flexibility Plan 2021 - publishing.service.gov.uk website](#)

10 [Northern Ireland Smart Meters - Cost Benefit Analysis Report - Department for the Economy website](#)

11 [Smart meters update - Department for the Economy website](#)

12 [L_2019158EN.01012501.xml - Europa.eu website](#)

13 [L_2019158EN.01005401.xml - Europa.eu website](#)

14 [Network Codes Home - Entsoe.eu website](#)

Working Group

This Plan has been prepared jointly by DfE and the Northern Ireland Authority for Utility Regulation (**UR**) over a series of meetings in combination with a Working Group to provide industry expertise and consumer views. The Working Group membership and its terms of reference are set out at [Annex A](#).

Topics

Whole System approach

Given Northern Ireland's significant renewable wind energy resource, wind powered renewable electricity will be the primary energy vector in our decarbonised future. However, planning and policy for NI's energy system should be on a holistic basis to ensure the maximum efficiencies are gained, and different elements are used where they can be most effective and efficient.

Therefore, the system should be managed as an energy system, including, inter alia, electricity, solar PV, decarbonised gas (biomethane and green hydrogen), biofuels and energy storage. This will ensure that regulatory and other investment decisions for gas, hydrogen, and other related networks support the electricity system for the lowest overall cost to consumers, and are developed to complement electricity generation, networks, and flexibility services and renewable gas production.

The transition from a centralised, fossil fuel energy system to a decentralised, decarbonised system shows the complexities and interactions between different parts of the system. This applies both within the electricity system and between existing and new elements of the overall energy system. For example, the existing gas system will be essential for any role gas fired electricity generators play in the future, and any new hydrogen energy system would have material interactions with the electricity and the gas systems.

Flexibility will be key to a successful renewables-based energy system, and a key issue to be resolved is delivering the large amounts of flexibility which are currently provided by our fossil fuel generation, in a decentralised renewable system.

Future System Operator – do we need it to reach net zero at least cost?

Looking at the energy system holistically brings up the issue of an 'integrated energy system operator'. Such a system operator would oversee, on a strategic basis, and on a dynamic (daily) basis, the delivery of energy for power, heat, and transport in the optimal way for consumers – minimising cost whilst providing security of energy supply. An integrated energy system operator could ensure that significant participants in the energy system are operating on compatible assumptions and projections, are consulting appropriately, and are sharing data openly.

GB has recently decided to move to a [Future System Operator](#)¹⁵ (**FSO**), responsible for planning and developing the whole GB energy supply system (electricity, gas, hydrogen etc.), and recently [consulted](#)¹⁶ again on issues for its development. The FSO will take over all of the electricity operational roles of National Grid ESO, and the longer-term planning, forecasting and market strategy functions in respect of gas. The FSO will have an advisory role to government (directed by the Secretary of State) and may be given additional roles in relation to hydrogen, Carbon Capture and Storage, and potentially elements of the distribution system.

15 [Proposals for a Future System Operator role - gov.uk website](#)

16 [Future System Operator: second policy consultation and project update - gov.uk. website](#)

In the Republic of Ireland (**RoI**) the [Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems](#)¹⁷ considers that an “annual assessment for electricity and gas should be produced collaboratively and jointly by the operators of the electricity and gas transmission and distribution networks”.

It should be noted, however, that some of the issues being addressed in GB by the FSO proposal are less relevant for NI. SONI Ltd (the System Operator of Northern Ireland) is already independent of the system owner (NIE Networks Ltd **NIEN**), so potential for conflicts of interest is not the same in NI. In GB, there is one System Operator (NationalGrid **ESO**), three electricity Transmission System Operators (**TSO**) and seven electricity Distribution System Operators (**DSO**), whereas in NI we have only one of each, so some of the coordination issues in GB do not exist in NI. The NI gas system is much smaller, both physically and relatively than in GB, so coordination of gas and electricity planning may not have the degree of benefit that GB foresees. However, NI's more complex gas system operator arrangements, compared to electricity, may increase the benefit of a single system coordinator.

In GB, the primary remit of the FSO will be the decarbonisation of the energy system while maintaining a safe, reliable, and efficient energy system.

DfE will develop a workstream in 2024 to review whether an FSO (or similar organisation/arrangements) is appropriate for NI. The workstream will consider and consult on issues including:

1. how the different elements of the NI energy system are currently coordinated;
 - a. what are the positive aspects of the current arrangement, how well does it work;
 - b. what are the deficiencies in current energy system coordination;
2. what are the benefits available to be realised from increased coordination of the various elements of the NI energy system;
3. what elements of the GB FSO proposal could usefully be adopted by NI;
4. should overall energy system coordination be managed by any individual existing bodies, or is a newly constituted body appropriate;
5. the costs, both monetary, and disruptive, of changing the current regulatory framework of the NI energy system (for information, Ofgem has approved an initial set up cost of the FSO in GB of £213 million¹⁸);
6. which bodies or organisations should be part of any whole energy system coordination and planning body;
7. what level of depth or detail should an energy system coordinating body be concerned with;
8. should a NI energy system coordinating body be involved in any form of system operation, in the way the FSO is planned to do in GB (at least for electricity);
9. what are the major statutory mandates which any energy system coordinator should be given; and
10. what interactions with the Single Electricity Market (**SEM**) should be considered in the FSO policy considerations.

¹⁷ [Review of the security of energy supply of Ireland's electricity and natural gas systems - gov.ie website](#)

¹⁸ [Decision on the funding of the transition to a Future System Operator - Ofgem.gov.uk website](#)

Questions

1. Do you consider that the FSO concept contains enough potential benefits to NI to warrant a DfE policy project, above the financial and disruptive effects of changing the regulatory regime for NI energy system? Please provide your reasons.
2. What aspects of NI's energy system would benefit from being controlled by an FSO type body?
3. What structures for a potential FSO type body should DfE consider?
4. What aspects of the GB model should NI consider, or reject?

TSO and DSO interaction

The TSO and DSO in NI have developed significant interaction and cooperation arrangements, which have benefitted NI. However, even with this, the division between transmission and distribution blurring in a decentralised network has increased the need for TSO and DSO to cooperate materially. For example, plant connected to the distribution system will be able to provide Flexibility Services to both the TSO and DSO, and even more cooperation between TSO and DSO will be needed to coordinate the supply of those services.

Electricity

The need for this cooperation is recognised in the Electricity Directive which has multiple provisions requiring the close cooperation of the TSO and DSO (Articles 31(6), 31(9), 32(4), 40(6)), and, as noted above, the Electricity Regulation and the Network Codes. DfE's transposition of the Electricity Directive will provide further statutory backing for increased SO cooperation.

Planning of the two electricity networks will need to be more coordinated, especially with more generation and system services on the distribution network. In many cases, one SO can provide solutions for the other SO more cheaply and efficiently, through reinforcement, network management or flexibility services, and consumers should reap the benefits available. Examples of such solutions may be data and information sharing, developing formalised cooperation processes and frameworks, shared understanding of whole system impacts, inputting into shaping each other's frameworks, and engaging and collaborating (potentially actively involving e.g. co-designing) more widely with stakeholders to further consumer interests.

This process has already started in NI. The electricity TSO and DSO advise that they are already discussing enhanced cooperation in relation to flexibility services assets connected to the distribution system, for example under the [Transmission Interface Arrangements](#)¹⁹, and under SONI and NIEN's Energy Strategy, Digitalisation & Data, and Whole System Innovation, and Joint Working Groups which SONI and NIEN have set up to support the Energy Strategy.

19 [Transmission Interface Arrangements - Northern Ireland Electricity Networks website](#)

The UR included NIEN and SONI cooperation and coordination (and with other stakeholders) as significant requirements of the SOs in its [RP7 Approach document](#)²⁰.

NIEN proposed a project in its RP7 business plan ([Taking a Whole System Approach](#)²¹ p56) to review the interface between the TSO and DSO, and their respective funding allowances, to ensure more effective cooperation, for the benefit of NI energy consumers.

In addition, to support UR's actions, DfE may consider issuing guidance to the UR under Article 50(2)(a) of the Electricity Order, asking the UR to have particular regard in performing its duties, to ensure that cooperation between NI SOs is effective, and benefits NI energy consumers.

One of the outputs of the SSFP will be a review of the state of current TSO and DSO cooperation, and whether further changes are needed. DfE and the UR will engage with stakeholders in developing the scope and terms of reference of the review. The TSO/DSO cooperation review will consider:

1. the degree and effectiveness of cooperation which currently exists between TSO and DSO;
2. areas where the current levels and types of cooperation could be expanded, or made more effective;
3. areas where increased cooperation could provide the most significant benefits;
4. benefits which could be derived from closer TSO DSO cooperation; and
5. possible areas for mandatory consultation and cooperation, or even joint operation.

Questions

1. Do you consider that the level and nature of TSO/DSO cooperation in NI warrants a policy/licensing review?
2. What areas of TSO/DSO cooperation being improved would most benefit NI?
3. Are there any costs which might be incurred by mandating increased TSO/DSO cooperation, and which should be included in any policy/licensing review?

20 [2022-07-06 RP7 final Approach Document final.pdf - Utility Regulator website](#)

21 [RP7-business-plan-full-report-april-2023 - Northern Ireland Electricity Networks website](#)

Flexibility

Flexibility will be a key determinant of a Smart and Flexible energy system. In a traditional fossil fuel, centralised, energy system generation/supply follows demand. Flexibility to match the changes in demand largely comes from centralised elements of the energy system (**Upstream Flexibility**). This has come from dispatching electricity generators (fossil fuel (gas, coal)) up or down, increasing or decreasing flows across interconnectors (electricity and gas), or from the form of storage that high pressure gas transmission pipes containing high pressure gas can provide (**line-pack**).

In a renewable energy system, power comes largely from non-dispatchable generators. It is quite predictable in the short-term, and in the longer/seasonal term, but it is largely not dispatchable²², and its generation pattern often does not correlate with consumers' demand patterns. Flexibility in a renewable energy system will come from other sources, rather than simply turning generators up or down. It will include: storage (long and short duration), demand side flexibility (**Downstream Flexibility**), dispatchable low carbon generation, interconnection to geographically diversified generation areas, and limited generation flexibility from renewable generation.

Inevitably, it will be a more complex and interrelated energy system, and one that continually evolves with technology, social and other changes.

The SSFP will look to map how we can develop policies and systems to link the flexibility we will need, with the demands of consumers (domestic and commercial). Our future system will need to provide the large volume of flexibility to match demand, from a largely decentralised, renewable, non-dispatchable generation system, rather than the current centralised system.

This will be more difficult in some ways, but easier in others, with the increasing electrification of heat and transport. They are likely to double or triple the amount of electricity needed on NI's electricity networks (depending on the energy reductions through efficiency measures and on-site generation). They are also likely to bring the potential for large scale downstream flexibility.

Upstream flexibility in the future energy system will come from a range of sources, including: interconnection, transmission connected batteries, pumped hydro projects, gas flow, line pack and storage in a decarbonised gas network, and from low carbon dispatchable thermal generators (powered by low carbon gas or connected to carbon capture and storage systems).

22 Except, for example, biogas, but dispatchable renewable energy will provide a small portion of NI's energy needs.

Monitor flexibility across the system

Monitoring progress against aims is essential to delivering the fastest, cheapest and most effective transformation. Effective monitoring will allow understanding of where blockages are occurring, and measures to alleviate them. It will also allow an understanding of the evolving state of the system, which will allow us to adapt the SSFP in light of the changes in technology, information, relationships and function that will inevitably arise over the life of the SSFP. It will also allow us to identify areas which are not progressing as quickly as necessary, and to develop interventions to address deficiencies. Monitoring evidence will be used to inform future policy changes and to identify priorities for unblocking remaining barriers.

DfE will develop a workstream in 2024 to review a monitoring and reporting mechanism for NI which could advise the Department and the UR how the level of flexibility is being delivered and the need for any measures to incentivise the development and delivery of appropriate flexibility services. The workstream will draw on the GB [Smart Systems and Flexibility Plan Monitoring Framework](#)²³.

The workstream will consider and consult on issues including:

1. whether it is possible or desirable to measure flexibility within a network, and the appropriate metrics to measure flexibility;
2. the appropriate measures to be reported on for different elements of the SSFP to demonstrate progress or achievement of the SSFP and of flexibility within the NI energy system;
3. the appropriate frequency of monitoring and reporting on progress in implementing the SSFP, the appropriate milestones. These are likely to be different at different levels of the system and networks and different for different entities;
4. the appropriate bodies to report on the disparate elements of the SSFP;
5. the bodies and agencies to whom the reports should be made, and the public or otherwise nature of such reports; and
6. the bodies and agencies who should hold accountability for delivering the SSFP.

Questions

1. Do you consider that monitoring flexibility is a viable and/or useful concept for DfE to consider?
2. Which organisation would be best placed to monitor system flexibility?
3. Is the GB SSFP Monitoring Framework an appropriate place for the policy consideration to commence?

23 [Smart systems and flexibility plan 2021: Appendix II - Smart systems and flexibility plan monitoring framework - publishing.service.gov.uk website](#)

Flexibility from consumers - Downstream

Consumer protection and engagement

In Northern Ireland we have a much higher proportion of demand coming from domestic consumers and small commercial users than other jurisdictions, such as GB. Our industry is therefore a much smaller proportion of demand and less able to deliver all of the flexibility needs of the NI energy system. This creates an opportunity to develop an entirely new source of flexibility services in Northern Ireland, but a difficulty in that consumers have so far been relatively disinterested in energy services and pricing in measures like Economy 7 offers or export from solar Photo Voltaic panels (**PV**). However, this is likely to have changed materially with the recent electricity and gas price rises, so engaging consumers may be easier.

Participating in flexibility services can provide benefits to consumers through lower energy costs by using energy when tariffs are lower, and in some cases there are [other benefits](#)²⁴ offered by suppliers of system operators. Households who install behind the meter generation or storage (such as batteries) can participate in flexibility services in other ways as well. Overall, household participation in flexibility services, either directly or via aggregators or suppliers, can assist to provide the flexibility that the network needs to ensure security of supply and to reduce other network costs such as constraint or curtailment costs²⁵.

Evidence, including from events in Britain, suggests that consumer awareness of energy flexibility services and the roles and benefits of aggregators in saving them money is low, but there is a willingness to change habits once made aware of the reasons and benefits²⁶. Therefore, sustained, accessible, engaging, and clear education and information will be required to gain material consumer engagement. The SSFP will need to set out the need for this prolonged and motivating engagement work and the stakeholders who will be required to deliver it. This will support the aim of the “One Stop Shop” consumer energy engagement centres considered under the Energy Strategy ²⁷.

It is likely that suppliers will be central to this, by providing tariffs which incorporate elements of Demand Side Response (**DSR**). Suppliers have regular contact with their customers, they are energy professionals with experience and knowledge of the SEM and other flexibility markets, and they have a direct financial opportunity/incentive to add DSR to their tariffs to retain and acquire customers. Third party aggregators may well also play a role in providing flexibility services to consumers, for example Electric Vehicle Chargepoint Operators (**EVCPOs**). There is currently no licensing regime for aggregators of this type in Northern Ireland (one has recently been introduced in GB), and the need for this is discussed below.

24 [Octopus Saving Sessions - Octopus Energy website](#)

25 Constraint and curtailment occur when the network, or parts of it, cannot cope with the level of renewable generation provided, and the system operator makes payments to those renewable generators who are told to reduce their generation.

26 [Household engagement with the Demand Flexibility Service 2022/23 - National Grid ESO website](#)

27 [Energy “One Stop Shop” Implementation Plan - consultation on policy options - Department for the Economy website](#)

Increased energy aggregator activity in the market is likely to raise consumer protection considerations including ensuring:

- energy savings claims are realistic and verifiable;
- aggregators' offerings are appropriate for consumer's consumption profiles;
- offers and contracts are clear and transparent;
- bills are clear and informative;
- consumers do not bear the cost of payments/compensations between market operators; and
- the benefits of demand side flexibility are passed on equitably to consumers.

Smart tariffs and smart appliances are likely to be more accessible to higher income consumers, or large, sophisticated housing suppliers like the Northern Ireland Housing Executive²⁸. Therefore, all actions will need to address the gaps across society and address the higher information and support needs of consumers in fuel poverty.

We believe that the aggregation industry will deliver, but need to ensure that consumers believe they can trust the providers, and that their information is safe. There is likely a need for a licensing regime to address any potential consumer protection issues which aggregators will bring for consumers, and any consequent legislation needed.

Consumer protection also includes attention to the costs associated with the energy transition, and the shifts in patterns of use. The principal objective of the UR and the Department, set out in Article 12 of the Energy Order, is to protect the interests of consumers of electricity, gas and water, and this will be applied in the development of the SSFP and the energy transition to ensure that it is a just transition. The evidence available is clear that in the long run, a switch to a renewable, smart, flexible system will save consumers money and provide a better environment for them.

As part of developing the Just Transition, under Action 1 of the [2023 Energy Strategy Action Plan](#)²⁹, the UR and the Consumer Council for Northern Ireland (**CCNI**) issued a Call for Evidence on protecting consumers during the energy transition³⁰. This will provide evidence to the UR and DfE in ensuring that consumers receive the necessary level of protection to ensure a Just Transition.

28 [The Housing Executive - Northern Ireland Housing Executive website](#)

29 [Energy Strategy - Path to Net Zero Energy. Action Plan 2023 - Department for the Economy website](#)

30 [Protecting consumers during the energy transition to net zero: Call for evidence - Utility Regulator website](#)

Under Action 1 of the [2023 Energy Strategy Action Plan](#)³¹, DfE issued a consultation in October 2022 on the “One Stop Shop” concept. A One Stop Shop would work with partners to consolidate advice, guidance and support in energy-related matters in an effort to simplify the energy decarbonisation journey for consumers, with a view to delivering an Energy Decarbonisation Information, Advice & Support Service to Consumers ([One Stop Shop](#)³²). The vast majority of responses to the consultation supported the proposals, but said that financial support would need to be an integral offering of the Energy One Stop Shop from its inception.

Many other jurisdictions have consumer and commercial based DSR programmes. Examples include: ESB Networks’ “[Beat the Peak](#)³³” programme in RoI. It addresses different segments of ESBN’s consumers in different ways, with media and financial incentives, and Octopus Energy’s [trial](#)³⁴ with National Grid ESO, which developed into NGESO’s [NGESO - Demand Flexibility Service](#)³⁵.

Aggregation of behind the meter assets (e.g. batteries which are in consumers’ homes, and therefore behind the meter) to form [Virtual Power Plants](#)³⁶ has less potential in NI than in countries such as Australia, because of our poor insolation³⁷, which makes solar PV much less of a value case, which in turn makes in home batteries less of a value case. Likewise, using Electric Vehicle (**EV**) batteries as a battery source for the electricity network (vehicle to grid, **V2G**) is currently very limited in NI due to the small number of EVs on sale in NI with **V2X** (“vehicle to anything”) capacity, and the higher cost of V2X chargers. But there is still plenty of opportunity in aggregating behind the meter assets.

Outputs

DfE has worked in partnership with the Department for Communities and the Department of Finance (**DoF**) in the development of a Residential Decarbonisation Action Plan. This includes possible initiatives on consumer education and engagement on managing consumers’ energy services in conjunction with the UR and CCNI, suppliers and service providers. This will dovetail with the One Stop Shop programme.

DfE and the UR will consider the need to develop a consumer protection and/or licensing regime for aggregation, data, and flexibility service providers, and any subsequent legislation.

31 [Energy Strategy - Path to Net Zero Energy. Action Plan 2023 - Department for the Economy website](#)

32 [Energy “One Stop Shop” Implementation Plan - consultation on policy options - Department for the Economy website](#)

33 [Beat the Peak - Overview - ESB networks website](#)

34 [National Grid ESO and Octopus Energy launch trial to unleash demand flexibility this winter - National Grid ESO website](#)

35 [First Demand Flexibility Service test event to take place tomorrow night - National Grid ESO website](#)

36 [IEEFA: Virtual power plants are the future of electricity retailing - IEEFA website](#)

37 Insolation refers to the amount of incident sunlight/energy a particular place on the earth receives.

Questions

1. In future, the price domestic consumers pay for the energy we use could change throughout the day (this already happens for larger commercial and industrial consumers, and to a lesser extent via Economy 7 tariffs for domestic customers). This would be done to provide an incentive for domestic consumers to reduce demand for electricity at the times when the network faces its highest demand for electricity, for example between 4pm and 7pm. Outside of these peak times prices would be lower. This type of pricing is often called a **“Time of Use”** tariff or pricing scheme. It is part of the wider **“Demand Response”** group of services. The flexibility in pricing would be intended to avoid having to increase energy bills to pay for upgrades to the network to provide additional capacity, and can reduce the cost of electricity by not having to run the most expensive generators during those peak demand periods. However, this would largely depend on NI implementing Smart Meters widely to allow smaller consumers to participate in providing this type of flexibility.

Do you think that DfE should progress a workstream to assess:

- **whether domestic consumers would be willing to reduce their demand at peak times to reduce their energy bill;**
- **whether it is likely to be cost effective (for individual consumers, and also for the wider energy system); and**
- **how such a function should be facilitated and regulated?**

If not, do you have any suggestions of alternative means to reduce energy demand that DfE should investigate or develop policy to address?

2. Data protection, reliable information on energy savings, transparency, and clear information are consumer protection issues that will be addressed in the development of smart and flexible energy systems.

Are there other issues relating to consumer protection that you think should be included in a proposed DfE work stream on Demand Response services?

3. Following the positive CBA, DfE is currently developing an implementation plan for smart meters for all electricity meters in NI (they are already in place for large consumers). Further consultation will take place to progress smart meters in Northern Ireland, along with an awareness campaign informing consumers of the reasons for proceeding and a clear explanation of the cost and benefits to consumers.

Please rank the following consumer information requirements for any future Demand Response policy workstream, in order of importance with 1 being most important and 6 the least important.	
Detailed advice about how to use a smart meter	
More accurate information about a household's energy use	
Energy use reduction to save money	
Energy use reduction to lower carbon emissions	
Avoiding disconnection	
Other related issues	

- Any future workstream which DfE undertakes will focus on the needs of vulnerable consumers, as part of the Executive's Energy Strategy objective of a Just Transition. Delivering the Just Transition objective in this context would focus on consumers with additional needs, who may be vulnerable, and may require extra assistance. This group could include older consumers, disabled consumers, people with learning or communication issues. It is important that all consumers, and particularly the fuel poor who may not have access to capital to install new systems in their homes, have easy access to the benefits of a smart system in a manner that works for them, including through the provision of advice and guidance on the use of smart meters and regarding tariffs.

Can you identify any other barriers for consumers in the future which DfE should address in any future policy workstream in this area?

- A one-size-fits all approach may not work for all consumers, including households with sensory needs and those with difficulties understanding new information. Consumer willingness and ability to engage in the use of flexible tariffs will also be necessary.

What actions should be taken to protect and engage with vulnerable or disengaged consumers in the process of developing any DfE policy workstream in this area?

Smart Meters

After the [Cost Benefit Analysis](#)³⁸ commissioned by DfE returned a net positive for NI electricity consumers, the Department [announced](#)³⁹ on 30 June 2023 that it will develop a plan for the implementation of electricity smart meters and systems (however, smart gas meters will not proceed as they did not receive a positive cost benefit analysis). Given that a smart meter roll out in NI would take a number of years, the SSFP will plan for what can be achieved prior to any critical mass of smart meters being installed. The [Girona](#)⁴⁰ and [RULET](#)⁴¹ programmes may be useful examples.

The potential benefits of electricity smart meters for flexibility are well known⁴², they include:

1. Time of Use Tariffs (**ToU**);
 - Basis for Supplier Smart Tariffs;
 - Enable Suppliers to pass on Distribution Use of System (**DUoS**)⁴³ and Transmission Use of System (**TUoS**) ToU tariffs to individual customers;
2. Consumer monitoring of own energy usage, amount and timing (largely to make use of ToU Tariffs);
3. Increased control by consumers of their accounts and services, such as remote top up, easy switching between credit and pre-payment;
4. Evidence for aggregator delivery of DSR; and
5. DSO visibility into network for better control and management.

At the consumer level, time of use, and other types of smart tariffs that help manage peak demand can improve the viability of Low Carbon Technologies (**LCTs**) such as heat pumps and EV charging, by reducing costs to consumers. The specific terms of different offers will influence consumer choices. Tariffs that ensure heat pumps can compete successfully with other fuel options (such as gas or oil boilers) for heating would seem one important consideration.

Low Voltage⁴⁴ (**LV**) visibility by the DSO (i.e. being able to monitor events on the very large and extensive low voltage network) is essential to operating a future distribution system, and is complemented by the data which is available from Smart Meters, for example, the use of line sensors and dynamic line rating^{45 46}.

38 [Northern Ireland Smart Meters: Cost Benefit Analysis Report - Department for the Economy website](#)

39 [Smart meters update - Department for the Economy website](#)

40 [Girona - Northern Ireland Electricity Networks website](#)

41 [Rulet - Northern Ireland Electricity Networks website](#)

42 [Smart Meters and Flexible Demand in Northern Ireland: A report for the NI Department for the Economy - Ulster University website](#)

43 DUoS and TUoS are the charges to electricity suppliers and generators for use of the Northern Ireland electricity networks. The monies are paid to the DSO and TSO respectively for operation, maintenance and construction of the electricity networks.

44 Low voltage networks are generally below 6.6kV and are part of the customer connections to the distribution system and contain very large numbers of individual assets and very long total length of lines.

45 [LineVision Partners with Northern Ireland Electricity Networks - YouTube.com](#)

46 [National Grid in the UK Is Saving Customers Millions and Increasing Grid Reliability with LineVision - YouTube.com](#)

This is in part set out in [NIEN's RP7 Business Plan](#)⁴⁷ sections on flexibility, digitalisation and innovation, and relates to the Department's proposal to require that the DSO digitalise its network in the manner required of the TSO under the Electricity Directive. In recognition of the increasing importance of LV Monitoring, the UR has recently [approved funding](#)⁴⁸ for NIEN to implement the use of monitors and controllers across the LV electricity network.

Any potential interactions, in relation to smart meters or any other topics, will need to be raised with the SEM Committee to ensure they are addressed through the appropriate regulatory channels.

Outputs

The Department will work with the UR, SONI and NIEN to deliver the SOs' mandates to digitalise their networks in accordance with the Electricity Directive requirements.

Gas Smart Meters

Gas smart meters are less well known than electricity smart meters, and because Time of Use pricing is not currently proposed for gas, they are somewhat less valuable to consumers and the networks. However, as the CBA for gas smart meters did not return a positive value the Department [announced](#)⁴⁹ on 30 June 2023 that it will not proceed with gas smart meters.

Questions

There are no specific questions, or SSFP work streams, in relation to electricity or gas smart meters given the extensive consultation programme that will inform the smart meter implementation planning.

Integrated Energy Service Providers

Aggregators (grouping the potential of large numbers of consumers to access wholesale markets) will facilitate network operators to access the large amount of flexibility services which consumers and small business can potentially provide. This is especially important in Northern Ireland, with the much larger proportion of energy demand coming from consumers and commerce compared to industrial demand in GB and other jurisdictions. Competition between aggregators will be positive for NI consumers and the policy development should ensure a level playing field, especially between incumbents and new entrants.

Aggregation and flexibility services will be new concepts for most NI consumers. The policy development for aggregation and flexibility services will ensure that consumers are adequately engaged and informed, for example, through clearly explained and informative marketing material, contracts and bills, and that consumers have strong regulatory protections.

47 [NIEN RP7-business-plan-full-april-2023 - NIE Networks website](#)

48 [NET_E_KS_633 LV Monitors Decision \[signed\].pdf - Utility Regulator website](#)

49 [Smart meters update - Department for the Economy website](#)

GB has recently required aggregators (calling them DSR providers or “load controllers”) to be licenced under the UK Government [Energy Act 2023](#)⁵⁰ and in its [response](#)⁵¹ to the “Delivering a smart and secure electricity system” consultation. Article 17 of the Electricity Directive relates to DSR services via aggregation specifically, but other Articles are also relevant.

Outputs

The Department will work with the UR to consider the need for a licensing regime, and code of practice for aggregators (either suppliers or third party aggregators).

The issues which the review and consultation will consider include:

1. potential providers of DSR and other flexibility services to consumers;
2. flexibility services which aggregators can provide/facilitate;
3. methods to support and facilitate aggregators entering the NI market;
4. barriers to entry for such providers and how to reduce them. For example, licensing constraints/requirements that should be applied to network operators and suppliers to mitigate barriers to entry for aggregators;
5. risks to the electricity system and consumers from such providers:
 - a. identifying and monitoring them;
 - b. reducing or mitigating those risks;
 - c. educating consumers on avoiding those risks;
6. consumer protection issues which need to be addressed to protect consumers and to provide confidence for consumers to take up aggregation offerings; and
7. ensuring that system operators are able to access DSR and other flexibility services in the most effective and efficient manner when they need such services for the safe and effective operation of the electricity system.

Questions

1. Do you consider that aggregation services will require a new licensing regime, or can they be fitted within NI’s existing licensing regime? Please provide your reasons.
2. What barriers currently exist in NI’s regulatory regime to aggregators operating in NI?
3. What are the main consumer protection issues that should be considered?
4. What aspects of the GB model should NI consider, or reject?

Smart buildings

Buildings account for around 30% of UK GHG emissions⁵². The “fabric first” approach says that decarbonisation of buildings should be led by energy efficiency, thereby lowering the amount of decarbonised energy which the electricity system will need to provide, and the networks will need to carry, as well as saving consumers money by reducing their individual energy consumption.

50 [Energy Act 2023 - legislation.gov.uk website](#)

51 [Delivering a smart and secure electricity system: Government response to the 2022 consultation on interoperability and cyber security of energy smart appliances and remote load control -publishing.service.gov.uk website](#)

52 [Final UK greenhouse gas emissions national statistics: 1990 to 2019 - gov.uk website](#)

Improving energy efficiency will require a range of interventions, particularly in retrofitting existing buildings. It is likely to be a long term task. The Building Regulations set minimum standards for any new or replacement fabric and services which apply when relevant building work is being carried out and in certain cases of a material change of use of a building (e.g. from an office to a dwelling). They also set overall emissions requirements for new builds that anticipate provision of on-site renewables in most cases. These standards are being reviewed by the Department of Finance, with an expectation of phased uplifts to further support improved efficiency standards, low carbon heating, renewables and storage, with potential to consider demand management benefits in the future⁵³. However, the portion of the building stock (new builds, extensions and alterations) to which they will apply is quite small each year.

The difficult, expensive⁵⁴, and much larger task of retrofitting the existing building estate will also provide energy efficiency gains and load reduction. There will inevitably be trade-offs required to ensure that actions are cost effective and provide the best value. This may mean that some desirable fabric retrofits are not viable, but other less intrusive interventions will be. However, optimising electricity time of use in buildings, and providing flexibility services, will assist the net zero target and whilst intervention alongside fabric first measures would be ideal, the practical difficulties in delivering this may mean renewables and smart systems come into play semi-independently, albeit with greater consequences for the grid than the ideal scenario.

Whether the fabric of buildings has been improved or not, most of the work of “smart buildings” will be done by smart appliances, considered below.

Smart Appliances

Smart appliances include smart thermostats, smart EV chargers, and other smart appliances to allow consumers to provide their consumption patterns to be used for flexibility services and other network services, and to be remunerated for them. Ensuring new EV Chargers and heat pumps/boilers (for heating and hot water services) are smart will increase the potential to shift the new load into periods of high renewable generation, or switch to other forms of heating during peak electricity load periods (e.g. stored heat, or low carbon gas). Other smart appliances will have lesser capacity to deliver flexibility services and DSR than EVs and heating, due to their lower energy consumption. An example of smart appliances is National Grid’s DNO [Western Power](#)⁵⁵ three year trial (2022-25) using smart heat pumps to provide DSR flexibility. In Northern Ireland, some consumers have commenced using [smart heating controls](#)⁵⁶, including demand response, through the NISEP scheme. We will need to learn the lessons that can be taken from consumers’ experiences of those technologies and could be applied to the rollout of other technologies as part of the energy transition.

53 See [Discussion document and Pre-consultation on next steps - revision A published 11 October 2023 - Department of Finance website](#) (Section 2B may be particularly relevant).

54 [A major housing association in England estimates a retrofitting cost of £35B cost to decarbonise existing housing association stock \(@£20,000/house\) - agendani.com website](#)

55 [Western Power - Equinox heat pump trial - National Grid website](#)

56 [Heating controls - Energy Saving Trust website](#)

Most smart appliances will be dependent on smart meters to have functionality and a business case/route to market, so much work will be dependent on the timing of a NI smart meter roll out.

GB has taken primary legislative powers in the Energy Act 2023 to allow regulations to be made in the future to set standards for smart appliances. BEIS [consulted](#)⁵⁷ in July 2022 on smart appliances and their cybersecurity and interoperability, and provided a government [response](#)⁵⁸ in March 2023. At present the regulations do not apply to Northern Ireland. Interoperability, with the NI networks and with all aggregators and suppliers, through policy or legislative standards, will be essential in achieving the most benefit from smart appliances for NI networks and consumers.

Outputs

The Department will develop policy and consult on relevant issues, including:

1. any smart appliances which will not need smart meters for a viable functionality/business case, and how those appliances will operate in the absence of smart meters in NI;
2. whether smart appliances, other than EVs, heating, hot water and PV are significant enough to warrant specific regulation; and
3. whether Northern Ireland can or should take primary powers in due course to regulate smart appliances, and if so:
 - a. whether NI should set standards for smart appliances, similar to those applied in GB;
 - b. whether NI should require certain types of appliances to be smart e.g. thermostats, heat pumps, water heaters;
 - c. whether NI should require such appliances to be smart, before the roll-out of Smart Meters.

Questions

1. Do you consider that policy for smart buildings and appliances should be developed by DfE and UR, or other government/regulatory agencies? Please provide your reasons.
2. To what extent should NI adopt GB regulation of the areas, or even seek to make GB regulation apply UK wide?

Smart EV Charging

EVs are likely to add the largest individual load to most houses in NI. Managing their demand will be an essential part of any SSFP. Electrification of transport has the potential to double the existing demand for energy from the electricity grid (in 2021 14% of total energy used in Northern Ireland was used as power (electricity) while 34% was used in transport⁵⁹), with up to 250,000 EVs in Northern Ireland by 2030⁶⁰, or even more⁶¹.

57 [Delivering a smart and secure electricity system: the interoperability and cyber security of energy smart appliances and remote load control - gov.uk website](#)

58 [Delivering a smart and secure electricity system: Government response to the 2022 consultation on interoperability and cyber security of energy smart appliances and remote load control -publishing.service.gov.uk website](#)

59 [Energy in Northern Ireland 2022 - Department for the Economy website](#)

60 Extrapolated from [Sector-summary-Surface-transport.pdf - theccc.org.uk website](#)

61 NIEN's RP7 Business Plan allows for 300,000 EVs in NI by 2030. [rp7-business-plan-full-report-april-2023 - Northern Ireland Electricity Networks website](#)

However, smart EV charging can reduce the effect of EVs on peak load, and provide flexible demand for high renewable generation periods and other flexibility services (e.g. V2G or **V2H** (“vehicle to home”)).

Connection of EVs will create reinforcement issues for significant parts of the LV network, especially Northern Ireland’s large rural LV network. However, the potential effect of EVs on the network can be mitigated, at least in part, through smart charging and other LCTs. The electricity DSO and TSO will need well developed predictive abilities to prepare for EV adoption across the network, given the likely pace of change in the next few years, and locally NIE Networks is conducting an EV Managed Charging trial⁶². The UR, correspondingly, has flagged in its RP7 Approach document that it will need to consider the need for anticipatory investment where demand is likely going to increase very significantly and very rapidly, such that reactive reinforcement may be a material inhibitor of EV and other LCT uptake.

Many jurisdictions are already addressing smart EV charging. GB has introduced legislation regulating smart EV charging units⁶³ requiring all new private charge points sold in GB after June 2022 to be smart, and has recently published its [Electric Vehicle Smart Charging Action Plan](#)⁶⁴, and the [UK Electric Vehicle Infrastructure Strategy](#)⁶⁵. NI has not yet introduced smart EV charging legislation. However, regulations in the much larger GB market may deliver smart chargers indirectly into NI. There is a risk though, that in the absence of NI legislation some installers may offer cheaper non GB-compliant products. As meters and chargers have a lifespan of up to 15 years there is a strong argument to move to require smart EV chargers in NI as early as possible to maximise benefits over the long-term for consumers. These benefits may be realised in the absence of smart meters through services provided by aggregators or other such entities using existing dual tariffs in NI.

The UK Government has prepared the UK wide [Public Charge Point Regulations 2023](#)⁶⁶ relating to EVCPOs and reliability, pricing, payment methods and other aspects of consumer interaction with EV charging. DfE will monitor the operation of the legislation in Northern Ireland to establish if further regulation, including licencing, is required. Under NI legislation, EVCPOs are taken to supply electricity to vehicles rather than “premises”, and so are not currently required to be licensed as electricity suppliers.

62 [Register your interest in an Intelligent EV Charging project trial - Northern Ireland Electricity Networks website](#)

63 [The Electric Vehicles \(Smart Charge Points\) Regulations 2021 - legislation.gov.uk website](#)

64 [Electric vehicle smart charging action plan \(publishing.service.gov.uk\)](#)

65 [UK electric vehicle infrastructure strategy - GOV.UK \(www.gov.uk\)](#)

66 [The Public Charge Point Regulations 2023 - legislation.gov.uk website](#)

The Department for Infrastructure (**Dfi**) published an [Electric Vehicle Infrastructure Action Plan for Northern Ireland](#)⁶⁷ in November 2022. It includes actions around connection costs, consumer priorities and the establishment of an oversight group to ensure a co-ordinated approach to EV infrastructure.

DfE and the UR published a [Call for Evidence](#)⁶⁸ (**CfE**) on 11 July 2023 for a review of electricity connections charging policy in NI. The costs to individual consumers of connecting LCTs to the distribution network is one of the subjects of the CfE.

Outputs

The Department will work with the UR and the Dfi taskforce and will consider the existing GB regulations, and the need for regulation of EVCPs in Northern Ireland. Considerations will include:

1. smart charging management and regulation in other jurisdictions and lessons to be learned for Northern Ireland;
2. whether the GB legislation is appropriate for NI and any changes required;
3. whether the legislation in the much larger GB market will introduce, de facto, smart EVCPs to NI. Anecdotal advice to DfE is that it appears to be happening already, or whether not adopting it risks Northern Ireland consumers installing large numbers of dumb EVCPs and needing to replace them with smart EVCPs before the end of their useful life;
4. whether introducing smart EVCP legislation in NI is appropriate in advance of a smart meter roll out in NI, or if smart meters are not introduced to NI;
5. what issues (if any) need to be addressed to ensure harmony with RoI smart EV charging and the shared SEM;
6. what steps network operators need to prepare their networks for potentially rapid and significant EV connection and energy demand (the UR has indicated that this will be considered in the RP7 project); and
7. how anticipatory development of networks to facilitate EV charging should be evaluated and funded.

An aspect of EV smart charging which is emerging is Vehicle to Grid (where an EV can supply electricity to the electricity network) (**V2G**)⁶⁹. The Department's policy group will consider the value to the grid, of promotion, support and regulation of V2G charging in Northern Ireland.

Questions

1. What aspects of smart EV Charging regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.
2. What gaps in the UK's Smart EV Charging regulation and policy currently exist for NI i.e. which part are GB only and we need to address? Please provide your reasons.

67 [Action Plan for Electric Vehicle \(EV\) Infrastructure - Department for Infrastructure website](#)

68 [Call for Evidence - Electricity Connection Policy Framework Review - Utility Regulator website](#)

69 EPBD 4 draft proposals are that EV CPs should be smart and, where appropriate, bi-directional - ref Article 12 Texts adopted - [Texts adopted - Energy performance of buildings \(recast\) - Tuesday, 14 March 2023 - Europa.eu website](#)

Cybersecurity

Each smart appliance or connection will provide a potential access point to consumers' properties and systems, and also to the energy networks themselves. Networks are increasingly connected, with control of major elements of networks being made remotely, usually with the remote linkage being over the internet. We have already seen a wide range of cybercrime attacks on energy networks^{70 71} (and other public infrastructure and services). ENTSO-E is currently drafting a [Network Code on Cyber Security⁷² for electricity networks](#). It is being drafted under Articles 59(2)(e) and (10) of the Electricity Regulation and therefore, under the [Protocol on Ireland/Northern Ireland⁷³ \(Protocol\)](#) (subsequent to the Withdrawal Agreement), it will be binding in the United Kingdom with respect to Northern Ireland.

The UK Government has passed [The Network and Information Systems Regulations 2018⁷⁴ \(NISR\)](#), updated in 2022) which provides in Regulation 10(1) that an Operator of Essential Services (which in NI includes large electricity suppliers, NIEN as DSO, SONI as TSO) must:

“take appropriate and proportionate technical and organisational measures to manage risks posed to the security of the network and information systems on which their essential service relies.”

The NISR applies in NI. The Department of Finance is the Competent Authority for NI.

In GB, the government has passed the [Product Security and Telecommunications Infrastructure Act 2022⁷⁵](#) which creates a new regulatory scheme to make consumer connectable products (“smart” products) more secure against cyber-attacks.

The TSO is tasked with ensuring the cyber security of its network under Article 40(1) (m) of the Electricity Directive, and the Department is considering imposing a similar requirement on the DSO with respect to the distribution network.

The UR has advised that cybersecurity strategy will be a requirement on NIEN in the UR's proposed approach to the RP7 price control period.

Outputs

The Department will establish a Working Group to consider NI requirements in terms of energy and network cybersecurity. It will consider the relevant GB legislation and the proposed Network Code on Cybersecurity.

70 [Lights stay on despite cyber-attack on UK's electricity system - The Guardian website](#)

71 [Cyber attack shuts down U.S. fuel pipeline 'jugular,' Biden briefed - Reuters website](#)

72 [Network Code on Cybersecurity - Entsoe.eu website](#)

73 [Revised Protocol to the Withdrawal Agreement.pdf - publishing.service.gov.uk website](#)

74 [The Network and Information Systems Regulations 2018 - legislation.gov.uk website](#)

75 [Product Security and Telecommunications Infrastructure Act 2022 - legislation.gov.uk website](#)

It will work with both the UR and the [NI Cyber Security Centre](#)⁷⁶ in assessing the appropriate path and agency to ensure the cybersecurity of smart EV chargers and other smart appliances which are connected to the electricity networks.

Issues the Working Group will be asked to consider include:

1. Existing and future cybersecurity energy, network and smart appliance risks to:
 - a. NI consumers;
 - b. NI electricity and gas networks;
 - c. NI electricity and renewable gas generators;
 - d. NI electricity and gas suppliers;
 - e. electricity and gas interconnectors;
2. appropriate measures to implement cybersecurity in NI and for NI consumers and energy systems (in GB, EV charge points are already required to meet specified cybersecurity standards and it is proposed that smart appliances will be required to meet similar cybersecurity standards) In GB, the government has also published its [Secure by Design](#)⁷⁷ consultation, a [Code of Practice for Consumer IoT Security](#)⁷⁸, and a [Consultation on regulatory proposals on consumer IoT security](#)⁷⁹ and proposes further regulation of smart appliances in the forthcoming Energy Security Bill.

Questions

1. What aspects of electricity network, and electricity consumer, cybersecurity regulation and policy should be determined by DfE and the UR, and what aspects should be developed by other NI departments or agencies?
2. What aspects of electricity network, and electricity consumer, cybersecurity regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.

Community energy solutions

The advent of distributed energy technologies and the ability to link to energy devices via the internet has increased the opportunity for consumers to become active through Citizen Energy Communities⁸⁰ (**CEC**).

Article 16⁸¹ of the Electricity Directive requires Member States to provide an enabling regulatory framework for CECs.

Outputs

Currently, a CEC is not defined in NI legislation, and its boundaries and terms will be a subject of a future DfE Working Group and consultation paper. That Working Group will also be asked to advise on the appropriate regulatory framework to comply with the CEC provisions of the Electricity Directive.

76 [NI Cyber Security Centre \(www.nicybersecuritycentre.gov.uk\)](http://www.nicybersecuritycentre.gov.uk)

77 [Secure by Design report - gov.uk website](#)

78 [Code of Practice for Consumer IoT Security - gov.uk website](#)

79 [Consultation on regulatory proposals on consumer IoT security - gov.uk website](#)

80 [Article 2\(11\) of the Electricity Directive Electricity Directive \(recast\) - europa.eu website](#)

81 [Article 16 of the Electricity Directive Electricity Directive \(recast\) - europa.eu website](#)

The Working Group, and respondents to the consultation paper, will be asked to provide their views on issues including:

1. Flexibility Services which local energy solutions/CECs may be able to provide to the NI network and network operators (including an assessment of the potential size of this market);
2. opportunities and pathways for developing and supporting local energy solutions;
 - a. improved accessibility for energy data;
 - b. improved locational signals for local provision of Flexibility Services;
 - c. consumer protection for smart energy communities and projects to encourage consumer participation;
3. appropriate routes to market for local energy solutions (especially smaller size participants/assets in Flexibility Services markets);
4. barriers to development and formation of localised energy groups;
5. licensing requirements for the manager of, or participants in, a CEC;
6. the role of local authorities/councils in supporting or facilitating local energy solutions;
7. consumer protection needs for participants in localised energy groups; and
8. the relative importance of local energy solutions compared to other pathways for Flexibility Services (and thus priority in policy development).

Questions

1. What aspects of CEC regulation and policy should be determined by DfE and the UR, and what aspects should be developed by other NI departments or agencies?
2. What roles of CECs are most likely to need specific regulation? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.

Flexibility on the grid - Upstream

The future energy networks will need a wide range of Flexibility Services providers to replace the roles currently filled by fossil fuel generators and to provide the significantly increased flexibility needed to operate electricity networks with high levels of non-dispatchable renewable energy. Grid flexibility may be supported by a low carbon gas network in the way natural gas supports the energy network today.

Historically, NI has generated flexibility through turning fossil fuel generation plants up and down, increasingly, these have been gas fossil fuel generators. That flexibility has depended to a large extent on the ability to increase or decrease the flow of gas via the Scotland to Northern Ireland Pipeline (**SNIP**). The SNIP can increase or decrease energy flows per hour by up to a GWhr. In addition, the gas network in NI provides further flexibility through the pressure variance allowed in the gas transmission system, known as “line pack”, and which can be restored during lower usage periods. In particular, the gas system currently provides the dispatchable flexibility to increase energy supply (for electricity generation and for domestic heating) over the winter demand period in NI. Although recent events in the world gas market have demonstrated that supply of gas is not risk free.

The flexibility derived from gas transmission and from large central generators is often described as “upstream” flexibility, and the flexibility from consumers and businesses, through things like smart meters, smart EV charging, and behind the meter batteries, is often described as “downstream” flexibility. It is likely that the future NI energy system will need both upstream flexibility from low carbon dispatchable electricity and low carbon gas, and storage of both, in its energy mosaic, and downstream flexibility from consumers. It is likely that the roles of upstream and downstream flexibility will change as the energy system evolves.

Barriers to providers can be found in:

1. market design;
2. market rules;
3. regulation, including licensing requirements and coordination between regulators/gatekeepers;
4. responses of incumbents, especially monopoly incumbents (which is the NI position);
5. information access needed to plan and prepare business cases;
6. certainty in the size and revenues associated with Flexibility Services markets (affecting planning and financeability);
7. planning constraints;
8. timeliness of regulatory and other requirements; and
9. financeability due to other barriers.

A critical issue will be providing appropriate routes to market to fund sufficient amounts of Flexibility Services to meet the SOs’ needs. Those needs should be defined from analysis conducted on a whole energy system approach. This could include support, regulatory framework, and market frameworks as appropriate.

In many areas of energy services, a predictable and stable regulatory framework is necessary for participants to commit resources and funding to develop the Flexibility Services that markets require.

The policy development that comes from the SSFP will need to provide sufficient certainty for market participants (timing, volume, type, conditions, market structure, etc) to be confident to make positive investment decisions.

Policy for Flexibility Services, for both TSO and DSO, is covered extensively in the Electricity Directive 2019. The Department has partly transposed the Electricity Directive and is in the process of completing transposition.

In July 2023, NIEN published a consultation “[Flexibility Procurement Statement](#)”⁸² on the principles and processes it will use in procuring Flexibility Services. The principles it sets out are consistent with NIEN’s relevant licence conditions and with the principles set out in the Electricity Directive 2019 and the Electricity Regulation and the Network Codes.

The Department’s policy development in relation to flexibility will consider:

1. what are the principal barriers to appropriate types and amounts of Flexibility Services being provided on the Northern Ireland electricity networks;
2. what interventions are desirable to facilitate Flexibility Services on the NI electricity networks;
3. are there licensing issues in Northern Ireland which should be reviewed for suppliers of Flexibility Services e.g. synchronous condensers, or reactive power suppliers such as shunt reactors; and
4. is the SEMC’s [System Services Future Arrangements](#)⁸³ project the appropriate path for routes to market for Flexibility Services, or is there a need for additional route to market supports for any Flexibility Services which fall outside the current markets and proposals.

Storage

Storage of energy/electricity is one of the essential elements of a flexible low carbon energy system.

There are questions of how to regulate energy storage, how to remunerate it, how to charge it for its use of networks and how to ensure there is adequate storage, of the right types, for network operators to operate networks efficiently, safely and at least cost.

In the longer term, assessment of NI’s (or the SEM’s) need for different forms of storage, and the signals needed to deliver appropriate amounts at the right time, could be a role for an FSO (or co-ordinating entity). This is especially relevant because of the different modalities of storage that are available. Part of the FSO role, or the existing network operators and the UR, will be to develop a NI-wide needs case for storage.

82 [Flexibility Procurement Statement - NIE Networks website](#)

83 [SEM-22-012 System Services Future Arrangements High Level Design Decision Paper - The Single Electricity Market Committee - The semcommittee website](#)

That will require an integrated plan for network development, with the interaction between transmission, distribution and retail industry stakeholders. Developing and publishing a long-term network wide plan for storage will provide market participants with the type of information they need for developing investment decisions.

Any such review would follow on from the work done by SONI in its [Shaping Our Electricity Future V.1.1](#)⁸⁴, [Tomorrow's Energy Scenarios](#)⁸⁵ and the Call for Evidence on [Procurement Options for Long Duration Energy Storage](#)⁸⁶. However, an FSO or holistic energy plan would incorporate this work with storage options and needs in relation to the other energy vectors and uses in NI, such as biomethane, hydrogen and fossil fuel gas.

Short duration

Short duration storage is primarily an electricity concept. For gas, adequate short-term storage exists inherently within gas pipelines for short-term balancing. Short term electricity storage is relatively well established, with battery storage becoming increasingly utilised. It can provide energy support and rapid Ancillary Services.

Over 700 MW of batteries are now operational on the Island of Ireland (with 200MW of this in NI). This type of storage/flexibility is essential to provide fast acting reserves that have helped the TSOs move the SNSP limit to 75% today. Low-carbon inertia, storage and flexibility such as provided by these batteries will enable us to increase SNSP limits up to 95-100% and accommodate more renewables on the system. This has numerous benefits in terms of reduced renewable curtailment, reduced running of fossil fuel units for ancillary services and reduced CO2 emissions and imperfections costs.

There is potentially a large scope for small scale, behind the meter, consumer owned storage in NI, especially given the 24,000 solar PV installations in NI in 2020⁸⁷.

Primary considerations are: how much short-term storage is needed/efficient under different demand, generation and network scenarios; and how to provide a route to market which will deliver the required amount and type at the required times.

Long duration

Long duration storage is seen as essential to any renewable dominated electricity network. However, it is not as advanced and faces significant economic and technical barriers. Long term storage is primarily an energy concept, with the stored energy able to be converted to electricity or used in other forms.

Long duration storage is loosely defined. Some definitions set 10 or 24 hours as the lower threshold.

84 [Shaping Our Electricity Future Roadmap: Version 1.1 - SONI website](#)

85 [Tomorrow's Energy Scenarios 2023 Consultation Report - SONI website](#)

86 [Long Duration Energy Storage-Call-for-Evidence-SONI - SONI website](#)

87 [Regional spreadsheets 2003-2022 - number of sites.xls - live.com website](#)

However, much longer duration storage, sometimes referred to as seasonal storage, would be needed to overcome the duration of [Dunkelflaute](#)⁸⁸ type periods in Northern Ireland and to provide energy for the winter heating period if renewable generators are not able to ramp sufficiently, and reliably, to meet the winter level of demand.

There has been significant work in NI on long duration storage, including the SONI Call for Evidence above, and the Baringa [“Game Changer” report](#)⁸⁹ for Energy Storage Ireland.

At present, long duration storage is supplied by a range of technologies, including:

- a. pumped hydro – limited by site requirements;
- b. Methane or Hydrogen in cavern or other storage - Islandmagee is an option, the volume of gas required may be a limiting factor;
- c. batteries – flow batteries may be more suitable for long duration, EV batteries are likely to provide a very large potential volume but are constrained by their owners’ use patterns and requirements;
- d. Iron/Air and other technology batteries – developing;
- e. non-hydro gravity storage; and
- f. thermal storage, over a range of temperatures, including high temperature such as molten salt, and very low temperature liquid air storage.

Interconnection is sometimes seen as a substitute for storage i.e. a different form of dispatchable energy when indigenous generation is not adequate for NI’s needs.

Outputs

The Department proposes to conduct a review with the UR on the appropriate enduring regime for licensing electricity storage in NI. This will include considering the licensing of electricity storage as a class of generation or separate licensable activity, and also other flexibility services providers connected to the network or participating in the energy or services markets e.g. synchronous condensers. [The Gas \(NI\) Order 1996](#)⁹⁰ already provides a licensing regime for storage of methane gas but does not currently cover hydrogen, and DfE will consider this in its hydrogen policy development.

The Department notes that DfI conducted a planning regime [review for renewable energy](#)⁹¹ in early 2023. The Department is liaising with DfI on the outcomes and next steps of that review.

The Department and the UR will consult on whether SOs should include an analysis of storage requirements (including type, amount and location) in their network development plans.

88 Periods of several days with very low wind levels. Commonly in Northern Ireland they occur in winter, with slow moving high pressure systems over the British Isles giving cold, clear skies.

89 [GameChanger-ESI-Report-May2022-Web-1.pdf - Energystorageireland.com website](#)

90 [The Gas \(Northern Ireland\) Order 1996 - legislation.gov.uk website](#)

91 [Review of Regional Strategic Planning Policy on Renewable and Low Carbon Energy - Public Consultation - Department for Infrastructure website](#)

Future policy development by DfE will include whether a support mechanism/route to market is needed to ensure adequate storage is developed, of the right type and right time. However, the implementation of storage is likely to continue at pace in the interim, according to the needs identified by the SOs and commercial opportunities which developers seek to fill.

The Department will consult on the development of a policy for energy storage in Northern Ireland. It will consider issues including:

1. what is the potential role of long-term energy storage alongside interconnection, or other security of supply solutions;
2. how can heat energy storage and district heating systems be integrated into the electricity flexibility system;
3. are there valuable forms of long-term storage that need specific government support or facilitation e.g. pumped hydro;
4. how should the amount of long-term storage needed on the networks be calculated, or should the determining criteria be the amount of energy and ancillary services required, with no reference to the type of plant which might provide it;
5. should the System Operators publish their expected long-term storage/energy needs, and their reasoning, to inform developers of long-term storage and competitor products/services;
6. what are the barriers to sufficient long-term storage being delivered in NI;
7. are there any operational issues, such as network charging or connection criteria that need to be addressed to facilitate storage;
8. what routes to market are needed for long-term storage, are they different to the needs of short-term storage; and
9. are there planning issues that represent a material barrier to market for long-term storage in NI, if so, is the recent DfI consultation adequate to resolve such issues.

Questions

1. Does energy storage require a separate licensing and regulation regime, or can it be satisfactorily encompassed within the existing licensing regimes with appropriate, storage specific, licence conditions?
2. What are the specific issues of storage that are most likely to need specific regulation e.g. licence conditions? Please provide your reasons.
3. How should NI's overall need for storage to deliver its energy and carbon targets be determined, and which entity should be responsible for determining that need?
4. What barriers for storage as a Flexibility Services in NI should DfE and the UR address?
5. Should NI look at the need, costs and benefits of a support scheme for storage as a flexibility service, or as a Security of Supply service, in NI? Please provide your reasons.

Interconnection

Electricity

NI currently has the 500MW [Moyle](#)⁹² interconnector to Scotland, and a tie line to RoI. The current 275 kV tie line to RoI is to be supplemented by the 1500MW “[North South Interconnector](#)”⁹³. RoI has the 500MW [EWIC](#)⁹⁴ interconnector from Meath to Wales, with two more in preparation, the 500 MW [Greenlink](#)⁹⁵ interconnector to Pembrokeshire in Wales and the 700MW [Celtic](#)⁹⁶ interconnector from Cork to Brittany in France.

Ofgem, in GB, has [published](#) extensively on its well-developed interconnection policy. GB has multiple interconnectors, with extensive plans for increasing its interconnection capacity. GB has a well-developed [analysis of its likely interconnection needs](#)⁹⁷, a specific [licensing regime](#)⁹⁸ for interconnectors, and a well-developed [support framework in its cap and floor mechanism](#)⁹⁹.

In RoI, the Department of the Environment, Climate and Communications has published a [National Policy Statement on Electricity Interconnection 2023](#)¹⁰⁰ and an accompanying report on the [Impacts of Increased Electricity Interconnection](#)¹⁰¹ on the Irish electricity network. The report and the policy statement both foresee increased future interconnection between RoI and both GB and Europe.

DfE is currently developing a policy on the amount of electricity interconnection needed for the NI network, and the need or form of any support mechanism. Meanwhile, there are currently further proposals for interconnectors to the SEM.

Northern Ireland needs to establish if it should actively encourage further interconnection and if so, what market signals are needed, or whether other forms of government intervention are needed to ensure delivery of some or all of it.

Interconnection will have a role alongside other flexibility levers.

The EU has set a cross border interconnection target of 15% of generation capacity by 2030 (up from 10% by 2020). 15% is an average target set for a range of networks, it may be too low for a small electricity network such as NI with a very heavy reliance on a single renewable energy source, i.e. wind¹⁰².

92 [Moyle Interconnector - Mutual Energy website](#)

93 [SONI North South Interconnector - SONI.com website](#)

94 [Interconnection - Eirgrid Group website](#)

95 [Greenlink Interconnector | energy infrastructure | Ireland and Wales - greenlink.ie website](#)

96 [Celtic-Interconnector-Project-PCI-Information-Brochure.pdf - Eirgrid Group website](#)

97 [Interconnector Policy Review - Decision - Ofgem website](#)

98 [Electricity Interconnector Standard Licence Conditions Consolidated - Ofgem website](#)

99 [Interconnector policy review: Working paper for Workstream 1 - review of the cap and floor regime - Ofgem website](#)

100 [gov.ie - National Policy Statement on Electricity Interconnection 2023 - gov.ie website](#)

101 [Impacts of Increased Electricity Interconnection \(www.assets.gov.ie\)](#)

102 Northern Ireland is mainly dependent on wind because low insolation levels, and poor correlation with peak demand, make solar PV less effective and more expensive than in other areas.

We believe a first step is to take an objective assessment of the need for further interconnection for NI, particularly from 2030 onwards with expected higher levels of renewables on the system, including significant offshore wind. Assessment could include, for example:

1. the costs and benefits of different levels of interconnection for the NI electricity network (similar to GB's Options Assessment for Interconnectors¹⁰³) taking into account current and proposed Interconnector capacities;
2. the costs and benefits of alternatives to interconnection in addressing the security of supply and other issues which interconnection can mitigate;
3. the consequences of that interconnection being to different foreign electricity networks. In particular, the shared weather patterns of the British Isles need to be taken into account in any interconnection cost benefit analysis; and
4. the need for further North South interconnection (beyond the North South Interconnector currently in development), and further connection of the SEM to continental Europe.

We see this analysis as a major workstream to emerge from the SSFP. In the longer term, assessment of NI's (or the SEM's) need for interconnection, and the signals needed to deliver appropriate amounts at the right time, could be a role for an FSO (or co-ordinating entity).

Gas Interconnection

NI's primary gas interconnection is the [Scotland to Northern Ireland Pipeline](#)¹⁰⁴. NI can also import gas from GB via the [IC2](#)¹⁰⁵ undersea gas interconnector between Scotland and ROI (Gormanston) and the South North gas pipeline. As with the SNIP, the South North pipeline does not currently have bi-directional flow.

Given the flexibility that line pack¹⁰⁶ provides to the gas network, and the lack of need for instantaneous balancing, the role of interconnectors in the gas network is primarily one of supply over daily periods, rather than half hour periods. As noted, there is currently no two-way flow on either of the gas interconnectors that can supply NI. In the future, two-way flow might be considered, especially if NI developed significant hydrogen generation capacity and reverse flow hydrogen was a viable alternative for connecting NI hydrogen with customers via a GB hydrogen pipeline system, or if significant gas storage is developed at Islandmagee.

Outputs

The Department will develop a policy in relation to interconnection to the Northern Ireland energy systems (in particular electricity interconnection). A first step will be to commission an analysis of the costs and benefits to NI of different levels of interconnection in light of the likely changes in generation and demand in NI and also in neighbouring jurisdictions.

103 [Network Options Assessment for Interconnectors - National Grid ESO website](#)

104 [Gas - Mutual Energy website](#)

105 [Second Interconnector - gasnetworks.ie website](#)

106 Line pack is the amount of high pressure gas in gas transmission pipes which can expand and compress to provide some short term flexibility in gas supply.

The policy development will consider issues including:

1. the services that interconnection can provide to the NI network (both direct and multi-purpose interconnectors);
2. the alternative sources of those services, and how do their costs and benefits compare to those of interconnection;
3. the need of the NI network for interconnection, particularly in light of the nature of NI's network. Is the EU average target of 15% by 2030 appropriate for NI;
4. who should develop the analysis of such need e.g. SONI, NIEN, UR, an independent consultant;
5. whether NI needs a policy on the amount of interconnection which is desirable and the form and amount of any support mechanism to deliver the preferred amount;
6. whether NI needs to develop a specific licensing regime for interconnectors, either as a sub-set of generators or as a separate licensable activity, with appropriate conditions for interconnector licences;
7. whether there are other jurisdictions on which NI should base its assessment and/or regulatory framework, and/or support mechanism;
8. routes to market for services which interconnectors can provide, and developments needed in routes to market to facilitate appropriate levels of interconnection;
9. barriers to interconnectors to NI which inhibit them providing the full range of services to the NI electricity network of which they are capable; and
10. barriers to developing new interconnection to NI.

Questions

1. Does interconnection require a separate licensing and regulation regime, or can it be satisfactorily encompassed within the existing licensing regimes with appropriate, interconnection specific, licence conditions in existing licensing regimes?
2. What are the specific issues of interconnection that are most likely to need specific regulation? Please provide your reasons.
3. How should NI's overall need for interconnection to deliver its energy and carbon targets be determined, and which entity should be considered to determine that need?
4. Should NI look at the need, costs and benefits of a support scheme for interconnection as a Flexibility Service, or as a Security of Supply service, in NI? Please provide your reasons.

Hydrogen

Hydrogen is potentially a significant facilitator of energy flexibility services in NI, both in terms of supply and demand. Hydrogen has numerous uses in hard to decarbonise sections of industry and, depending on price and available supply, may have a role in power generation (as demonstrated by the [B9 LODES](#)¹⁰⁷ project relating to hydrogen combustion in an OCGT). Subject to similar caveats, hydrogen may have a role for domestic heating, depending on boiler type.

107 [Government boost for new renewable energy storage technologies - gov.uk website](#)

On the other hand, NI has no industrial centres which would have a high usage of hydrogen, and transport of hydrogen from NI to demand centres (such as shipping liquid hydrogen) may be infeasible¹⁰⁸. In the maritime sector, green hydrogen produced ammonia as an energy carrier is a potential option and green hydrogen [eMethanol](#)¹⁰⁹ as a low carbon fuel.

The production of green hydrogen via electrolyzers using either normal grid electricity, or otherwise curtailed wind, should be explored further for flexibility services, and for hydrogen generation from surplus wind as an alternative to curtailment, DSR, other storage vehicles, or interconnection. Such uses would be subject to the economics, and other use cases for hydrogen in NI.

Hydrogen may be used as a blend with, or as a replacement for, methane in the current gas grid, or for fuelling dispatchable low carbon electricity generation, if there is sufficient produced and stored in NI, at a competitive price. Hydrogen could be used in hybrid heat pumps as a blend or as the sole gas (especially as a tool to reduce peak electricity demand). NI is well placed to use hydrogen given the recent installation of its gas network, and therefore, most of the NI distribution gas network is made from hydrogen impermeable, polyethylene pipeline.

A further option for the energy mosaic is the use of hydrogen fuel cells. Low temperature domestic fuel cells attain up to 50% efficiency generating electricity and the heat generated can be used to heat the house or hot water for the house¹¹⁰¹¹¹. Using the waste heat materially increases the overall efficiency of the process.

DfE has a multi-disciplinary team developing a hydrogen strategy for NI. NI takes its lead on hydrogen from the UK Hydrogen Strategy. DfE is currently drafting a NI Green Gas Hydrogen policy. A consultation on the policy will issue early 2024 for comment. The SSFP team will continue to liaise with the DfE hydrogen team to ensure the strategies are developed in a complimentary and cohesive manner.

Questions

1. How should hydrogen be incorporated into NI's SSFP? Please provide your reasons.
2. What roles should DfE be investigating for hydrogen in NI's energy system?

Biomethane

Biomethane is another low carbon energy vehicle, with many similar characteristics to hydrogen (but some quite different). NI has a significant biomethane potential from its agricultural industries, and there are currently approximately 80 anaerobic digestion sites in the country. However, the current biomethane production is relatively small compared to NI's current fossil gas use.

108 However, proposals have been put forward for hydrogen pipeline from GB to Europe which could materially affect the production and use case for hydrogen in NI - [Netzerotc.com website](#)

109 [Green hydrogen-based E-fuels \(E-methane, E-methanol, E-ammonia\) to support clean energy transition: A literature review - ScienceDirect website](#)

110 [Fuel Cell Basics | Department of Energy \(www.energy.gov\)](#)

111 [Hydrogen Fuel Cells Fact Sheet \(californiahydrogen.org\)](#)

Biomethane can be injected into the existing methane gas network, or be used to decarbonise some of the hard to decarbonise sectors of industry. However, there are logistical issues in transporting its usual primary source (animal slurry or chicken litter). There are also high costs in upgrading biogas to biomethane (dewatering, decarbonising and other cleaning), purchasing propane which must be used to increase the calorific value of the biomethane, and connecting to the network. DfE will be conducting a Call for Evidence in relation to biomethane in 2024. The number of biomethane plants needed to inject into the gas network will be one of the issues consulted on.

Many rural anaerobic digestion plants at present are also far from any gas infrastructure, so it is not envisaged that many if any current AD plants will switch to grid injection. Biomethane has the potential to replace a substantial volume of current natural gas demand, but this is dependent on future government policy. To meet system wide needs, the existing gas network would need to be retained as primarily a methane network. Generally, we don't foresee competition between hydrogen and biomethane as we envisage there will not be enough of either due to their likely small-scale production. Sectorisation of the gas network has been suggested by some commenters, e.g. some areas pure hydrogen and some pure biomethane as a functional compromise to make optimal use of both resources.

Biomethane, if used as a fuel for electricity generation has the potential to provide significant low carbon, dispatchable flexibility to the electricity networks. Given the value of gas energy in future renewable based energy systems, it currently appears unlikely that biomethane will be used for low quality heat production such as home heating, unless generating added value as a peak shaving vehicle through hybrid heat pumps, to provide flexibility to the electricity network by reducing peak demand.

Biomethane can also be used as a drop-in fuel for heavy industry in NI, which is facing increasing pressures to decarbonise all aspects of its operation. With most large industrial sites already connected to the gas network, biomethane is ideal for heavy industry as unlike hydrogen, it requires no changes to existing gas equipment/infrastructure. However, producing biomethane is an expensive process, and whilst it is an excellent medium to decarbonise the gas network, this decarbonisation may not be economically viable for NI consumers.

DfE's Green Gas Team is currently developing policy on biomethane, and how best to support and grow the sector, whilst ensuring the key objectives of self-sufficiency in affordable renewable energy are met.

Questions

1. How should biomethane be incorporated into NI's SSFP? Please provide your reasons.

Future technologies

Future technologies are, of course, the unknown unknowns. Except that we are certain:

- that they will arise;
- that we do not know whether they will arise as forms of generation, or storage or other forms of Ancillary Services or Balancing Services;
- they are likely to arise unexpectedly and likely quite quickly; and
- that we will not have made specific preparations for them.

The SEMC [System Services Future Arrangements](#) paper makes clear that future systems services markets will “remain open to new and innovative technologies, with a clear and transparent route for those technologies to establish their capabilities.”

Outputs

The Department will consider the policy and legislative needs to enable NI and its energy systems to deal with new technologies and issues proactively as they arise. This will include:

- the potential for new technologies to emerge in the next 5-10 years;
- how we can encourage and support their emergence; and
- how we can build in the flexibility into the legislative and regulatory regimes to be able to respond agilely.

Questions

1. How should NI’s legislative and regulatory regimes be adapted to provide sufficient agility to incorporate future technologies in a timely manner? Please provide your reasons.

Digitalisation

Digitalisation will be one of the essential parts of developing a smart and flexible system. It has two main elements. The first is gathering detailed, timely and relevant digital information for the system operators, gas and electricity. The second is using that data to plan, develop, operate and control the energy systems. This is likely to remain more important for the electricity system due to its need to balance supply and demand over very much shorter time frames than gas network operators.

Delivering digitalisation has a number of elements. The first is developing data acquisition systems. It, in turn, has separate parts. There are two sources of digitalised data in the NI system. The first is the potential roll out of smart meters in NI which digitalise the end point of the consumer side of the network. Large commercial and industrial consumers are already digitalised with half hourly meters which automatically communicate with their supplier. Smart meters can provide detailed information on a highly granular level and in a timely manner on activity at the very periphery of the grid, allowing system operators much greater visibility of power flows, disruptions and usage patterns. Smart appliances and controls can help control the consumer’s consumption, even further downstream of the meter and supply.

The second source of digitalisation data is the installation of a comprehensive set of measuring and control facilities throughout the electricity networks, on the network side of customer connections. In part, this will be legislated for with the Electricity Directive requirement for the TSO to digitalise the transmission system (Article 40(1)(l) of the Electricity Directive). DfE is currently asking the UR to consider whether a similar requirement ought to be placed on the DSO in respect of the distribution network.

Once data has been acquired it then needs to be used effectively to plan, develop and operate the electricity system. Current examples include NIEN's [LV Active Network Management](#)¹¹² project looking to use intelligent switches and greater visibility of the LV network to increase the capacity of the LV network for LCT and for NIEN's management and maintenance of its LV assets (switches, reclosers, transformers, etc).

That planning and development will require close cooperation between the SOs, the UR and the Department. Part of that cooperation will require large scale sharing of digitalisation data between the SOs. A very significant part of the value in data sharing is the quality and format of data, such that it is easily described, found, shared and used. A significant part of NI's energy digitalisation strategy will be to bring about a uniform format for energy data, with a policy which is based on a presumption of openness. As a member of the [Energy Networks Association's](#)¹¹³ [Open Networks Project](#)¹¹⁴, NIEN already operates on an assumption of "Open Data" in Northern Ireland. NIEN has started to implement this through its "[Open Data Portal](#)¹¹⁵". NI already has an open data policy for NICS data, which is set out in the [Open data strategy for Northern Ireland 2020 - 2023](#)¹¹⁶

Digitalisation is necessary as both the transmission and distribution systems become more complex, as generation becomes more distributed, and Flexibility Services are used as a cheaper and more effective way of managing a decarbonised, distributed energy system safely and reliably. In the future smart flexible system, millions of items and plant will provide a range of Flexibility Services, many in real time supported with Artificial Intelligence controls. Digitalisation will be essential to understand their distribution and state of load or readiness, to manage the electricity system in real time.

In GB, Ofgem published the GB SSFP, with its digitalisation strategy alongside as a separate document "[Digitalising our energy system for net zero Strategy and Action Plan 2021](#)"¹¹⁷. It followed the report in 2019 by the Energy Data Taskforce - "[A Strategy for a Modern Digitalised Energy System](#)"¹¹⁸.

Outputs

The Department will develop a policy on digitalisation of the energy system in Northern Ireland. The issues which it will consider will include:

1. specific stakeholders who should be consulted for NI's digitalisation policy;
2. whether NI should incorporate the digitalisation part of the SSFP within the SSFP, or should publish a stand-alone separate document on digitalisation of the NI energy system;
3. whether the recommendations of the Energy Data Taskforce are directly translatable to NI and if so, whether we should adopt them en bloc;

112 [LV Active Network Management - NIE Networks website](#)

113 [Energy Networks Association \(ENA\) - The voice of the networks \(www.energynetworks.org\)](#)

114 [Open Networks: developing the smart grid - Energy Networks Association \(www.energynetworks.org\)](#)

115 [Open Data Portal | Northern Ireland Electricity Networks \(nienetworks.co.uk\)](#)

116 [Open data strategy for Northern Ireland 2020 - 2023 | Department of Finance \(www.finance-ni.gov.uk\)](#)

117 [Digitalising our energy system for net zero: strategy and action plan 2021 - publishing.service.gov.uk website](#)

118 [Energy Data Taskforce | A Modern Digitalised Energy System - Catapult website](#)

4. what are the costs and benefits of digitalising other parts of the energy system (or requiring their owners and operators to digitalise them) than the transmission and distribution systems and smart meters;
5. are there parts of the energy system, and the energy data set, that would be best managed through a centralised, government controlled or operated, body rather than a decentralised ownership model (Note: the DfE smart meters High Level Design, as part of the smart meter implementation plan which has commenced, will recommend the organisation who should store and maintain data from smart meters);
6. whether NI should formally adopt the “data is open” assumption across all energy data unless specific security issues are demonstrated¹¹⁹; and
7. what are the most appropriate incentives for the different agents within energy data systems to adopt digitalisation and best practice data management and sharing practices.

Questions

1. What aspects of energy data regulation and policy should be determined by DfE and the UR, and what aspects should be developed by other NI departments or agencies, for example, under wider holistic data regulation?
2. What aspects of energy data regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE’s proposed Working Group? Please provide your reasons.
4. How much of GB’s energy digitalisation policy is directly transferable to NI? Have you any specific examples of issues where an alternative approach would be required or preferred?

Markets to reward flexibility

The infrastructure for Flexibility Services can be expensive and slow to develop and construct. The market for their services is new and developing. The volume and consistency of revenues to support Flexibility Services and to provide appropriate signals to developers is uncertain. However, it is certain that renewables dominated electricity networks will require greater amounts of Flexibility Services to manage the variability of both demand and supply. As noted above, this was previously managed by turning fossil fuel generators up or down. The SEMC’s System Services Future Arrangements puts in place a framework for the competitive procurement of System Services at the wholesale, All Island level, required for the stable and secure operation of the power system across the island of Ireland.

The regulatory arrangements will need to provide a clear pathway forward for developing markets and products. This will provide the necessary signals and incentives for developers to deliver the infrastructure and Flexibility Services that the network operators need to deliver and operate a safe, reliable and affordable decarbonised electricity system.

¹¹⁹ As a member of the Energy Networks Association’s Open Networks Project, NIEN already operates.

This process will need to be conducted with the SEM and regulatory agencies in RoI, as well as industry and consumer stakeholders. Part of developing this aspect of the SSFP will involve engagement with the SEMC and regulatory stakeholders in RoI in the development of the proposed System Services Code.

Flexibility Services will likely be procured at SEM SO level through the SEM System Services markets, but also at DSO level as more Flexibility Services plant connects to the distribution system, and the DSO must manage an increasingly complex network. The SSFP will need to address how the DSO will be able to procure the Flexibility Services it needs to operate the distribution system, how Flexibility Services produced on the distribution system will be available to the SO and TSO to operate the overall system safely reliably and affordably. The coordination of TSOs and DSOs has been discussed earlier in this document, and it will be a key part of managing and delivering Flexibility Services in NI.

DSR

Demand Side Response is likely to become one of the large sources of flexibility services. In large part that will be enabled by smart meters and Time of Use tariffs if smart meters are introduced by NI. Other drivers will be the advent of aggregators, smart appliances, remote control opportunities of smart appliances, suppliers offering smart tariffs based on DSR and other services made available by consumers, and most importantly, by economic signals from SOs through flexibility markets which will be developed.

NIEN has completed, and is currently conducting or supporting, a number of innovative trials, supported by funding approved by the UR under the RP6 price control, including the Flex, Girona and Energy Cloud projects.

FLEX

Flexibility - a customers' ability to modify their generation or consumption in reaction to an external signal thereby providing a service to the electricity system.

NIEN's 2021 **FLEX** project studied consumers' ability and willingness to vary their electricity consumption to help NIEN manage network congestion and to match demand and supply. It has been run in areas of network congestion, and currently only with consumers with half hourly metering i.e. commercial and industrial consumers or those domestic consumers with Smart Meters. Consumers bid into a market designed by NIEN, offering demand capacity.

NIEN designed three products with different types of flexibility. "Sustain", a scheduled reduction in peak loading, "Secure", a 24 hour notice reduction based on near term forecasts, and "Dynamic" a responsive flexibility activated with only three minutes notice.

NIEN successfully awarded contracts with consumers for 20 MW of power in 11 congestion zones in NI relating to a wide range of assets worth £400,000 in a cost comparable to established flexibility markets in GB.

NIEN currently intends to extend the trial into 2024.

In a rapidly developing area, National Grid ESO in GB has received Ofgem approval for its [Demand Flexibility Service](#)¹²⁰, which is also a market based DSR Flexibility Services programme to allow ESO to procure demand side flexibility. Its terms are similar to NIEN's Flex trial. A number of GB DNOs^{121 122} have also launched flexibility markets in their distribution areas which operate similarly to FLEX. UK Power Networks released a [500MW tender](#)¹²³ for flexibility using the [Piclo](#)¹²⁴ market application. Flexibility Services in GB are being facilitated by Market Wide Half Hourly metering being rolled out in GB. Prices offered vary with the different terms of the schemes, from [£3,000 MWhr](#)¹²⁵ offered in the NG ESO trials to [£600/MWhr](#)¹²⁶ in the UKPN tender.

The UKPN tender specifies a number of areas within its network for demand increase and different sites for demand reduction services being required.

Output

The Department will develop policy on Demand Side Response. In part this will inform the Department's transposition of the Electricity Directive, including Article 17, which requires NI to allow and foster participation of demand response through aggregation. The Electricity Directive has other provisions which require support for aggregation and DSR, especially where the TSO or DSO are procuring ancillary services.

In developing policy in relation to DSR, the Department will consider, at least:

1. the potential size of the DSR market;
2. potential providers of DSR and particular needs or features of different providers which will need to be addressed to ensure they can participate efficiently and effectively in the Flexibility Services markets;
3. barriers to developing DSR markets and products in NI (including any SEM issues);
4. methods to mitigate barriers to DSR markets and achieve their potential;
5. information that SOs should be required to provide to the market to facilitate development of business cases for DSR and other Flexibility Services;
6. incentives for SOs to adopt DSR and other Flexibility Services as network management options compared to physical network reinforcement;
7. licensing requirements for DSR providers/aggregators; and
8. whether DSR should be made a separate licensable activity (or whether a separate, wider licensable activity of providing Flexibility Services should be developed and DSR could be a sub-category of the Flexibility Services licence with conditions determined by the UR after consultation).

120 [Demand Flexibility Service - National Grid ESO website](#)

121 [Western Power - Flexibility tender - National Grid website](#)

122 [Our launch of GB's first USEF flexibility market - SP Energy Networks website](#)

123 [Autumn 2023 Flexibility Tender UKPN - Cloudfront.net website](#)

124 [Dashboard - Piclo Flex website](#)

125 [Demand Flexibility Service - Guaranteed Acceptance Price - National Grid website](#)

126 [Flexibility-Post-Tender-Report-Aug-2022.xlsx - Live.com website](#)

Support

NI does not currently have a Contracts for Difference (**CfD**) scheme and has not had an open support scheme for renewable generation since the closure of the [NIRO](#)¹²⁷. The 2022 Energy Strategy Action Plan item 12 commits to consult on a renewable energy support scheme and the Department has published a [consultation document](#)¹²⁸ on the design considerations for a renewable support scheme in Northern Ireland.

A range of different support schemes is used in different jurisdictions¹²⁹. Support schemes have been used to support renewable generation, and are currently being reviewed in some jurisdictions to support the provision of services such as energy storage and Flexibility Services.

CfDs

CfDs are a support mechanism which provide a more controlled level of support, and the CfD auction processes used in GB for renewable electricity generation support have delivered the most cost effective and robust projects winning contracts. CfDs provide developers of projects that have high upfront costs and long lifetimes, with direct protection from volatile wholesale prices, and they protect consumers from paying support costs when electricity prices are high and support is not needed. GB has developed a strong CfD mechanism, and significant organisational infrastructure, mainly for offshore wind generation. CfDs are bid for competitively by commercial operators rather than government seeking to determine the optimum price. CfDs can be structured to provide specific cost/price parameters, or a band by placing a cap or floor or both onto the terms. This approach has been adopted in the current GB electricity interconnector support mechanism.

Although they have been used largely for support of renewable generation, the Cap and Floor system of regulatory support for interconnectors operates similarly to CfDs, and provides a slightly different model. The interconnector Cap and Floor model invites us to think more widely for using the CfD or Cap and Floor model for supporting services which a renewable network needs, but which the market does not appear to be providing without further signals/incentives. Long duration storage may be a network service which could deliver the needed services with a version of the CfD or Cap and Floor support.

127 [Northern Ireland Renewables Obligation - Department for the Economy website](#)

128 [Consultation on Design Considerations for a Renewable Electricity Support Scheme for Northern Ireland - Department for the Economy website](#)

129 [Rethinking Electricity Markets - The case for EMR 2.0 - Catapult Energy Systems website](#)

RTFO

The [Renewable Transport Fuel Obligation](#)^{130 131} (**RTFO**) is a UK wide support scheme designed to decarbonise the transport industry. It is administered by the GB Department for Transport (**DfT**) and requires any fuel supplier, which supplies more than 450,000 litres of relevant types of fuel annually, to ensure that a certain percentage comes from renewable sources. Producers of renewable transport fuels, such as hydrogen and biomethane can claim RFTO Certificates (**RFTCs**) for their production which they can then sell to fuel suppliers to meet their RFTO. However, if fuel has been separated from its RFTC it can no longer be sold or marketed as low carbon fuel. In an NI context, it is expected that a large number of biomethane plants and prospective plants will participate in the RTFO scheme.

A major challenge of DfE Gas Team is to explore NI centred alternatives to the RTFO, which are funded by a cost base that is magnitudes smaller. Currently, many NI renewable gas credits are sold into the UK RTFO scheme. A NI version would allow NI gas users access to renewable gas credits.

Output

The Department will consider the policy needs for support, or routes to market, in the relevant particular areas.

Markets for System Services

The SEM Committee (**SEMC**) is currently reviewing the [SEM System Services](#)¹³² processes and markets for the SO to procure system services for the All Island electricity network, including flexibility services.

Electricity System Services are currently procured by the SO under the [DS3](#)¹³³ (Delivering a Secure Sustainable System) which was introduced in 2015 to put in place system policies, tools and performance to allow the electricity system to operate safely with a high penetration of wind. Under DS3, the SO procures system services from qualified providers using regulated tariffs set by the SEMC.

The SEMC has published a series of papers on “[System Services Future Arrangements](#)¹³⁴” under which it proposes that post 2023, the SO will procure short-term system services under a daily auction framework, combined with medium and long-term contracts needed to provide signals for investment and construction of flexibility infrastructure.

130 [RTFO Compliance Guidance 2023 Final v2 - publishing.service.gov.uk website](#)

131 The [Renewable Transport Fuel Obligation - gov.uk website](#) (RTFO) supports the UKG policy on decarbonising transport by encouraging the production and use of renewable. Under the RTFO, suppliers of relevant transport fuel in the UK must be able to show that a percentage of the fuel they supply comes from renewable and sustainable sources. Biomethane is a potential source of RTFO certificates, and is open to NI producers.

132 [System Services Future Arrangements Scoping Paper - The Single Electricity Market Committee website](#)

133 [SEM-14-108 DS3 System Services Decision Paper - The Single Electricity Market Committee website](#)

134 [System Services Future Arrangements High Level Design Decision Paper - The Single Electricity Market Committee website](#)

DfE and the UR will liaise closely with SEMC to ensure that the System Services – Future Arrangements, and the SSFP are closely aligned in delivering a smart, sustainable and flexible electricity system which can help deliver Northern Ireland’s net zero targets.

As noted above, NIEN published a consultation document in July 2023 concerning [Flexibility Services Procurement](#)¹³⁵. The document sets out NIEN’s proposals for how it will procure Flexibility Services for management of the distribution system. The statement reflects the principles set out in NIEN’s relevant licence conditions and the principles set out in the Electricity Directive 2019 on procurement of flexibility and ancillary services.

Questions

1. Should flexibility markets at transmission and distribution levels be regulated separately, or should a uniform regime be adopted?
2. What aspects of flexibility markets should be harmonised with RoI? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE’s proposed Working Group? Please provide your reasons.

Innovation funding

Innovation is risky, by definition. It will involve successes and failures. It will be costly at times, and will provide great savings and efficiencies at other times.

GB has a well-developed and well-funded innovation system for its gas and electricity systems ([Strategic Innovation Fund](#)¹³⁶). NI can be a fast follower of GB innovations, and an active participant in GB innovation systems.

However, NI’s electricity system (as part of the SEM) is at the leading edge of incorporating renewable, low carbon, non-dispatchable and non-synchronous generation. In many cases NI will need to innovate because it is ahead of many other markets/systems so there may not be initiatives on which NI can be a fast follower.

Innovation will come from many sources. The primary innovators are likely to be SEMC, the electricity SOs, SEMO, SONI, NIEN and the gas TSO and DNOs, supported by academia, and developers looking to introduce new services or plant. Article 12(5) (d)¹³⁷ of the Energy Order 2003 requires the Department and the UR, in carrying out their functions, to promote research into, and the development and use of, new techniques by or on behalf of persons authorised by a licence to generate, supply, distribute, or participate in the transmission of electricity (with similar obligations in respect to gas and water consumers in NI). The UR currently allows NIEN funds in its price control revenue to allow it to undertake [innovation projects](#)¹³⁸.

135 [Flexibility Procurement Statement - NIE Networks website](#)

136 [Strategic Innovation Fund \(SIF\) - Ofgem website](#)

137 [Article 12\(5\)\(d\) of the Energy Order 2003 The Energy \(Northern Ireland\) Order 2003 - legislation.gov.uk website](#)

138 [Innovation Projects - Northern Ireland Electricity Networks website](#)

Mechanisms will need to be in place for learning lessons from successful and from unsuccessful innovation projects (especially those supported by government/consumers).

Output

The Department will consult on the best approach to innovation in NI. Issues which will be included in the innovation review will include:

1. the degree to which NI can be simply a fast follower of GB and other jurisdictions, or needs to stimulate innovation within NI and the NI electricity system;
2. appropriate methods for selecting innovation projects on a whole of system basis to make the most of the limited innovation funding that will be available in NI;
3. potential sources of funding innovation and how to administer to best effect;
4. appropriate methods to invite/promote innovation for areas of identified need;
5. methods to facilitate NI entities participating in GB and RoI innovation programmes and projects;
6. any potential changes to the regulatory or legislative framework;
7. potential need for reporting requirements for the UR and SOs on their innovation work each year and innovation opportunities for NI; and
8. other government support mechanisms for innovation in the electricity system.

Questions

1. Is innovation within energy systems sufficiently different from other areas of the economy that it needs separate policy or support to that currently provided by DfE?
2. What role should routine funding to the DSO and TSO play in innovation?
3. Should the DSO and TSO have explicit innovation targets and funding?
4. Should innovation funding from network charges be solely available to the TSO and DSO, or should the UR consider third party innovation proposals?

Skills

The energy transition will require a new range of skills, and a much larger workforce with these skills to deliver the changes in the energy system needed to reach the net zero target in time. Under Action 5 of the 2022 [Energy Strategy Action Plan](#) DfE carried out¹³⁹ an Energy Skills Audit for energy decarbonisation. The [2023 Energy Strategy Action Plan](#)¹⁴⁰ built on this to commence implementation of a skills development plan based on the findings of the skills audit.

139 [Investigating the skills required for a transition to an advanced zero emission, indigenous diverse energy secure and circular economy in Northern Ireland: Summary Report - Department for the Economy website](#)

140 [Energy Strategy - Path to Net Zero Energy. Action Plan 2023 - Department for the Economy website](#)

Questions

1. Is skills development for energy systems sufficiently different from other areas of the economy that it needs separate policy or support to that currently provided by DfE?
2. What role should routine funding for the DSO and TSO play in skills development?
3. Should the TSO and DSO have specific skills targets and funding?

Next steps

The Department will consider the feedback it receives from this consultation. It will publish a response and decision document responding to the feedback it receives and set out its decisions on the issues raised in this consultation paper. The Department may contact individual responders to clarify any aspects of their submissions if it considers it desirable to do so.

The Department will then develop its internal work plans for the actions which come from this consultation and publish consultation documents as those actions are progressed.

Questions

FSO

1. Do you consider that the FSO concept contains enough potential benefits to NI to warrant a DfE policy project? Please provide your reasons.
2. What aspects of NI's energy system would benefit from being controlled by an FSO type body?
3. What structures for a potential FSO type body should DfE consider?
4. What aspects of the GB model should NI consider, or reject?

TSO and DSO interaction

1. Do you consider that the level and nature of TSO/DSO cooperation in NI warrants a policy/licensing review?
2. What areas of TSO/DSO cooperation being improved would most benefit NI?
3. Are there any costs which might be incurred by mandating increased TSO/DSO cooperation, and which should be included in any policy/licensing review?

Monitoring Flexibility

1. Do you consider that monitoring flexibility is a viable concept for DfE to consider?
2. Which organisation would be best placed to monitor system flexibility?
3. Is the GB SSFP Monitoring Framework an appropriate place for the policy consideration to commence?

Consumer Protection and Engagement

1. Do you think that DfE should progress a workstream to assess:
 - a. whether domestic consumers would be willing to reduce their demand at peak times to reduce their energy bill;
 - b. whether it is likely to be cost effective; and
 - c. how such a function should be facilitated and regulated?

If not, do you have any suggestions of alternative means to reduce energy demand that DfE should investigate or develop policy?

2. Are there other issues relating to consumer protection that you think should be included in a proposed DfE work stream on Demand Response services?
3. Please rank the following consumer information requirements for any future Demand Response policy workstream, in order of importance with 1 being most important and 6 the least important.
 - a. Detailed advice about how to use a smart meter
 - b. More accurate information about a household's energy use
 - c. Energy use reduction to save money
 - d. Energy use reduction to lower carbon emissions
 - e. Avoiding disconnection
 - f. Other related issues
4. Can you identify any other barriers for consumers in the future which DfE should address in any future policy workstream in this area?

5. What actions should be taken to protect and engage with vulnerable or disengaged consumers in the process of developing any DfE policy workstream in this area?

Smart Meters

There are no specific questions in relation to smart meters given the extensive consultation programme that will inform the smart meter implementation planning.

Integrated Energy Service Providers

1. Do you consider that aggregation services will require a new licensing regime, or can they be fitted within NI's existing licensing regime? Please provide your reasons.
2. What barriers currently exist in NI's regulatory regime to aggregators operating in NI?
3. What are the main consumer protection issues that should be considered?
4. What aspects of the GB model should NI consider, or reject?

Smart Buildings and Appliances

1. Do you consider that policy for smart buildings and appliances should be developed by DfE and UR, or other government/regulatory agencies? Please provide your reasons.
2. To what extent should NI adopt GB regulation of the areas, or even seek to make GB regulation apply UK wide?

Smart EV Charging

1. What aspects of smart EV Charging regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.
2. What gaps in the UK's Smart EV Charging regulation and policy currently exist for NI i.e. which part are GB only and NI needs to address? Please provide your reasons.

Cybersecurity

1. What aspects of electricity network, and electricity consumer, cybersecurity regulation and policy should be determined by DfE and the UR, and what aspects should be developed by other NI departments or agencies?
2. What aspects of electricity network, and electricity consumer, cybersecurity regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.

Community Energy Solutions

1. What aspects of CEC regulation and policy should be determined by DfE and the UR, and what aspects should be developed by other NI departments or agencies?
2. What roles of CECs are most likely to need specific regulation? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.

Upstream Flexibility

Storage

1. Does energy storage require a separate licensing and regulation regime, or can it be satisfactorily encompassed within the existing licensing regimes with appropriate, storage specific, licence conditions in existing licensing regimes?
2. What are the specific issues of storage that are most likely to need specific regulation? Please provide your reasons.
3. How should NI's overall need for storage to deliver its energy and carbon targets be determined, and which entity should be considered to determine that need?
4. What barriers for storage as a Flexibility Services in NI should DfE and the UR address?
5. Should NI look at the need, costs and benefits of a support scheme for storage as a flexibility service, or as a Security of Supply service, in NI? Please provide your reasons.

Interconnection

1. Does interconnection require a separate licensing and regulation regime, or can it be satisfactorily encompassed within the existing licensing regimes with appropriate, interconnection specific, licence conditions in existing licensing regimes?
2. What are the specific issues of interconnection that are most likely to need specific regulation? Please provide your reasons.
3. How should NI's overall need for interconnection to deliver its energy and carbon targets be determined, and which entity should be considered to determine that need?
4. Should NI look at the need, costs and benefits of a support scheme for interconnection as a Flexibility Service, or as a Security of Supply service, in NI? Please provide your reasons.

Hydrogen

1. How should hydrogen be incorporated into NI's SSFP? Please provide your reasons.
2. What roles should DfE be investigating for hydrogen in NI's energy system?

Biomethane

1. How should biomethane be incorporated into NI's SSFP? Please provide your reasons.

Future Technologies

1. How should NI's regulatory regime be adapted to provide sufficient agility to incorporate future technologies in a timely manner? Please provide your reasons.

Digitalisation

1. What aspects of energy data regulation and policy should be determined by DfE and UR, and what aspects should be developed by other NI departments or agencies?
2. What aspects of energy data regulation and policy should be determined by NI, separately to GB policy/regulation? Please provide your reasons.

3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.
4. How much of GB's energy digitalisation policy is directly transferable to NI?

Markets to Reward Flexibility

1. Should flexibility markets at transmission and distribution levels be regulated separately, or should a uniform regime be adopted?
2. What aspects of flexibility markets should be harmonised with RoI? Please provide your reasons.
3. What agencies and stakeholder groups should be represented on DfE's proposed Working Group? Please provide your reasons.

Innovation Funding

1. Is innovation within energy systems sufficiently different from other areas of the economy that it needs separate policy or support to that currently provided by DfE?
2. What role should routine funding for the DSO and TSO play in innovation?
3. Should the DSO and TSO have explicit innovation targets and funding?
4. Should innovation funding from network charges be solely available to the TSO and DSO, or should the UR consider third party innovation proposals?

Skills

1. Is skills development for energy systems sufficiently different from other areas of the economy that it needs separate policy or support to that currently provided by DfE?
2. What role should routine funding for the DSO and TSO play in skills development?
3. Should the TSO and DSO have specific skills targets and funding?

Glossary

aggregators: agents who act on behalf of multiple smaller (often consumer) accounts to gain the benefit of trading in wholesale markets.

Ancillary Services: services, including demand response, that a System Operator uses to ensure the security and stability of the electricity system.

behind the meter: appliances which are connected on the customer's side of the electricity meter.

Carbon Capture and Storage: capturing Carbon Dioxide from emission sources (such as gas power stations) and placing in long term storage e.g. underground caverns.

decentralised: generation, or other services, from multiple, geographically dispersed providers. Compared to a few very large fossil fuel providers.

demand side services: reduction or increase in demand by consumers (domestic or commercial) in response to signals from an aggregator or the system operator.

Dunkelflaute: periods of multiple days, usually in winter, where there is little wind blowing (potentially also low sunshine, but less relevant in NI).

dynamic line rating: setting the allowed current on an electricity line based on its inherent capacity as modified up or down by the existing weather around it.

EVCP0: Electric Vehicle Charge Point Operator.

Flexibility Services: similar to DSR, increasing or decreasing electricity demand/consumption in response to a signal from the system operator.

flexible: is the ability to shift in time or location the consumption or generation of energy.

interconnection: electricity connection between electricity systems of different jurisdictions. Note: NI and RoI are the same electrical system, so links between them are not interconnection.

iSEM: Integrated Single Electricity Market, the market on which all electricity in the island of Ireland is traded.

LV visibility: the ability of the DSO to observe assets, activity and processes occurring at the Low Voltage (most distant) part of the distribution network.

LV: Low Voltage, the level at which most houses and businesses are connected to the electricity network.

non-dispatchable; generation which depends on non-controllable factors, such as wind or sunshine.

non-synchronous: generation which connects to the electricity network via an electronic controller, so is not directly synchronised with the frequency of the network.

RP7: Price Control no. 7 for NIEN, controlled and approved by UR.

SEMO: Single Electricity Market Operator, the body which conducts the SEM electronic markets.

smart appliances: appliances which are able to respond to signals to change their level of electricity use.

Smart EV charging: shifting the time at which EVs charge away from peak demand periods to low demand and high renewable periods, usually in response to a signal from the System Operator or an aggregator.

Smart tariffs: electricity tariffs which vary over time, designed to encourage less consumption in peak, congested periods, moving it to periods of less demand and more available renewable electricity.

smart: means the ability of a device to respond in real time to communication signals, using digital technologies, to deliver a service.

SO: System Operator, of either the transmission or distribution system.

Time of Use tariffs: see Smart Tariffs.

Research, Consultations and Trials

1. NIEN – FLEX trial – DSR flexibility services
[FLEX | Northern Ireland Electricity Networks \(nienetworks.co.uk\)](https://nienetworks.co.uk)
2. NIEN – FES – Facilitation of Energy Storage Systems
[FESS | Northern Ireland Electricity Networks \(nienetworks.co.uk\)](https://nienetworks.co.uk)
3. NIEN – Networks for Net Zero – NIEN’s network decarbonisation plan
[networks-for-net-zero](https://nienetworks.co.uk/networks-for-net-zero)
4. NIEN – RULET Rural smart meters, batteries and EVs
[Rulet | Northern Ireland Electricity Networks \(nienetworks.co.uk\)](https://nienetworks.co.uk)
5. NIEN – Girona – smart microgrid
[Girona | Northern Ireland Electricity Networks \(nienetworks.co.uk\)](https://nienetworks.co.uk)
6. NIHE/NIEN – Handiheat – heat efficiency and renewable energy solutions
[HANDIHEAT \(interreg-npa.eu\)](https://interreg-npa.eu)
7. SONI – Shaping Our Electricity Future – delivering SONI’s decarbonisation ambition
[Full Technical Report on Shaping Our Electricity Future.pdf \(soni.ltd.uk\)](https://soni.ltd.uk)
8. SONI - Tomorrow’s Energy Scenarios 2020 – Analysis of network needs to deliver decarbonisation
[TESNI-SNA-2020.pdf \(soni.ltd.uk\)](https://soni.ltd.uk)
9. NIEN – Open Data Portal – <https://www.nienetworks.co.uk/open-data-portal>
10. ESNB – Beat the Peak programme – <https://www.esbnetworks.ie/who-we-are/beat-the-peak/overview>
11. DfE – Energy Transition Model
12. DfE – Quintel – Interconnection modelling for NI
13. DfE – QUB – Pr Aoife Foley – British Isles Dynamic Grid Study
14. Peer to peer grid in local housing schemes – pages 31-41 Passive House Plus (Sustainable building) issue 41.

Annex A

Working Group

DfE and the UR convened a Working Group to provide expertise, advice and critical review of the development of the design consultation for the SSFP. We are deeply grateful for their input, time, energy and commitment to this important project. The project is materially improved for their input. Parties invited to join the Working Group include:

- DfE – Teams from: Consumers, Electricity Networks, Energy Intelligence, Green Gas, Heat, Hydrogen and Advanced Technologies, Renewables, and Security of Supply.
- Department for Infrastructure (planning)
- Department of Finance (building regulations)
- The Northern Ireland Authority for Utility Regulation – Networks
- Northern Ireland Electricity Networks Limited
- SONI Limited
- EirGrid Ltd
- Electricity Suppliers:
 - Power NI Energy Limited
- Gas DNOs, Gas Suppliers:
 - Firmus Energy (Supply) Limited
 - Mutual Energy
 - SSE Airtricity Gas Supply (NI) Limited
- Renewables NI
- Northern Ireland Housing Executive
- Consumer Council of Northern Ireland
- National Energy Action Northern Ireland
- Energy Saving Trust
- NI Chamber
- Confederation of British Industry
- Academia:
 - Pr. P Keatley UU, Pr. Aoife Foley QUB

NI Energy Strategy – Action Plan item 19

Prepare a Northern Ireland Smart Systems and Flexibility Plan

Terms of Reference

Background

The Department for the Economy (DfE) with support from the Utility Regulator (UR), is required to prepare a Northern Ireland centric Smart Systems & Flexibility Plan (SSFP) under the Energy Strategy – Path to Net Zero Energy to set a pathway to transform the current NI electricity networks into a smart flexible energy network.

The SSFP will consider key issues such as desired outcomes, flexibility opportunities and barriers for both consumers and networks. Digitalisation needs and future markets for flexibility will also be considered. The SSFP will set out a series of outputs or roadmap of actions which will help address any gaps or barriers to achieving a smart and flexible network.

Roles and Responsibilities

A steering group consisting of DfE & UR will set the scope of the SSFP, the agenda for upcoming meetings, prepare papers and select the topics for discussion. The steering group will retain policy responsibility and make recommendations for final proposals to the Minister or senior management.

Development of the SSFP will be overseen by the steering group and supported by a working group made up of key stakeholders who will provide technical advice and evidence.

Membership of the working group does not confer any authority on organisations to make representation that they are acting on behalf of The Department for the Economy or the Northern Ireland Executive.

There will be no voting rights within the working group.

Stakeholder Engagement

In 2017 UK Government published a GB Smart Systems & Flexibility Plan which went to a public consultation. In July 2019 BEIS published an update to this plan following significant stakeholder engagement. The working group will use GB's SSFP as a starting point and guide but focus on NI specific needs and objectives.

A consultation will be developed and published to inform a final plan. The group will hold workshops with industry representatives and other stakeholders to focus on the areas to be included in the draft plan.

Focused sessions with relevant organisations and policy leads have been held over recent months to develop an initial outline of the plan. The working group will now be formally convened to provide a collective review of the proposals and agree the draft plan which will be consulted on more widely. The initial meetings are likely to be twice-monthly if possible, with timings to be reviewed on completion of the draft plan. The Working Group will be asked to continue to provide support to the workstream into 2023 as we consult on the plan and finalise it.

Meetings will be minuted.

This is a development forum and commercially sensitive material or policy in development may be discussed. Therefore, there needs to be confidentiality within the group, and members should refrain from posting any details of the discussions on social media. Information disclosed should not be discussed outside this forum.

Responsibilities

ROLE OF STEERING GROUP (DfE &UR)

- Set scope of plan and direction of group.
- Set agenda.
- Set topics for discussion.

ROLE OF DfE (POLICY LEAD) & UR

DfE & UR as lead organisations will:

- To agree and set objectives.
- Agree workstreams.
- Overall responsibility for the project.
- DfE Head of Electricity Networks will act as policy lead.
- DfE and UR to publish papers and lead stakeholder engagement.

The policy lead will also:

- Agree primary issues and structure of SSFP.
- Produce a draft SSFP for consultation.
- Analyse responses to the consultation.
- Engage with stakeholders and responders where necessary to understand responses.

In delivering these outcomes, the team will:

- Liaise with stakeholders as required to develop the plan, which may include external academic or business stakeholders and ensure that, where relevant, this engagement is shared as appropriate.
- Analyse relevant responses to the consultation on the draft Smart Systems & Flexibility Plan and direct interactions with relevant stakeholders;
 - Identify key issues which should be included in a NI Focused Smart Systems & Flexibility Plan.
 - Collate evidence and data that will help inform both strategic decisions and specific policies to support and deliver strategic aims.
 - Identify gaps in evidence and take action to fill these gaps or bring the issues to the attention of the wider group.
 - Identify areas where low-regret or clear options exist and ascertain need and opportunities for progress in these areas in advance of the Smart Systems and Flexibility Plan being finalised.
- Contribute to consideration of potential measurement and monitoring of implementation of the Smart Systems & Flexibility Plan.

ROLE OF TECHNICAL WORKING GROUP

It is expected that the working group will:

- Participate in relevant workstream meetings.
- Provide critical friend role.
- Provide input and draft papers.
- Provide data and expertise.
- Attendance will be agenda dependent requiring only relevant members to participate.

Timeframe

The group will operate for the duration of the period of the development of the NI Smart Systems & Flexibility Plan. A draft plan is expected to be prepared and consulted on in early 2023, following which the SSFP can be finalised and published.

The membership and structure of the group will be reviewed regularly to ensure appropriate representation.

Membership and Structure

The membership and structure of the Working Group will be determined by DfE and UR in consultation with stakeholders.

Meeting Arrangements

The Working Group will meet as directed by the Policy Lead.