Northern Ireland Affairs Committee Inquiry into Renewable Energy and Net Zero in Northern Ireland

Written Evidence from SONI (System Operator for Northern Ireland)

January 2024

SONI

Castlereagh House, 12 Manse Road, Belfast BT6 9RT
Telephone: +44 28 9079 4336 • www.soni.ltd.uk

EXECUTIVE SUMMARY

1.0 As Northern Ireland's Transmission System Operator (TSO) SONI (System Operator for Northern Ireland) welcomes the opportunity to contribute to the Northern Ireland Affairs Committee (NIAC) Inquiry into Renewable Energy and Net Zero in Northern Ireland. The Inquiry offers an important opportunity to consider the progress that has been made, the measures required and the challenges that need to be addressed to meet the 2030 targets and Northern Ireland's future net zero ambitions.

2.0 The 2030 targets are hugely challenging in both their scale and complexity. Achieving these targets will require a continuation of the close collaboration that has delivered the progress made to date alongside timely reform, innovation and agility in policy and practice. Well managed strategic investment in the grid, system operations and electricity markets now will provide Northern Ireland with the opportunity to achieve the 2030 targets and also reach a net zero power system in the decades beyond.

3.0 The substantive policy direction and the required measures to deliver Northern Ireland's renewable energy targets are largely in place. In our professional assessment as the Transmission System Operator, the key focus needs to be on removing barriers which risk falling short and proactively identifying opportunities to accelerate delivery.

4.0 SONI is licenced and regulated independently to run the transmission system (high voltage electricity grid) in real-time, while also planning the development of the grid to meet Northern Ireland's future energy needs. SONI does not generate electricity or own any assets. SONI also supports the operation of the Single Electricity Market, governed by the SEM Committee, which includes the regulatory authorities in both jurisdictions.

5.0 Given our experience and expertise, we support decision-makers by forecasting future energy needs and developing the technical roadmaps to support policy formation and enable the delivery of the solutions required of the electricity transmission system to achieve government policy objectives.

6.0 In assessing Northern Ireland's progress in meeting its 2030 targets, it is important to consider the current context and sequencing of policy development. Northern Ireland met the 40% renewable energy target by 2020 set by the Strategic Energy Framework (SEF 2010) a year early. In December 2021, the Department for the Economy published the Northern Ireland Energy Strategy which set a 70% target by 2030. This target was subsequently upgraded to 80% by the Climate Change (Northern Ireland) Act 2022.

7.0 Since the 40% target was met in 2019, SONI recognised that further significant decarbonisation of the power system would be required to meet Northern Ireland and the UK's net zero obligations. SONI's *Strategy 2020-2025* pre-empted ambitious future targets and SONI immediately commenced work on the Shaping Our Electricity Future roadmap to enable a 70% target in anticipation of the Northern Ireland Energy Strategy which was published in December 2021. We also supported government in the development of the Energy Strategy through a series of working groups.

8.0 When considering the current landscape and progress towards the 2030 targets, it is important to consider the unprecedented scale and complexity of the challenge. The 40% SEF target was enabled through innovation within the power system's existing operational and infrastructure limitations. Doubling the amount of renewable integration in less than ten years requires a fundamental overhaul of the electricity system at every level. In addition, the complex and decentralised nature of the electricity system in Northern Ireland means that a transition of this scale must balance the needs and priorities of a wide range of stakeholders.

9.0 The policy measures required to deliver Northern Ireland's 2030 targets, and efforts to accelerate progress, can create competing priorities which requires close collaboration to navigate. It is important that assessment of progress to meet the 2030 targets and the remaining challenges are considered in the context of the scale and complexity of the policy ambition.

10.0 The collective challenge is further exacerbated by the significant anticipated growth in demand over the coming decade. To ensure the grid is prepared for this modernisation and growth, significant strategic projects are already underway through the Transmission Development Plan for Northern Ireland.

11.0 In many respects, the challenges and experiences in Northern Ireland are not unique. Many comparable jurisdictions are seeking to modernise and decarbonise their electricity systems simultaneously. While this creates great opportunities for collaboration and knowledge sharing, it also creates a scenario whereby there is a competition globally for certain resources and skills, creating increased complexity to project planning and development.

12.0 Despite challenges in some areas, Northern Ireland has made significant progress in recent years. Following a comprehensive engagement exercise, SONI, working with its partners in EirGrid, the TSO in the Republic of Ireland, published the Shaping Our Electricity Future roadmap in 2021. The Roadmap sets out all the measures required, across networks, operations and markets, to enable the power system to support the delivery of Northern Ireland's 2030 targets. SONI published a revised roadmap in 2023 to account for the new 80% target.

13.0 In 2021, SONI increased the proportion of electrical demand which can come from renewable sources at any one time, known as System Non-Synchronous Penetration, to 75%, up from 50% only a few years previously This is amongst the highest SNSP levels in the world and few other systems have this capability yet. SONI has continued to issue connection offers for a wide range of new renewable generation and system services, and we have seen a significant (fourfold) increase in demand for connections in 2023. This has included a range of technologies (onshore wind, offshore, batteries and interconnection projects).

14.0 In the last number of years, we have handed over a range of key grid infrastructure upgrades to NIE Networks for construction and have published the Transmission Development Plan setting out future infrastructure needs to meet the 2030 targets. SONI has progressed the vitally important second North South Interconnector project despite legal challenges and is in the process of finalising the land access to the level required to enable construction to commence. This has required close collaboration with our project partners (NIE Networks, EirGrid and ESB Networks) to bring the project forward for the benefit of consumers in both jurisdictions.

15.0 Working with our partners in NIE Networks, SONI has resolved challenges in relation to the connections policy for small-scale renewable generation to balance the need for more connections with the importance of protecting the security of the grid.

16.0 The substantive policy measures for meeting the 2030 targets are set by the Northern Ireland Energy Strategy. SONI's role is to ensure the transmission system can facilitate a renewables-based electricity supply in a coordinated and efficient manner while ensuring a safe, secure and reliable power supply for homes, farms and businesses across Northern Ireland. This transformation of the power system is unprecedented in scale and requires fundamental reform at every level, but notably in three core areas:

16.1 **Network infrastructure** – a significant programme of network infrastructure needs to be built and upgraded to accommodate increases in electricity demand and integration of renewable energy in a way which protects security of supply.

16.2 **System Operations** – how the electricity grid is operated must be fundamentally reformed to deal with more variable, weather-dependent forms of generation, in a way which maximises the use of renewables but protects security of supply for consumers.

16.3 **Markets** – the electricity markets need to incentivise the right generation, in the right place and at the right time. Noting the lack of investment in renewable generation since the closure of the last support scheme, it is vital that the renewable energy support scheme is delivered expeditiously and fundamentally aligns with the needs of electricity consumers in Northern Ireland.

17.0 The substantive policy direction and delivery roadmaps are largely in place to meet the 2030 targets. In SONI's professional assessment as the Transmission System Operator, the key focus needs to be on removing barriers which risk falling short and identifying opportunities to accelerate delivery. In this respect, we identify a number of key areas:

17.1 **Managing short-term challenges of a power system in transition** – there are short-term challenges with integrating and utilising renewable generation while ensuring a secure, stable supply of electricity which need to be carefully navigated. SONI's priority must be to maintain security of supply for consumers.

17.2 **The limitations of a developer-led approach and the need to move towards more of a plan-led approach** – currently, SONI must approach connections to the grid and plans to increase grid capacity reactively in response to demand from developers. In SONI's assessment, this is inefficient and contributes to increased costs and timescales. By shifting posture to **more of a plan-led approach working with industry, government and regulatory partners**, collectively we can increase grid capacity in a proactive and more timely manner through **more anticipatory investment** while reducing costs and timescales for grid connections.

17.3 **Timely delivery of significant network infrastructure and engaging with consumers and local communities** – an extensive programme of network infrastructure needs to be completed to enable the 2030 targets to be delivered. To achieve this, it will be crucial to deliver **meaningful and substantial reform to planning policy** and additional policy responses should be considered to increase public understanding and acceptance with landowners and local communities. SONI also supports the Utility Regulator's request to seek a broadening of its statutory remit to include Northern Ireland's decarbonisation targets.

18.0 The ability to meet the ambitious 2030 targets will require collective buy-in from all stakeholders and significant progress in these core areas.

19.0 As Northern Ireland's Transmission System Operator, SONI is committed to playing our part, working with all stakeholders, in supporting Northern Ireland's energy transition. Our primary purpose, as set out in our Strategy 2020-2025, remains transforming the power system for future generations and delivering a cleaner energy future for homes, farms and businesses across Northern Ireland.

About SONI: current context and our role to facilitate energy policy in Northern Ireland

20.0 As a Transmission System Operator, SONI does not generate electricity, nor does it own any of the transmission system assets. Our role, enshrined in law and through our licence, is to run the transmission system in an efficient, economical and coordinated fashion to meet long-term demand for electricity and to ensure a secure supply of electricity.[1] In doing so, we are regulated by the Utility Regulator for Northern Ireland.

21.0 Given the legal requirement to be certified as independent in operating the transmission system, SONI is in a unique position to act as a trusted expert to inform and facilitate the delivery of energy policy in Northern Ireland, including forecasting future energy needs. SONI has the dual responsibility of managing the electricity grid in real time to facilitate a safe, secure supply of electricity to homes, farms and businesses across Northern Ireland while also upgrading the grid to facilitate Northern Ireland's renewable energy targets.

22.0 In addition, we work with our counterparts in EirGrid in the Republic of Ireland to run the all-island electricity market as part of the Single Electricity Market (SEM), which is regulated and governed by regulatory authorities in both jurisdictions via the SEM Committee (SEMC).

23.0 The Strategic Energy Framework (2010) set a target of 40% renewable energy consumption target by 2020. This target was met in 2019. The substantive policy direction thereafter was set by the *Northern Ireland Energy Strategy in 2021*[2], which set a 70% target by 2030. This target was subsequently upgraded to 80% by the Climate Change (Northern Ireland) Act 2022.

24.0 Achieving the 80% renewable energy target by 2030 is hugely challenging and requires an unprecedented upgrade in the transmission system and how it operates.

25.0 In our professional assessment, consideration of the scale and complexity of transformation required to meet the 2030 targets, the deeply interdependent nature and decentralised structure of the electricity system and the multitude of competing factors is crucial when assessing current progress and recommendations for the future.

26.0 Despite challenges in recent years and real and perceived barriers to investment in renewable generation, Northern Ireland remains a genuine world leader from the perspective of the integration of renewables onto the transmission system. In 2021, Northern Ireland increased the proportion of electrical demand which can come from renewable sources at any one time, known as System Non-Synchronous Penetration, to 75%, up from 50% only a few years previously. There are few other power systems in Europe or across the world yet capable of these levels.

27.0 However, to reach the 2030 targets, SONI understands that more needs to be done to accelerate the integration of renewables and remove barriers to further progress and we stand ready to work collaboratively with industry partners, government, regulatory authorities and local communities to achieve Northern Ireland's renewable energy ambitions.

28.0 Through this written evidence, we will endeavour to provide important context in relation to the scale and complexity of the electricity system and the transformation required to meet the 2030 targets, outline the significant progress that has been made to date, and highlight the barriers to delivery which risk falling short and opportunities for acceleration.

---

[1] Part II, Article 12, The Electricity Order (Northern Ireland) Act, https://www.legislation.gov.uk/nisi/1992/231/article/12

[2] Department for the Economy (2021), The Path to Net Zero, https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf

The scale and complexity of the task at hand – managing competing priorities

29.0 Since Northern Ireland achieved the 40% renewable energy target by 2020 set out in the Strategic Energy Framework a year early, SONI recognised the need for further decarbonisation of the power system. As such, in 2020, we published *Tomorrow's Energy Scenarios Northern Ireland* and in doing so assessed three scenarios for energy use looking out to 2040.

30.0 The process to reach 40% by 2020, from a starting point of almost zero, took more than 15 years and was largely achieved through significant engineering innovation in the existing system infrastructure and operations, including the successful delivery of NIE Networks "Medium Term Plan". In December 2021, this target was upgraded to 70% through the Northern Ireland Energy Strategy and subsequently upgraded further to 80% by the Climate Change (Northern Ireland) Act 2022.

31.0 The power system in Northern Ireland has been historically designed around three large thermal generation power stations, with power flowing outwards through progressively lower capacity lines. Unlike the power system in Great Britain, Northern Ireland has no nuclear generation, very little hydro generation, and no long-term energy storage at any scale. Interconnection is limited to the existing North-South interconnector and the Moyle HVDC link with Scotland, and we currently have no offshore generation connected.

32.0 As such, effectively doubling the amount of renewables integration in a shorter space of time requires an unprecedented transformation of the power system and the biggest scale of change since electrification. In addition to significant upgrades in the existing system, there is also a requirement for the construction of an extensive programme of new transmission system infrastructure in the form of pylons, poles, overhead lines, underground cables and substations extensions.

33.0 Furthermore, the movement towards a power system based on renewable generation, which is variable and weather-dependent, requires a fundamental rethink on how the transmission system is operated to maintain a secure supply of electricity for consumers.

34.0 This scale of change is important context when considering Northern Ireland's progress in achieving targets set just over two years ago.

35.0 In addition to consideration of the scale of change, it also important to note its complexity. The electricity system in Northern Ireland is complex, including the integration of a private market, and involves a multitude of stakeholders including: consumers and local communities, private companies seeking to generate electricity and connect to the grid, policy-makers, regulatory authorities, a transmission asset owner, a transmission system operator, a distribution network operator, landowners, private companies seeking to supply and sell electricity, industry lobbying groups and consumer protection NGOs.

36.0 As the Transmission System Operator, SONI's key priority must be facilitating the flow of a safe, secure, reliable supply of electricity from those who generate it to the homes, farms and businesses across Northern Ireland who need it.

37.0 In seeking to transform the power system at the magnitude required to meet the 2030 targets, there are competing challenges that need to be navigated to achieve the twin objectives of running the power system and maintaining security of supply in the present and upgrading the system and integrating more renewables for the future. For example, upgrading overhead lines to enable more renewable energy to flow across the grid necessitates securing the appropriate planned outages to undertake the work. This needs to be delivered carefully and in a planned, safe manner to reduce the risk of any disruption to the electricity supply.

38.0 A further example, discussed in more detail later in this submission, is the challenge of oversupply and curtailment. To maintain a secure and stable power system, it is imperative that a system frequency balance of 50Hz is achieved at all times. Too much or too little demand for electricity or too much or too little generation can create system imbalance and pose risks to system security. Northern Ireland's

climate is such that the difference between peak demand in the summer and winter months is significant. Combined with variable wind generation, unpredictable forced outages on conventional generation and market forces dictating interconnection flows, this means there are times when there is either not enough renewable electricity or too much.

39.0 To maintain a secure, stable system in this context, our security standards dictate that a minimum amount of base conventional generation (three sets) is always on the system until such times as other technologies become available such as low carbon sources of inertia, demand flexibility tools or Long Duration Energy Storage. This means there are occasions when there is a system security requirement to curtail wind generation in times of low demand or low interconnection availability, particularly during the night when there is often insufficient demand for the amount of available renewable generation.

40.0 When considering the actions and measures required to deliver the scale of change required to meet the 2030 targets, it is important to acknowledge that all stakeholders have different and sometimes competing priorities. In our professional experience, these competing priorities span the areas of speed, cost to the consumer, decarbonisation/renewables integration and security of supply.

41.0 It is important to remember that Northern Ireland consumers (both domestic and non-domestic) ultimately pay for this transformation through their bills and the Utility Regulator has the important responsibility for protecting consumers in this respect. During a cost-of-living crisis, this is a vitally important consideration and research shows that cost remains the top priority for consumers when considering the energy transition. The industry has a commercial incentive and is understandably concerned about more timely delivery of the infrastructure needed to facilitate a better return on investment in generation. However, it is important that the energy transition is delivered in a manner which is efficient and maintains the confidence of consumers and local communities.

42.0 To develop an accurate picture of how Northern Ireland is progressing against the 80% target set in 2022, it is important to consider these competing priorities and acknowledge the potential trade-offs when it comes to recommendations for policy change.

43.0 Given this complex landscape, the close collaboration between all stakeholders that has been crucial to the progress made to date will be key to navigating the remaining challenges and barriers to meeting the 2030 targets.

Measures required to meet Northern Ireland's 2030 targets, challenges and opportunities to accelerate

Progress to date

44.0 The *Northern Ireland Energy Strategy* and its associated Action Plans set the substantive policy direction at a macro-level. As the Transmission System Operator, SONI's role is to support government as a trusted adviser while also delivering the changes required to the transmission system as important enabling infrastructure.

45.0 A recent report by Renewable NI's, *Accelerating Renewables in Northern Ireland* report correctly identifies a number of challenges in relation to meeting the 2030 targets. These challenges include lack of a renewable energy support scheme to incentivise investment, lengthy planning system timescales and issues around available grid capacity and grid connection timescales and costs.[3]

46.0 We continue to work closely with the industry to identify solutions which balance the needs of all stakeholders to address these challenges. However, while we recognise that there is more to do, it is important to recognise the significant progress that has been achieved to date.

47.0 Northern Ireland met the 40% target set by the Strategic Energy Framework (2010) a year early in 2019. This was a significant milestone and the result of an extensive body of work and collaboration across the whole system. Innovation, such as the collaboration between SONI and NIE Networks on clusters, and a number of significant infrastructure upgrades, including the Omagh-Tamnamore circuit and new cluster substation at Gort, were key to this success.

48.0 However, since meeting the 40% target, SONI has been acutely aware of the need for further decarbonisation of the power system in Northern Ireland to meet the UK's future net zero goals. Since then, we have been publishing key roadmaps to advise and inform government policy on the next steps in relation to changes required in the electricity system.

49.0 From 2019, and in the absence of any agreed target for Northern Ireland, SONI commenced plans through our *Strategy 2020-2025* to develop the measures that would enable the power system to facilitate more ambitious renewable energy targets by 2030.[4]

50.0 In 2020 we published *Tomorrow's Energy Scenarios Northern Ireland (TES NI)* which presented three potential pathways for the development of energy use out to 2040. This was followed by the *TES Needs Assessment (TESNA)* in 2021 assessing the impact of these three scenarios on the transmission system itself. TESNA identified areas of the system requiring reinforcement to enable decarbonisation, and this in turn has informed the overall programme of projects reported on in our *Transmission Development Plan for Northern Ireland.*

51.0 In response to the new 70% targets set by the *Northern Ireland Energy Strategy* in December 2021, SONI, working with our partners in EirGrid, published Shaping Our Electricity Future – a roadmap setting out all the measures that need to be taken to deliver this new target. Following an upwards revision of the target to 80% in 2022 through the Climate Change (Northern Ireland) Act, we published *Shaping Our Electricity Future 1*[1] which forecasts electricity needs in the future in areas such as economic growth and decarbonisation of heat and transport.

52.0 It also sets out the measures needed across Markets, Networks, System Operations and Engagement. We discuss these required measures, which were developed following an extensive programme of research and engagement with industry, government, academia, local communities and others, further below.[5]

[3] Renewable NI (2023), Accelerating Renewables in Northern Ireland, https://renewableni.com/wp-content/uploads/2023/09/RNI-Report-Accelerating-renewables-in-Northern-Ireland-online-version.pdf
[4] SONI (2020), Strategy 2020-2025: Transforming the power system for future generations, https://www.soni.ltd.uk/about/strategy-2025/, pg. 5.
[5] SONI (2021/2023), Shaping Our Electricity Future 1/1.1, https://www.soni.ltd.uk/the-grid/shaping-our-electricity-f/

53.0 In 2021, Northern Ireland increased the proportion of electrical demand which can come from renewable sources at any one time, known as System Non-Synchronous Penetration, to 75%, up from 50% only a few years previously. There are few other power systems in Europe or across the world yet capable of these levels.[6] SONI (and EirGrid) have plans set out in our operational roadmap to further increase System Non-Synchronous Penetration to 95% over the decade.

54.0 In this respect, while the Committee rightly notes the small drop in the percentage amount of total electricity consumed from renewable sources between July 2022-June 2023, it is important to remember the wide range of factors that contribute to this single metric, including the availability of wind in a particular time period, and other factors which may impact the amount of wind that can actually be used.

55.0 For example, for the reasons noted above, changes in weather patterns and fluctuations in demand, may mean that some renewable generation may need to be curtailed in the short-term while the investment in grid capacity and new technology, such as Long Duration Energy Storage, is taking place to unlock greater use of renewable energy in the future.

56.0 As such, it is important to make the distinction between the amount of renewable energy the power system can accommodate, the amount of renewable energy being generated, and the amount that is actually being consumed, all of which are important.

57.0 Since 2021, SONI has continued to deliver on our obligations to issue Connection Offers to those wishing to connection to the grid at transmission level. Between 2021-2023, we issued 28 connection offers, of which 9 were renewable projects. Of the renewable connection offers issued, 5 have been accepted, 3 are still in the acceptance review period and 1 has lapsed/been withdrawn. Of the Connection Offers issued in 2023, SONI issued two Connection Offers for major offshore renewables projects.

58.0 In the last number of years, we have successfully handed over a number of key infrastructure projects to NIE Networks to develop the grid, including: the Omagh-Dromore restring, the Ballylumford-Eden restring, a second transformer at Gort, the Garvagh Cluster, the Castlereagh-Knock cable replacement and the first part of the Energising Belfast project. SONI has progressed the vitally important second North South Interconnector project despite legal challenges and is in the process of finalising the land access to the level required to enable construction to commence, and worked with our project partners (NIE Networks, EirGrid, ESB Networks) to bring the project forward for the benefit of consumers in both jurisdictions.

59.0 In 2023, further significant progress has been made working closely with our partners in NIE Networks. Responding to concerns in relation to the challenges of connecting small-scale generation, which in part included technical challenges of being able to control the impact of this type of generation on the security of the grid, SONI and NIE Networks developed revised policy to allow more timely connections in future with new safeguards in relation to security of supply.[7]

60.0 In addition, SONI published the draft Transmission Development Plan for Northern Ireland 2023-2032 (TDPNI) for consultation in September 2023.[8] This Plan includes all the key network infrastructure projects required to meet the 2030 targets, including notable projects such as the North-South Interconnector, the Mid Antrim Upgrade and Mid Tyrone project. The TDPNI sets out an ambitious package of investment in grid infrastructure totalling over £600 million over a ten-year period. In addition to NIE Networks ambitious package of asset replacement projects, SONI is proposing 36 network development projects which will; increase renewable integration; increase demand capacity in areas of growth; modernise the grid; reduce constraints; and improve security of supply.

---

[6] European Flexibility Roadmap (2022), European Flexibility Roadmap (eu-sysflex.com), pg. 35
[7] NIE Networks (2023), Distribution Generation Application and Offer Process Statement, https://www.nienetworks.co.uk/documents/connections/distribution-application-offer-statement-nov-2023.aspx
[8] SONI (2023), Draft Transmission Development Plan 2023-2032, https://consult.soni.ltd.uk/consultation/draft-transmission-development-plan-northern-ireland-and-sea-2023-2032

61.0 To accelerate this significant grid development programme, we are working closely with our partners in NIE Networks as part of the Transmission Development Plan Joint Working Group to identify opportunities to hasten key strategic projects that will support more renewables integration.

62.0 In 2023, SONI continued to play a key role in developing key thought leadership policy to advance the decarbonisation of the power system. To encourage further technological innovation, we issued a Call for Evidence on Long Duration Energy Storage, which will be an important tool for ensuring security of supply in a more renewables-based electricity system.

63.0 In addition, noting the importance of looking beyond 2030, we published a consultation on a revised *Tomorrow's Energy Scenarios*, which models scenarios in energy use for Northern Ireland to reach a net zero power system in the coming decades.

64.0 SONI is also currently tendering for low carbon sources of inertia to support the energy transition. These services will be key to enabling the system to be securely operated with less reliance on thermal generating units.

65.0 We also note that NIE Networks published its RP7 Price Control submission in 2023, detailing an ambitious package of proposals and investment to support the decarbonisation of the electricity system. This is a welcome package of investment that will support Northern Ireland to reach its 2030 renewable energy targets.

66.0 We also continue support engage with the Department for the Economy in the development of key strategic enabling policies and sit on a number of working groups, including the Offshore Renewable Energy Action Plan Working Group and the Renewables Grid Liaison Group.

Measures required to meet 2030 targets

67.0 As previously outlined, the Energy Strategy and associated Actions Plans establish the substantive policy measures required to meet the 2030 targets. From SONI's perspective, our focus is on the measures required to ensure the power system, as crucial enabling infrastructure, can facilitate their delivery. There is a consensus amongst all stakeholders that the 80% target is hugely challenging. Meeting it will require innovation, agility and reform in existing policy and practice.

68.0 The transmission system requires significant upgrade and investment in order to support an electricity system based on 80% renewables by 2030, and net zero beyond. As previously outlined, reaching the 40% target was largely achieved through innovation in the system as it presently stands. Doubling the level of renewable integration in less than ten years is a far larger and more complex task. It requires fundamental reform at every level of the power system, both in terms of the infrastructure that supports it and how the system itself operates.

69.0 In anticipation of the 70% target set by the Northern Ireland Energy Strategy in December 2021, SONI, together with our partners in EirGrid, published Shaping Our Electricity Future – a roadmap detailing the measures that needed to be taken to enable the power system to facilitate this target by 2030. Following the upwards revision of the target to 80% through the Climate Change (Northern Ireland) Act 2022, we published a revised Shaping Our Electricity Future Roadmap 1.1.

70.0 These roadmaps were developed following an extensive period of consultation with a wide range of stakeholders, including industry, academia and local communities. The Shaping Our Electricity Future Advisory Council incorporates a range of industry and academic stakeholders to offer advice, oversight and accountability on our progress against delivery.

71.0 In response to the Committee's question as to what measures need to be in place to meet the 2030 targets, the roadmaps split the measures required into four categories, including: Network Infrastructure, System Operations, Markets and Engagement.

Network Infrastructure

72.0 As previously highlighted, the electricity grid in Northern Ireland was designed for power to flow outward from a small number of power stations, through progressively lower capacity lines. Our ability to optimise the existing infrastructure to enable more renewable integration has been exhausted in reaching the initial 40% target. A significant body of infrastructure development, in the form of more overhead lines, underground cables, poles and pylons, is required to facilitate new forms of renewable generation right across Northern Ireland.

73.0 This major grid infrastructure development is required to be able to integrate more renewable energy, increase grid capacity, facilitate more connections to the grid, accommodate more demand for electricity and improve flexibility to bolster security of supply.

74.0 In 2023, SONI published the draft Transmission Development Plan for Northern Ireland 2023-2032. The Plan, which includes a capital investment of over £630 million, sets out the key infrastructure upgrades required over the next ten years, prioritised by the key projects required to meet the 2030 targets.

75.0 The TDPNI proposes 36 network development projects, including 16 projects to support renewables integration, 6 to increase demand and 14 projects to modernise the grid and improve security of supply. The projects will:

75.1 Modernise parts of the grid in Greater Belfast, so its people and businesses have the power they need to grow
75.2 Upgrade the transmission system in County Antrim, to increase the amount of clean energy we can transport from where it is generated to where it is needed
75.3 Strengthen the grid in the North West and Mid Tyrone areas to support economic development and to facilitate decarbonisation of Northern Ireland's electricity supply; and,
75.4 Bolster interconnection with GB and ROI by increasing capacity of the Moyle Interconnector and constructing a new North South Interconnector.

76.0 Key projects for meeting the 80% target include:

76.1 The North South Interconnector;
76.2 The Mid Antrim Upgrade;
76.3 Mid Tyrone Project;
76.4 The Moyle Interconnector Capacity Increase;
76.5 The North Sperrin Generation Substation; and
76.6 The North West of NI Reinforcement.

77.0 Working with our partners in NIE Networks, SONI is working to explore all options to expedite this programme through a dedicated Transmission Development Plan Joint Working Group. Key dependencies include:

77.1 Planning decisions made in a timely manner;
77.2 The availability of land and the successful acquirement of land access;
77.3 The availability of sufficient outages on the system to allow upgrades to take place;
77.4 Timely regulatory funding approval for required projects;
77.5 Public acceptance of the required infrastructure; and,
77.6 Granting of the required licenses for offshore developments.

78.0 As Northern Ireland's Transmission System Operator, we understand that consumers and local communities must be at the heart of the energy transition. That is why SONI has a comprehensive three-part engagement process for developing the grid, which goes far beyond the statutory requirements for Pre-Application Community Consultation, to ensure local communities have an opportunity to shape our plans from the very earliest stages of their development. In many cases, we engage with local

communities, landowners and elected representatives years before a project is submitted for planning approval.

79.0 Noting the importance of public acceptance for the infrastructure needed to enable the energy transition, we will shortly be reviewing and consulting on our public engagement approach, taking account of best practice elsewhere.

80.0 The timely delivery of these network infrastructure upgrades, in addition to the additional infrastructure required to connect new generation to the network, is vital for meeting the 2030 targets. Further in this submission, we outline the key challenges in this respect.

System Operations

81.0 To deliver Northern Ireland's 2030 targets, it will be necessary to accommodate unprecedented penetrations of variable non-synchronous RES such as offshore wind, onshore wind, and solar while keeping curtailment levels to a minimum. This will require a significant evolution of the operation of the power system for SONI to deal with unique challenges that will not be faced in larger more heavily AC interconnected power systems for years to come.

82.0 Continued secure operation of the power system is critical. We are currently operating the power system with System Non-Synchronous Penetration (SNSP) levels of up to 75% and trialling Rate of Change of Frequency (RoCoF) up to 1.0 Hz/s. Satisfactory completion of this RoCoF trial (expected in Q2 2023) will form the basis of further changes to our operational practices to achieve our 2030 targets.

83.0 Operating the future power system with fewer conventional synchronous generators will be technically challenging. In order to deliver on government renewable energy policies in Ireland and Northern Ireland, it will be necessary to have the ability to operate the power system with SNSP levels of up to 95% and with significantly reduced numbers of conventional units online. However, operating at such SNSP levels is unprecedented and poses several technical challenges, many of which have not been experienced by other synchronous power systems to date.

84.0 In response to these challenges, we have developed a programme of work, which will enable us to enhance our power system operational capability out to 2030. This all-island programme of work builds upon the programme of activity that was carried out, and the extensive knowledge, learnings and experience developed, as part SONI's 'Delivering a Secure Sustainable Electricity System (DS3)' Programme which was a key enabler in achieving the 2020 RES-E target of at least 40%.

85.0 System services will play a key role in managing the resilience of the power system. The new system services arrangements introduced in 2016 were key to achieving 40% RES-E by 2020. New system service capabilities from low carbon sources are required to incentivise the investment in the right technologies to enable SONI to address the technical and operational challenges arising from the need to operate with SNSP levels up to 95% by 2030.

86.0 Service providers connected to the distribution network and partnerships between the Transmission System Operators (TSOs) and Distribution System Operators (DSOs) are required to help release the full potential of demand-side flexibility. Demand side flexibility will be critical to ensuring we can enable the transition up to 80% RES-E and facilitate electrification of the heat and transport sectors while maintaining power system security. A regulatory driven demand side strategy covering the participation of demand side resources in the energy, capacity and system services markets is required to incentivise the necessary behaviours and flexibility.

87.0 The current maximum SNSP level facilitated by existing system operations capability is 75%. By 2030, we are planning to be able to operate at SNSP levels up to 95%, to have a reduced Inertia Floor (reduction from the current floor of 23,000 MWs), to have implemented a secure RoCoF limit of 1 Hz/s (an operational trial is currently underway and expected to run until Q2 2023) and to have a significantly reduced Minimum Number of Large Synchronous Units requirement (the current requirement is to keep eight large conventional synchronous units synchronised across the island).

88.0 The purpose of evolving these, and other, operational metrics is to facilitate a reduction in the minimum level of conventional synchronous generation (in MW terms) required on the Northern Ireland power system. In Q4 2022, we published an 'Operational Policy Roadmap to 2030'[16] which sets out our plan for evolving operational policy across a range of these key metrics as well as development of new metrics such as System Strength. This roadmap will be reviewed and updated if required every two years.

Markets

89.0 The Single Electricity Market (SEM) will play an integral role in providing the necessary incentives for third-party investment and the financial support needed for renewable assets. This is key for the procurement of the necessary energy and system services needed to operate the power system at 80% Electricity from Renewable Energy Sources (RES-E) and to enable us to achieve carbon reduction targets. Given the ageing profile of Northern Ireland's conventional generation portfolio, the market is a crucial enabler of the investment signals needed to ensure capacity from renewable powered conventional generation, demand side units, renewables and Long Duration Energy Storage providers.

90.0 It is important to acknowledge that EU legislation determines the overall structure of much of the current and future market design, and that regulatory authorities and the SEM Committee have an oversight and legal role in the development of any new SEM rules and processes.

91.0 Achieving this goal will require industry stakeholder commitment and extensive engagement with governments, regulatory authorities, market participants, consumers, and other interested parties to agree, develop and approve the market rules, process and market system changes needed to achieve the decarbonisation targets by 2030.

92.0 To achieve the higher levels of renewable supply will require additional system and adequacy services to be available to ensure we can meet demand requirements securely with close to 95% non-synchronous generation. There is a growing need to ensure that sufficient generation adequacy is available to meet consumer demand during periods of low renewable generation supply. This will require incentives that promote the right third-party investment in a balanced portfolio of new generation, demand side and system support assets to achieve a resilient power system at 80% RES-E and allow the reliable and secure operation of the power grid.

93.0 Based on the Shaping Our Electricity Future detailed technical market review and the industry and public consultations, SONI recommend many of the key market initiatives needed to evolve the current design. These key initiatives can be categorised under the following high-level groupings each of which could result in significant changes to the existing electricity market design, processes, and systems.

94.0 Specifically, the suggested key changes that might inform the evolution of the market design to support the delivery of the 2030 targets are grouped under two pillars:

94.1 **Aligning markets to the operational challenges of high RES-E** - evolving the design of the energy, and system services markets to provide aligned incentives for third-party investment in resources that will provide the necessary balanced portfolio, energy and system services to meet dynamic demand requirements and physically operate the power system at 80% RES-E and be compliant with carbon emission reduction targets. This also includes wider aspects that influence third party investment such as RESS design, network tariff design and transmission loss adjustment factors.

94.2 **Full Trading arrangements between SEM in the Great Britain and EU markets** - evolving the market structures to best utilise interconnection – to improve the economic outcomes for SEM consumers and to facilitate the export and import of large volumes of renewable energy efficiently and effectively. While there are working practices today between SEM and Great Britain they have been impacted by Brexit. In addition, prior to Brexit the SEM market was not coupled with Europe in the Intraday or Balancing timeframes. These are central components of the European market design and if not addressed could materially undermine the efficacy of interconnection between SEM and the rest of the EU.

95.0 The Committee asks a specific question in relation to any future renewable support scheme in Northern Ireland. To deliver the right type of generation, in the right place and at the right time, it will be crucial that any future support scheme in Northern Ireland is fundamentally aligned with SEM and the markets for electricity and system services.

96.0 The Committee further asks about how new renewable generation can be incentivised while keeping the cost as low as possible to consumers. We discuss the case for moving towards a more plan-led approach to network development below. However, in our professional assessment, the inclusion of technology and locational signals for new generation in any future scheme would help maintain downward pressure on both the network development costs and wholesale electricity costs.

97.0 While in the longer-term, technology such as Long Duration Energy Storage (LDES) will be an important mitigation, the short-term issue raised by industry in relation to compensation for oversupply and curtailment will need to be addressed. Stakeholders in government, regulatory authorities and industry will need to collaborate to find a balanced solution.

Challenges to overcome and opportunities to accelerate

98.0 Unlike some other public policy challenges, the electricity system understands the measures that are required to reach the 80% target by 2030. The ability for Northern Ireland to reach these targets now rests on identifying and removing barriers to delivery that risk falling short and proactively identifying opportunities to accelerate progress.

99.0 In our professional assessment, there are a number of key challenges to overcome and opportunities to accelerate progress. For the purposes of the Committee's inquiry, we have grouped these challenges into five categories below.

100.0 **Managing the complexities of a power system in transition –** for the reasons discussed earlier in this submission, there can be a number of complexities with managing a power system in transition. For example, in the short-term, depending on demand trends, weather conditions and market flows on interconnectors, there can be times when the requirement to meet current security of supply standards in terms of conventional generation means that renewable generation needs to be curtailed.

101.0 As Northern Ireland's Transmission System Operator, SONI always seeks to utilise renewable generation as often as possible within our system security parameters, and we have an obligation to do so. We understand the concerns raised by industry in relation to a disincentive to investment and we are continuing with an extensive body of work to develop the right operational solutions which can minimise the dispatch down of renewable generation while maintaining security of supply. Future innovation in system services such as low carbon inertia services and batteries, and increased interconnection will be crucial in this respect.

102.0 In the long-term, there will be a need to address the challenge of oversupply. Northern Ireland's climate and demand patterns are such that there are times when the available renewable generation will exceed the demand for electricity. It will be important that relevant stakeholders work together to find an appropriate solution which balances the interests of consumers and developers. Innovation in areas such as Long Duration Energy Storage, interconnection and demand flexibility will be vital enablers of solutions in this respect. We also note the potential for smart meter installation for domestic and small non-domestic users to support changes in consumer behaviour.

103.0 As previously highlighted, the transition away from fossil-fuel generation to a more renewables-based electricity system creates a number of security of supply challenges in the short-term. As a Transmission System Operator, SONI manages the electricity system with the generation made available to it by those generators successful in securing capacity contracts. Delays in new generation coming onto the system, such as the new Open-Cycle Gas Turbines that were due to replace the retired coal units at Kilroot, can cause significant challenges to security of supply. Furthermore, the lack of Long Duration Energy Storage in the short-term means there are challenges to ensuring sufficient supply during periods of low wind and low interconnector imports.

104.0 Ensuring the appropriate market arrangements are in place to incentivise the right generation, at the right time, in the right place will be essential to mitigating the challenge of maintaining security of supply in a predominately renewables-based electricity system in the medium to long-term.

105.0 **The limitations of a developer-led approach and the need to move towards more of a plan-led approach –** through significant engagement with the industry in Northern Ireland in the last few years, we understand their frustration and concerns in relation to the speed of connections and the availability of the required grid capacity.

106.0 At present, the terms of our licence are such that the development of the grid, both in terms of the network and customer connections is "developer-led." For example, under the terms of our licence, SONI is obligated to offer a connection to anyone who applies for it within a 90-day window, regardless of the proposed location, type of technology or the availability of connection space.

107.0 This means that we have to take a reactive approach to grid development for the purpose of connecting new generation which can increase both costs and timescales. In our assessment, this conflicts with our legal obligations to develop the grid in an economical, efficient and coordinated manner.

108.0 To accelerate the connection of new generation, SONI recommends working collaboratively to industry to move to more of a plan-led approach whereby there would be more flexibility to signal the most appropriate and strategic locations and technology. In our view, this would quicken the timescales and reduce costs by reducing the technical complexity of connections.

109.0 We note the important opportunity of the current joint Call for Evidence on Connections Policy Reform in Northern Ireland issued by the Utility Regulator and the Department for the Economy for balanced and meaningful reforms.

110.0 In keeping with best practice elsewhere, SONI strongly recommends maintaining the requirement for the relevant consents and planning approval to be in place before a connection offer can be accepted. This provides an appropriate threshold to prevent capacity/queue hoarding and to ensure resources are allocated to projects that are viable and at an advanced stage. We note that National Grid Electricity System Operator has recently changed its policy to better manage their connections queue by implementing milestones for relevant consents earlier in the connection process.

111.0 As Northern Ireland's Transmission System Operator, we are committed to working with industry and other stakeholders to **review and make improvements to our own connections policy**. We intend to consult with the industry and other stakeholders in 2024.

112.0 The current approach for planning and developing the grid is mostly predicated on identifying and demonstrating the need reactively and making submissions for regulatory funding approval on a case-by-case basis.

113.0 To accelerate the development of the network to increase grid capacity and connection opportunities, SONI recommends **building on previous progress in relation to anticipatory investment**. Innovation in areas such as clusters was key to progress towards the 40% target. By working together with industry, regulatory partners, and local communities to understand demand trends and investment plans, SONI can develop the grid more proactively and in more of a plan-led fashion which can ensure the required grid and connection capacity is available for the right generation, in the right places, in a more timely manner.

114.0 Taken together, we believe this shift in approach, which would require collaboration between government, industry and regulatory partners, would accelerate progress towards Northern Ireland's 2030 targets.

115.0 Timely delivery of significant network infrastructure and engaging with consumers and local communities – as previously stated, the timely delivery of the significant package of grid infrastructure upgrades is critical for meeting Northern Ireland's 2030 targets and future 2050 net zero ambitions. With

six years left until 2030, SONI is committed to working with partners to explore all opportunities to accelerate the pace of change.

116.0 We note with interest the report published by the Electricity Networks Commissioner in Great Britain, *Accelerating electricity transmission network deployment,* which makes wide-ranging recommendations for acceleration of change in areas such as planning, regulatory approval, community benefit, land access, supply chain planning, skills development and public acceptance.[9] SONI is studying the recommendations of this report to understand what best practice learning could be applied in Northern Ireland.

117.0 We understand the industry in Northern Ireland has suggested a government-led taskforce to consider the acceleration of onshore renewable energy. As the TSO, we would welcome this development, and play a full participating role, as a forum to bring together the key stakeholders to identify the barriers to delivery and opportunities to accelerate progress.

118.0 In the current landscape, there are a number of challenges to the delivery of the significant body of infrastructure required to facilitate the 2030 targets.

119.0 A recent report published by Renewables NI, *Accelerating Renewables in Northern Ireland*, notes major challenges with the **timescales for planning permission** with the average application for onshore wind applications taking over 3 years, which far exceeds timescales in ROI, Great Britain and the statutory targets of 15 weeks for local projects and 30 weeks for major projects. We welcome recent and current consultations from the Department for Infrastructure which consider planning reform for renewables and the associated infrastructure. However, given the scale of infrastructure required, it is crucial that **comprehensive and meaningful reform of planning policy is completed expeditiously**.

120.0 Furthermore, we understand that it is vitally important that consumers and local communities continue to be at the heart of the energy transition. A recent report from the Consumer Council, *Attitudes to the Energy Transition*, outlines a number of key insights.[10] The research highlights that while there are high levels of support in relation to the energy transition, further education was needed in relation to its importance, the government targets that are in place and the positive impacts that household changes can make.

121.0 The Consumer Council research finds that 58% of respondents supported the building of new infrastructure in their local area to support the increased use of renewable energy. As previously highlighted, SONI's public engagement approach involves local communities at the earliest possible stage of the planning for infrastructure projects, sometimes years ahead of any planning application. Throughout our three-part process, there are multiple opportunities for local communities to contribute their views to our plans.

122.0 The North South Interconnector is an important case study of a crucial project that has faced significant delays due to local public opposition. This project is vital for renewables integration and security of supply. While it is vitally important to ensure local communities are meaningfully involved in the development of infrastructure in their local area, it is important to understand that future delays of this nature will mean Northern Ireland will not reach its 2030 renewable energy targets.

123.0 Given the scale of infrastructure required across Northern Ireland, it will be vitally important that more is done at a strategic level to help local communities understand the importance of the energy transition, why infrastructure is needed and the benefits for them. In respect, we support the recommendation made by the Electricity Networks Commissioner in Great Britain for a ***"****A Government-led national information campaign should be started on the need for electricity infrastructure and how this can lead to good outcomes for people and the communities in which they live and work."*

[9] Electricity Networks Commissioner (2023), Electricity Networks Commissioner: companion report and findings, https://www.gov.uk/government/publications/accelerating-electricity-transmission-network-deployment-electricity-network-commissioners-recommendations

[10] Consumer Council (2023), Attitudes to the Energy Transition, file:///C:/Users/Brown_G/Downloads/Consumer_Council_%20_Attitudes_to_%20the_Energy_%20Transition_R.pdf

124.0 Historically, Northern Ireland has relied on the use of wayleaves which carry an annual rental payment to secure the required land access for grid infrastructure projects. However, there is a strong feeling amongst landowners and rural stakeholders that this is insufficient compensation for the burden placed on their land. A different approach was agreed amongst stakeholders for the North South Interconnector, due to the critically important nature of the project.

125.0 We note that Northern Ireland is now an outlier in terms of its approach to compensation for landowners, and SONI is concerned that a failure to align with best practice elsewhere will lead to significant delays in securing the required land access consents to proceed with vital grid infrastructure development. SONI has engaged with the Utility Regulator to make the case for a change in approach and further dialogue on reform will take place in due course.

126.0 We also note innovation elsewhere in relation to community benefit and gain, including policy proposals in Great Britain on compensation for local communities in the form of lower energy bills. SONI would welcome a discussion with all stakeholders in Northern Ireland about policy proposals that could further promote community acceptance. We are in the process of exploring how community gain models could be incorporated into our existing public engagement models and intend to discuss potential reform with the Utility Regulator in due course.

127.0 Research from the Consumer Council, supported by research undertaken by SONI in 2023, points to the importance of cost to the consumer, particularly during a cost-of-living crisis. In discussing the need for acceleration, it is also important to remember that the consumer pays for much of the cost associated with the energy transition through their bills. As Northern Ireland's Transmission System Operator, we fully understand the imperative of balancing keeping costs as low as possible to consumers, while also investing in the development of the grid to secure a cleaner, cheaper and more secure energy future for everyone in Northern Ireland. In this respect, we note the important role played by the Utility Regulator and the Consumer Council.

128.0 While investing in the electricity grid to meet Northern Ireland's renewable energy targets can introduce some additional costs for consumers in the short-term, it will ultimately help reduce the price and increase the security of electricity in the long-term. In this respect, we welcome the Utility Regulator's intention to seek an expansion of its statutory remit to support Northern Ireland's statutory renewable energy targets. In our professional assessment, this will enable closer collaboration with regulatory partners to balance value for money for consumers with investments that are crucial to the 2030 targets.[11]

129.0 Skills and resources – the scale of transformation in the electricity system is unprecedented and timebound. Therefore, it is important that the key parts of the system, including the Transmission System Operator, are properly resourced to deliver on our obligations. The proportion of the cost paid by the consumer through their bills which goes to SONI is very low, and therefore an appropriately resourced Transmission System Operator can play a major and impactful role in support Northern Ireland's climate action ambitions.

130.0 In addition to having the resources in scale, the availability of a skilled workforce to deliver the energy transition is also a crucial dependency. We welcome the work that has been already undertaken by the Department for the Economy through the Energy Strategy to address this.

131.0 Additional policy direction and alignment – successfully meeting Northern Ireland's renewable energy targets will require a "whole-system approach", including fundamental policy alignment between electricity and the gas network, which has served Northern Ireland well. We note the development of a hydrogen policy in the Republic of Ireland and the potential for policy innovation in this area in Northern Ireland to mitigate challenges such as future oversupply of renewable electricity. We also note recent innovation in ROI in the development of interconnection policy to address the future needs of the power

[11] Utility Regulator (2024), *Utility Regulator's draft Corporate Strategy 2024-2029,* https://www.uregni.gov.uk/files/uregni/documents/2023-10/Draft%20Corporate%20Strategy%202024-2029.pdf, pg. 13

system in integrating more renewable energy while ensuring security of supply. SONI would welcome further discussion in Northern Ireland in relation to policy in these areas.

132.0 The Climate Change (Northern Ireland) Act 2022 sets legal obligations to set carbon budgets in Northern Ireland and develop Climate Action Plans. We note that while the policy responsibility sits with the Department of Agriculture, Environment and Rural Affairs, it will be crucial that there is policy alignment with the Energy Strategy which is owned by the Department for the Economy. For example, it is important that the relationship between the carbon budgets and the wider energy transition is understood and aligned.

Concluding Observations

133.0 As Northern Ireland's Transmission System Operator, SONI is committed to playing our part in supporting Northern Ireland's energy transition. Our primary purpose, as set out in our Strategy 2020-2025, remains transforming the power system for future generations and delivering a cleaner energy future for homes, farms and businesses across Northern Ireland.

134.0 The 2030 targets are hugely challenging in both their scale and complexity involving a wide range of stakeholders with different, and often competing priorities. Achieving these targets will require a continuation of the close collaboration that has delivered the progress made to date alongside timely reform, innovation and agility in policy and practice. Well managed strategic investment in the grid, system operations and electricity markets now will provide Northern Ireland with the opportunity to not only achieve the 2030 targets but also reach a net zero power system in the decades beyond.

135.0 The substantive policy direction and the required measures to deliver it are largely in place. In our professional assessment as the Transmission System Operator, the key focus needs to be on removing barriers which risk falling short of Northern Ireland's renewable energy targets and proactively identifying opportunities to accelerate delivery.