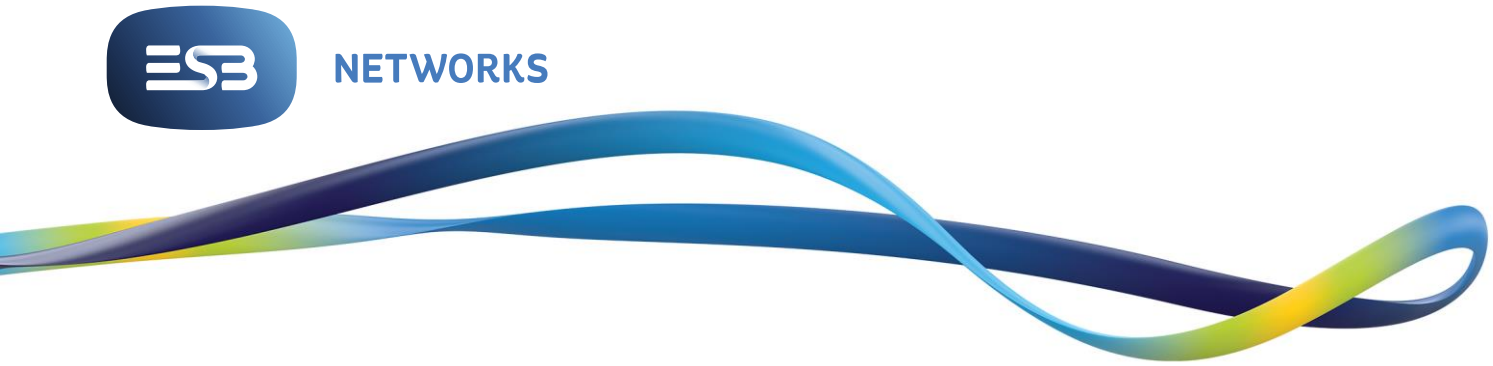

REVIEW OF THE SECURITY OF ENERGY SUPPLY OF IRELAND'S ELECTRICITY AND NATURAL GAS

ESB Networks' Consultation Response

28th October 2022

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1. Introduction

ESB Networks welcomes the opportunity to respond to the Department of the Environment, Climate and Communications (DECC) consultation 'Review of the security of energy supply of Ireland's electricity and natural gas systems'. Energy security and affordability are of critical importance to our customers and the economy as Ireland transitions to a net-zero emissions future. ESB Networks is committed to supporting the security of electricity supply as Ireland delivers on Climate Action Plan targets including 80% renewable electricity by 2030 and decarbonisation, through electrification, of the heat and transport sectors. Electrification, combined with flexibility and storage technologies will help facilitate higher levels of renewable generation on the power system. Demand side flexibility and customer participation will reduce peak demand and utilise renewable generation in times of surplus supply. A digitally enabled network consisting of high levels of automation and artificial intelligence, will combine with these technologies and initiatives to reduce energy import dependencies and provide an opportunity to harness Ireland's abundant indigenous renewable energy resources.

Our own strategy is aligned with this through a key focus on connecting renewables to the electricity system and enabling the electrification of other parts of society including heat and transport. This will be underpinned by a reliable, resilient, and flexible electricity network, which will also facilitate customer-centric solutions for citizens to become active participants in the energy system.

1.1 Role of ESB Networks

As Distribution System Operator (DSO), Distribution Asset Owner (DAO) and Transmission Asset Owner (TAO), ESB Networks works to meet the needs of all Irish electricity customers, providing universal access to the electricity system, and delivering and managing the performance of a system of almost 155,000 km of overhead networks, 23,000 km of underground cables and 640 high voltage substations.

ESB Networks also delivers a range of services to the Republic of Ireland (RoI) Retail Electricity Market, servicing over 2.5 million customers. It manages relationships with Market Participants and provides data in a timely and accurate fashion each day. ESB Networks supports the wider RoI market through the ring-fenced Meter Registration System Operator (MRSO) and Retail Market Design Service (RMDS) and supports the wholesale Single Electricity Market through the provision of aggregated meter data.

The role of ESB Networks is also evolving to enable and drive an increasingly dynamic energy system, to meet Ireland's Climate Action target for 80% renewable electricity and the electrification of heat and transport. The DSO will have increased responsibility for actively managing demand and generation at a local level on the distribution system, and with increasing co-ordination with the TSO to enable and manage additional flexibility in the electricity system.

2. Reponses to Consultation Questions

In this section, ESB Networks has provided responses to Consultation Questions 1, 2, 4, 6, and 7-10. In addition, we have provided overarching response commentary as follows below.

1. **Broader Definition of 'Secure Energy'**
   The Consultation refers to the 'most secure energy' as that which is 'not used' and therefore 'energy efficiency should always form part of our response to energy security'. ESB Networks view energy that can be stored or shifted to different times and/or sources as amongst the 'most secure energy', as this approach leverages indigenous renewable energy resources.

2. **Energy Import Dependency**
   In the consultation, Ireland is outlined as one of the most energy import dependent countries in the EU due to oil (100%) and natural gas (71%) import dependencies. Electrification of heat and transport will reduce import dependency on both commodities. Furthermore, by enabling and harnessing the flexibility of this load, in conjunction with renewable electricity storage, grid technology, market mechanisms, and behavioural change incentives, Ireland has an opportunity to maximise the use of indigenous renewable electricity to significantly reduce dependency on energy imports. The inherent efficiency of electric vehicle and electric heat pump technologies also provide a significant energy efficiency opportunity compared with conventional technology. For example, battery electric vehicles can travel 3-4 times the distance with the same amount of energy than a conventional combustion engine. Similarly, heat pumps can heat space and water with high coefficients of performance, meaning each kW of electricity consumed generates ~4kW of energy.[1]

3. **Materials Considered**
   The Consultation lists ten pertinent documents which provide a range of insights and analysis on energy security matters. ESB Networks propose the inclusion of the 2030 Power Systems Requirements document (issued under the National Network, Local Connections Programme) which provides interim analysis on when, where and how much flexibility will be needed over the coming years.[2]

   Finally, ESB Networks projections indicate that that the scale of the peak load challenge will be significant assuming that volumes of heating and transport adoption set out in the Climate Action Plan are met and that demand side flexibility is absent.

[1] https://www.accenture.com/_acnmedia/PDF-98/Accenture-Eurelectric-Gamechangers-Final-Report.pdf
[2] https://www.esbnetworks.ie/docs/default-source/publications/esb-networks-national-network-local-connections-programme-power-system-requirements-.pdf

2.1 Risks

Q1. Are there any other security of supply risks that you can identify in addition to those set out in section 6?

Yes, additional risks for consideration are as follows:

1. **Cybersecurity**: The 'electricity system' should not be considered as just the infrastructure in the electricity grid, overhead/underground wires, substations etc. When reference is made to 'improving the resilience of the electricity system', supporting operational technology (OT) and information technology (IT) systems and industry processes must also be considered. These OT and IT systems and processes serve the retail and wholesale markets well, are resilient but are complex given the nature and requirements of the electricity industry.

   ESB Networks recognise that a major cybersecurity incident with grid connected systems would result be very negative for ESB Network's business, for electricity customers and for the wider economy. The protection of these systems, from all forms of cyber risk and blended (combined physical/cyber) attacks is recognised as essential to maintaining ongoing operations.

2. **Procurement of materials/resources and international supply chain challenges:** Procurement challenges need to be overcome. Energy networks are being transformed across the world to meet the needs of the changing energy policy landscape. Given this, Ireland is competing internationally for the same materials and resources and procurement of these will therefore be difficult. This has been exacerbated by Covid-19 and geopolitical factors.

3. **Critical Skills Gap:** There are emerging gaps in terms of future technically skilled personnel and engineers required to meet the challenges in transforming how we power our society in the years ahead.

4. **Customer engagement/behaviour:** ESB Networks recognises that without an emphasis on energy consumer communication, engagement, and education it may be difficult to encourage the behavioural changes necessary to harness the potential of demand side participation and flexibility. It is vital that energy consumers have access to clear and simple information to assist with navigating the various services and products in the electricity market which may assist them on their decarbonisation journey.

5. **Extreme weather events:** ESB Networks have identified the increasing impacts of climate change such as more frequent flood events, increased severity and frequency of storms and high temperature events as a risk to network operation and resiliency.

6. **Project planning and consenting timelines**: The development of renewable projects and associated grid infrastructure can be a lengthy process – planning and consenting timelines may inhibit the opportunity to add renewable generation to the system more quickly.

7. **Pipeline of renewable projects:** It is crucial that there is a steady drumbeat of renewable projects such that every year between now and 2030 is utilised to the fullest extent possible. The carbon budgets and sectoral emissions ceilings which have been agreed by the Government strengthen this need further. Renewable energy auctions will need to be structured such that capacity is

brought on in the frequency and at the scale needed from the early years. If this does not happen it will be difficult to make up the difference in the latter half of the decade.

Q2. If there are other risks that you have identified, could you outline some mitigation options to address the risk(s)?

Additional Mitigations are as follows:

1. **Cybersecurity**: ESB Networks continues to develop innovative solutions to increase the cybersecurity of the energy sector. These solutions include a new private communications network which will enhance the security and reliability of the electricity network. Additionally, this private network will enable further integration of renewable generation and the roll-out of customer projects including the NN, LC programme. ESB Networks remains open to exploring how this technology can also benefit other utilities to improve resilience nationally. Furthermore, ESB Networks remain strongly committed to complying with the EU NIS Directive on cybersecurity.

2. **Procurement of materials/resources and international supply chain challenges:** Delivering on the national CAP targets will require a secure supply chain of critical resources, technologies, and materials. A national strategy for this should be considered.

3. **Critical skills gap:** A national plan is required to address emerging gaps in terms of future technically skilled personnel and engineers required to meet the challenges in transforming how we power our society in the years ahead.

4. **Customer engagement/behaviour:** ESB Networks are committed to bringing together an ecosystem of aggregators, energy suppliers, energy services companies, and technology companies who will be at the front line of developing new propositions to help customers change how and when they use electricity. ESB Networks plans to support these developments, through awareness, education and engagement initiatives.

   Customers need to become informed as to how to best manage their electricity consumption and keep control of their bills. However, experience has shown that conventional communication channels find it difficult to reach into communities that need the most help. Providing information through schools has proven more effective than mass media campaigns and all utilities have a responsibility in this regard. Furthermore, in 2021, ESB Networks launched the National Networks Local Connections Programme, in collaboration with stakeholders, to enable and drive customers active participation in local and system wide services. This programme will play a key part in ensuring efficient use of the network by maximising its utilisation, increasing its resilience, and helping to meet climate targets for 2030.

   Furthermore, ESB Networks has introduced the Beat the Peak Domestic (BTP-D) initiative - a nationwide domestic behavioural demand response campaign, promoting and rewarding customers who reduce demand during peak demand events, testing a mixture of personal, community and broader pro-social incentives. This campaign will be supported by digital elements including the provision of targeted insights into customers' electricity demand. Additionally, ESB Networks has introduced Beat the Peak Commercial (BTP- C) -, targeting large and multi-site commercial customers to reduce demand during peak events, in return for financial incentives in the form of direct payments.

5. **Extreme weather events:** ESB Networks is already taking steps to ensure the network is adaptable and resilient to the increasing impacts of climate change such as more frequent flood events, increased severity and frequency of storms and the impact of increased temperatures on network operation. ESB Networks have already implemented mitigation measures to the Low Voltage (LV) network which have proved effective in recent flooding events during 2022.

   Specific LV Mini-pillar sites, which connect ESB Network customer service cables to the main LV network, were elevated at flood prone locations to protect from rising water levels during flood events. ESB Networks have also redesigned the LV network in other towns where severe flooding has occurred such as Athlone and Galway. Furthermore, ESB Networks are currently revising designs to provide increased climate-breakdown adaptability and resilience for assets such as HV stations (specifically flooding mitigations) and overhead lines.

   ESB Network's 'Development of Dynamic Line Ratings' project seeks to improve the resilience of the overhead distribution and transmission network during an event where a circuit exceeds the allowable maximum conductor temperatures (due to high ambient temperatures and low wind speeds). Such events are expected to increase in frequency due to climate change. This project will introduce technology that can determine the allowable capacity on the circuit on an hourly/forecast day ahead basis. This will make it possible to reduce the capacity of the infrastructure during extreme temperature events to ensure optimum life of the conductors.

6. **Project planning and consenting timelines:** Addressing planning delays and the consenting process would add renewable generation to the system more quickly. Opportunities should be examined to streamline the timelines for the planning process for such projects, which includes appropriate objections and appeals mechanisms.

7. **Pipeline of renewable projects:** It is crucial that there is an increasing and steady drumbeat of renewable projects such that every year between now and 2030 is utilised to the fullest extent possible. Close alignment between the timing of government RESS auctions and regulated connection policy will be important so there is a steady flow of contracted projects bidding into a competitive RESS auction process. Delivery of grid connections for projects with Corporate Power Purchase Agreements and projects successful in Capacity Auctions in a timely manner will also be important to meeting CAP targets.

Q3. Are the five shock scenarios that were considered, and the additional scenarios related to the Russian invasion of Ukraine, sufficiently broad?

No Response.

2.2 Mitigation Options

Q4. Do you have any additional mitigation options that you think should be considered?

Additional mitigations for consideration are proposed as follows:

1. **Distribution flexibility and system services:** In its role as DSO, ESB Networks is establishing the new products, services and market arrangements for flexibility mandated in the Clean Energy Package. This is needed to enable Ireland's Climate Action target for 20–30% of demand to be flexible. Achieving this ambitious target will rely on distribution-connected resources (individual or aggregated demand, distributed generation, and storage) being empowered to participate in new local flexibility markets, as well as in the SEM and DS3 system services.

   Throughout 2021 and 2022, ESB Networks have invested heavily in a programme addressing the full range of technological, market design, behavioural and engineering challenges which must be addressed to achieve this goal. ESB Networks is the lead for Action 101 of the Climate Action Plan 2021. To date ESB Networks has delivered actions on time and are on target to meet future actions in an agile and collaborative manner for the benefit of customers.

   ESB Networks have developed a number of proposed actions as critical next steps in enabling Ireland's 20–30% demand side flexibility target.

   - The introduction of standard reporting on flexibility market operations, addressing volumes of flexibility products, schemes, participants, bids, and other key market parameters critical to building transparency and supporting flexibility market liquidity.
   - Extension of 2030 Flexibility Requirements published in January 2022 to introduce innovative new applications of flexibility.
   - Implement initial community / local energy dashboards' providing local, regional, and community-specific information including renewables and electricity carbon intensity.
   - Pilot standard control and monitoring requirements for consumer energy technologies to be 'flexibility ready' in a range of technical and customer settings.
   - Publish first year's findings from national programme of consumer communications based on research relevant to demand side flexibility.

2. **Greater emphasis on storage and routes to market for emerging storage technology**: Electricity storage will be important in terms of ensuring greater flexibility for electricity system operators. It will provide a range of valuable services from congestion management, peaking capacity, alternative network solutions, increasing renewables on the grid, delivering cost benefits to end consumers, and ensuring security of supply. ESB Networks believe that there are a number of areas which require consideration:

   - Currently, there is no mechanism in the retail electricity market to treat battery storage differently to other generators. If there are any regulatory policy and market design changes introduced to facilitate greater levels of battery storage, it is vital that sufficient time is allowed to implement these changes in the retail electricity market. For any changes envisaged for ESB Networks or the retail electricity market, the earlier we are involved in

the process, the greater our ability to provide effective solutions and efficient implementation timelines.

- It would be worthwhile considering how to encourage community small scale renewable generation projects to integrate battery storage projects in order to reduce their impact on network capacity and avoid expensive reinforcement works, making them more feasible. Such projects could also be valuable to ESB Networks to understand their benefit to the electricity system and society.

- Locational signals are important to ensure that the deployment of future storage projects delivers value both to the investor and the system. The need to maximise the co-locational complementarities of storage and renewable generation (with a focus on charging the storage from renewable energy that might otherwise by constrained or curtailed).

Furthermore, ESB Networks suggest that consideration should be given to the benefits of storage in aiding large EV charging hubs. Such charging hub installations are becoming more common across the UK and EU, with a significant ramp up of large 1-5MW “hubs” in the coming years to meet EV charging demand (in compliance with the proposed Alternative Fuels Infrastructure Regulation). These installations could be co-located with batteries, further leveraging the network infrastructure put in place (and introducing the potential to deliver system or flexibility services).

Q5. Which gas supply mitigation options, if any, should be considered for implementation?

No Response.

Q6. Which electricity supply mitigation options, if any, should be considered for implementation?

ESB Networks have responded on 'Additional Electricity Interconnection' and 'Electricity Mitigation Package' only as the other mitigations fall outside our remit.

1. Additional Electricity Interconnection

While additional electricity interconnection is part of the solution, it has certain limitations. It depends on other countries not having similar issues at the same time. While it may be able to deliver extra power when demand is high, Irish renewables are often deeply embedded and thus the capacity to transport over-supply in peripheral regions to the interconnectors is limited. Therefore, it is vital that additional electricity interconnection is coupled with greater local balancing to achieve an increased level of energy supply resiliency across the energy sector.

2. Electricity mitigation package (DSR and Batteries)

Demand Side Response

Demand side management has an important role to play in the Irish electricity market by enhancing security of supply and providing significant benefits to both the Distribution System and the Transmission System and will be essential for:

- Local system management, to be able to securely connect electrification and renewables in a timely manner. And to reduce the constraint of renewable generation (thus reduce CO_2/kWh at a local level).
- Transmission/SEM system services, to maintain a secure system with adequate balance and reserve.
- Reducing CO_2/kWh at a system level, by allowing for price - or carbon - following consumption, where possible, by storage-like demand technologies (e.g. EV batteries, domestic/commercial batteries, some portion of heating and cooling).

By introducing demand side response services and utilising electricity storage as an alternative to reinforcing the network it may be possible to reduce cost and time to connect a new customer or improve the reliability for existing customers.

Batteries

The potential value of battery storage technologies has been outlined in a number of national and international studies and should be considered. For example, in May 2022, ESI and Baringa had some interesting findings in their report titled 'Game Changer'. In the report they identified benefits that they believed various durations of energy storage could bring to the electricity system and to end consumers on the island of Ireland by 2030[3], their findings included:

- Strategic deployment of energy storage in constrained regions of the network reduces the dispatch-down of renewable generation from constraints without the need for network reinforcement, unlocking additional carbon savings.
- By contributing to security of supply, helping to support renewable capacity, and displacing fossil fuels in the balancing market, energy storage can deliver a net saving to end consumers in Ireland of up to €85m per year.

[3] https://www.energystorageireland.com/wp-content/uploads/2022/05/GameChanger-ESI-Report-May2022-Web-1.pdf

- These benefits are additional to the carbon, renewable curtailment, and end consumer savings offered by energy storage through the provision of zero-carbon system services.
- Energy storage helps the integration of renewables at all stages by ensuring that generation is not wasted.

Q7. What measures should be considered on the demand side to support security of supply of electricity and gas?

Demand Side Flexibility (DSF) will play a key role on the demand side to support the security of supply of electricity. DSF incorporates a broad range of actions to reduce peak demand and to utilise renewable generation in times of surplus supply. ESB Networks proposes a number of reforms and investments below to support overcoming the barriers to DSF and to enhance security of electricity supply.

Reforms include:

- **Introduce a regulation/standard for smart technology**: this will require or mandate the installation of smart systems e.g., EV chargers, inverters, home energy management, etc.
- **Climate Action Plans**: The Irish Government's annual Climate Action Plan provides a detailed roadmap for decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030. ESB Networks' will continue to emphasise the importance of reaching the Climate Action Plan target of 20-30% system demand flexibility by 2030. This sends out a strong signal to the market system and encourages investment. ESB Networks' next steps in achieving increased demand side flexibility are outlined in Question 4 above.

Investments include:

- **Market Integration:** Currently there is a low level of market integration in increasing demand side flexibility capacity. To overcome this, necessary resources should be allocated to form a dedicated DSO / TSO team which can subsequently develop an overall framework/operating model for flexibility through engagement with stakeholders.
- **Training programmes**: to upskill technicians so that they are qualified to install and commission smart technologies (chargers and inverters).
- **Continued investment in R&D**: particularly in participative research between TSO/DSO/aggregators/customers.

Q8. Do you have any views on how the mitigation options should be implemented?

ESB Networks propose the adoption of a number of **general implementation principles:**

1. **Piloting**: Piloting has a central role to play in how ESB Networks engages with its stakeholders. For every pilot, it is essential that a communications and consultation plan, based on the insight-led approach is developed. This enables timely and relevant communication and engagement. Piloting involves process and systems changes, which may vary and are dependent on factors including procurement processes, piloting locations, stakeholder types and customers involved. It is crucial that ESB Networks develop an insight into what stakeholders across all segments would like to understand from pilots and identify how learning is taking place over their duration.

2. **Supporting Industry**: ESB Networks is strongly committed to developing and maintaining partnerships with other organisations which seek to maximise customer reach, penetration, and adoption within communities. To achieve this ESB Networks will bring together an ecosystem of aggregators, energy suppliers, energy services companies, and technology companies who will be at the front line of developing new propositions to help customers change how and when they use electricity. ESB Networks will support these developments through awareness, education and engagement initiatives. For example, through a coordinated campaign ESB Networks will seek to align communications between the industry and the National Network, Local Connections Programme in order to support the launch of new products and customer propositions.

3. **Consultative stakeholder group:** Stakeholder engagement is of fundamental importance to ESB Networks as we transform the electricity system to meet the targets set out in the Climate Action Plan and eventually net zero emissions. ESB Networks recognise the importance of stakeholder collaboration through the National Network, Local Connections 'Consultative Stakeholder Group'. The 'Consultive Stakeholder Group' plays a central role in engagement, collaboration and maintaining support for stakeholders' ability to plan for and influence the timing of consultations into the future.

4. **Making it real for industry, customers, and communities**: ESB Networks remain committed to communicating lessons learned in a tangible format that is easily digestible for stakeholders, enabling them to share in the piloting experience. Sharing the customer/community experience through the delivery of tangible roadshows, awareness campaigns and nationwide piloting zones where propositions and services are tested builds upon ESB Networks insight-led approach. This helps achieve the ambition of 'making it real' for industry, customers and communities.

In addition to the principles above, the right customer, market and technical signals will be critically important to driving the required customer behaviours and to the implementation and adoption at pace of new clean technologies and services.

ESB Networks recognise that influencing consumer behaviour through incentives and communication campaigns will be key in increasing the adoption of low carbon technologies at the rate required to have a meaningful impact by 2030. It is essential that all customers understand the benefits of these technologies for themselves and their communities in fighting global climate change.

An example of this can be seen with electric vehicles. Based on current forecasts it is assumed that in the future, the majority of customers will charge their electric vehicles over roughly the same period in the evening. While this is currently likely, actions could be taken now to encourage more flexible charging patterns in the future. With the right market and technical signals, customers could be encouraged to charge electric vehicles at times which are more favourable based on network or market

conditions. Given the fact that electric vehicle adoption remains low and that behavioural patterns have not yet formed, it is very feasible to believe that this shift in behaviour can be obtained.

Similarly, the contribution of future heat pump load to peak demand could be reduced, once again with the correct market and technical signals. While heating demand is quite different from electric vehicle charging, given its “always on” nature, if customers were encouraged to change their temperature requirement - for even a short period of time - substantial aggregate demand changes could be achieved.

2.3 Policy Measures

Q9. Do you support the policy measures proposed in section 8 of the consultation paper?

Yes, overall, ESB Networks is supportive of the policy measures proposed in Section 8. We continue to support joint planning and welcome further coordination between the operators of the electricity and gas transmission and distribution networks. ESB Networks supports the proposed 'Regular Energy Security Review'. Recognising the pace of change of the energy transition, the shifting geopolitics of energy and international relations, and the rate at which both energy and digital technology is evolving, ESB Networks suggests that more frequent/dynamic understanding, and visibility (e.g., digitally enabled), of the state of energy security may be prudent.

Q10. What further tools and measures do you think would contribute the most to Ireland's energy security of supply?

Additional tools and measures for consideration are proposed as follows:

- A national customer engagement and education programme.
- A national energy supply chain/procurement risk review and strategy for net zero transition and energy security.
- A national review and strategy to ensure the availability of critical skills including engineers and technically skilled personnel to deliver CAP targets.
- The distribution grids will be critical to enabling the energy transition and security of the power system. Controlling system stability in a high variable renewable system will present growing challenges. New approaches and technologies are needed to deliver on the overarching goal of a secure and efficient power system operation. A digitally enabled network of the future with a high level of automation and artificial intelligence will be critical to aiding human operators to manage an increasingly dynamic and complex grid. This will provide more accurate and real time understanding and measurement of grid/system characteristics (e.g., technologies to provide accurate and continuous inertia measurements) ensuring enhanced system resilience as the energy system evolves toward net zero.

3. Conclusion

ESB Networks welcomes the opportunity to respond to the Department of the Environment, Climate and Communications (DECC) consultation on 'Review of the security of energy supply of Ireland's electricity and natural gas systems'.

ESB Networks remains available to discuss the comments provided in this consultation response and look forward to engaging with the DECC and other industry stakeholders as this critical area progresses.