2020 Energy Security and Sustainability Review

Background Analysis to the Terms of Reference

An independent expert technical report commissioned on behalf of Stop Climate Chaos, a coalition of civil society organizations campaigning to ensure Ireland does its fair share to tackle the causes and consequences of climate change.

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All views and opinions expressed in this technical report are those of the author and do not necessarily reflect the official policy or position of the Stop Climate Chaos coalition.

2020 Energy Security and Sustainability Review
Terms of Reference – Background Analysis

Introduction

The information set out below provides the rationale and background analysis associated with questions in the proposed Terms of Reference.[1] The purpose is to clarify the questions and outline the reasons as to why these separate issues should be addressed in the Energy Security and Sustainability Review (ESSR). This report also seeks to identify and summarise certain risks associated with individual Review areas.

There is no one common accepted definition of "energy security." The International Energy Agency (IEA) defines energy security as "the uninterrupted availability of energy sources at an affordable price."[2] In this way, it is an extremely broad concept covering not only the security of energy sources but supply infrastructure, energy efficiency and demand-side responses across all relevant sectors. The level of security is not only defined by the availability of alternative sources (back-up), as well as safety of relevant infrastructure and likely demand. Potential security or insecurity equally relate to external factors, that is the degree of impact of an individual failure/disruption, as well as the likelihood of that failure/disruption occurring.

For the purpose of this report, 'sustainability' is understood to mean the degree to which energy sources support or undermine climate mitigation and decarbonisation efforts. It is essential that the ESSR takes as a starting point the need to meet Paris Agreement objectives in relation to this consideration of sustainability. However, 'sustainability' is an equally broad term and other elements including adaptation, biodiversity and health impacts and co-benefits could equally be considered. It is particularly important to note that energy security and sustainability are fundamentally related and must not be treated as separate elements in the ESSR. Indeed, these are two mutually reinforcing objectives requiring accelerated and integrated action at national level: an insecure energy system and insecure energy supplies would undermine Ireland's climate action; equally, a weak or limited climate response poses fundamental risks to energy security. A holistic, transparent and long-term approach is undertaking this Review. The ESSR should critically assess, and where necessary, challenge pre-existing assumptions and responses of relevant state bodies in order to assist all stakeholders in making improved policy decisions both in 2020 and beyond.

It is critical that the ESSR does not only address the security of the power system and resilience of current assets. Electricity is only about one fifth of the final energy used in Ireland. Decarbonising heat and transport is already an important element of Irish energy and climate policy. However, energy security analyses at national level have tended to focus on the maintenance and availability of electricity, gas and oil infrastructure and supplies (and/or diversifying these supply sources) with less attention paid to the security benefits of decarbonising the heat and transport sectors (through energy efficiency, renewables or demand reduction).[3]

Policy Context

The Minister for Communications, Climate Action and the Environment has overall responsibility in Ireland for energy security. However, the independent Commission for Regulation of Utilities (CRU) has a range of specific statutory functions under national and EU law relating to ongoing assessments and maintenance of security of supply in the gas and electricity sectors.[4] As part of their functions, Gas Networks Ireland (GNI), EirGrid and the National Oil Reserves Agency also have legal responsibilities in relation to gas, electricity and oil security respectively.

The 2014 National Policy Position on Climate Change sets out that the state will seek to achieve an aggregate reduction in CO2 emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, building and transport sectors; and in parallel, achieve carbon neutrality in the agriculture and land-use sectors. The 2015 Climate Action and Low Carbon Development Act provides for the preparation of national mitigation plans in order to specify policy measures to reduce GHG emissions. The first National Mitigation Plan produced in 2017 was updated by the Government's Climate Action Plan of June 2019 which committed the Department to prepare new 5-year carbon budgets and new sectoral targets. This latter plan is a separate initiative which does not have a statutory basis (i.e. does not stem from or seek to fulfil obligations under the 2015 Act). As part of the Climate Action Plan, the Government also committed to introducing a new long-term national transition objective based on the achievement of net zero emissions by 2050. Draft legislation to give effect to these provisions was published in January 2020 just prior to dissolution of the Dáil but has not been considered by the Oireachtas.

Under the EU's Clean Energy Package, the state is also required to produce a new National Energy and Climate Plan (NECP) by the end of 2019 (at the time of writing Ireland's NECP has not been finalised). This will see the production of another climate strategy and long-term strategy also requires the compilation of information on national measures relating to energy security. The EU's 2030 Climate and Energy Framework also seeks to improve ensure energy security by increasing the share of renewable energy sources in the energy mix and further enhancing energy efficiency objectives, while also requiring reductions in emissions by at least 40% below 1990 levels by 2030. Most recently, the European Council in December 2019 endorsed the objective of achieving a climate-neutral EU by 2050 as part of a new EU 'Green Deal'. The EU will likely increase its mitigation objectives, including through the introduction increased 2030 and 2050 targets in EU legislation and this will require the preparation and application of higher mitigation targets at national level. It is also important to note that the EU's and Ireland's 2030 targets are still not aligned with objectives of the 2015 Paris Agreement as set out in article 2 and a Paris-aligned pathway will require even greater ambition than is currently planned under the 2019 Climate Action Plan or the NECP.

Background Analysis

Section 1 Review Methodology

1. To undertake an impartial and transparent assessment of Ireland's energy security and sustainability by appointing an independent steering group to commission relevant technical analysis and host a public consultation. This group should oversee the integrity and objectivity of the review process.

The attached Terms of Reference puts forward guiding principles including regarding development, operation and outputs associated with the ESSR. The ESSR should be conducted in an open and transparent manner and it is particularly important that underlying assumptions are clearly presented. For policy decisions to be verifiable, evidence based, socially acceptable and in accordance with decarbonisation commitments, assessments must also be based on open modelling analyses that make use common long-term datasets and which apply Paris Agreement aligned scenarios. Assessments must also clearly present supply and demand assumptions and take account of potentially conflicting interests of key stakeholders, including state entities.

Independent, integrated and transparent assessment of energy security is needed to ensure policy and investment decisions are in the long-term interest of citizens; this particularly in relation to gas infrastructure and investment. An independent steering group should be appointed to lead the ESSR supported by the technical analysts to be appointed. This group should oversee the integrity and objectivity of the review process that will involve submissions from state, commercial, academic and independent actors. The Department should follow the approach taken for other policy reviews in appointing independent experts to carry forward the terms of reference based on a commitment to transparency.[5]

This steering group should lead the public consultation and engage with all stakeholder representatives in order to identify and address questions set out in these terms of reference and put forward short, medium, and long-term recommendations responses. Such stakeholders include the CRU, the SEAI, gas and electricity TSOs and DSOs, the Climate Change Advisory Council, the EPA, semi-state companies, energy providers and business networks, academics, researchers and relevant Non-Governmental Organisations.

This steering group should be tasked with producing a final report with recommendations based on stakeholder feedback and presenting this report to the Oireachtas. The report should address legislative, regulatory and cost implications for the delivery of the recommendations and actions. It should also put forward optimal structures or processes to ensure ongoing co-ordinated and effective energy security in the long-term, including developing clear communication channels between relevant state bodies, semi states and the Oireachtas.

As occurred for the Department's Review regarding collection of single use plastic bottles, analysis should not only focus on the strengths and weaknesses of approaches in Ireland but also examine best practice in other states. [6]

Section 2 Scope and Objectives

2. To examine and make recommendations on how Ireland as an isolated grid with declining indigenous fossil fuel resources can achieve full decarbonisation by 2050 at the latest and remain energy secure.

Questions

2.1 How can the security of the state's whole energy system [Total Primary Energy Requirement] be enhanced whilst meeting the objectives of the Paris Agreement and Ireland's national and EU mitigation obligations?

Energy security must be assessed in the context of the climate crisis and the urgent need for increasing policy ambition. It is important that energy security and sustainability are not consideredtwo mutually exclusive or competing aims. Energy security has traditionally focused on physical supply. However, it is now essential that energy security is defined to include decarbonisation objectives, as well as other new related challenges such as severe climate change impacts and extreme weather events, and the adequacy of flexibility resources.[7]

An important consideration is that Ireland's climate mitigation targets are not in line with the Paris Agreement 1.5 °C temperature objective. As noted in the UNEP Emissions Gap report, Ireland needs to be reducing emissions by at least 8% (and potentially closer to 15% without negative emissions technologies) a year in order to contribute equitably to the Paris Agreement goals. However, the 2019 Climate Action Plan only provides for 2% annual reduction. More ambitious reductions will also be necessitated by the EU's new Green Deal commitment to reach carbon neutrality by 2050 and reach up to 55% reduction by 2030.

DCU Energy & Climate Research Network note in their recent letter to Minister Bruton that "[i]ndependent assessments suggest that prudent, equitable, ambition, consistent with the Paris goals, will require the EU as a whole to reach nett zero well before 2050. In the case of the relatively wealthy EU member states with high per capita emissions – such as Ireland – nett zero would likely have to be achieved c. 2035." Energy supply and demand scenarios consistent with equitable action under Paris Agreement goals should be developed.[8]

MaREI research underlines that delayed action has major impacts on the rates of decarbonisation required by the Paris Agreement. Their modelling indicates that "using equitable carbon budgets creating ambitious decarbonisation of the Irish energy system is not excessively expensive as a proportion of GDP, nor is the reduction in production significant enough to pose concern for annual economic growth."[9]

It is important to note that the IEA's 2019 assessment of Irish energy policy did not assess the impact of current and recommended policies on Ireland's commitments under the Paris Agreement. It also failed to address the potential stranding of gas infrastructure assets and the risk that Ireland's decarbonisation would be undermined by the addition of new natural gas infrastructure and entry points (see below).[10]

2.2 How should the increased penetration of renewables in power generation, and offshore wind specifically, be planned in the short (i.e. by 2025) and medium term (i.e. by 2030-35) to improve long-term energy security?

2.3 To what extent do enhanced measures to reduce energy demand in industry and heat provide additional security while also reducing emissions?

2.4 How should enhanced energy efficiency and zero-carbon transport measures be implemented to improve Ireland's energy security and sustainability alongside mitigation?

The SEAI note that "[e]nergy security relates to import dependency, fuel diversity and the capacity."[11] However, as noted by MaREI, the breadth of the concept and variety of definitions "leaves it vulnerable to exploitation as a justification for energy policy instruments." It is important that the ESSR is not limited to a review of electricity and gas system stability which are already carried out by EirGrid and GNI and independently reviewed by the CRU. Such assessments do not integrate 2030 and 2050 decarbonisation objectives and do not go beyond the power sector. It is also particularly important that the ESSR does not equate maintenance of existing gas infrastructure with energy security given the significant stranded asset risks of ongoing further investments in gas assets [see section 4.2].

MaREI research in 2017 specifically examined the security benefits of decarbonising the energy system.[12] They point to several co-benefits of ambitious climate mitigation policy as it involves (inter alia) a diversification from foreign fuel sources to indigenous renewable generation, reduced coal-fired generation and improved transport efficiency and emissions intensity. They note that "[l]onger term to 2050 the higher ambition reduction of emissions has energy security co-benefits in counteracting the trends in decreasing security of primary energy supply, by increases in domestic renewables efficiency in domestic infrastructure with lower sectoral energy intensity per value added, per household and per unit of freight transported." MaREI emphasise that there are multiple environmental and energy security co-benefits to decarbonising the energy system. Their analysis on future low carbon scenarios also shows an increasing trend in energy security as indigenous renewable energy grow over time, thereby decreasing our import dependency.[13]

The environmental consultancy E3G have underlined that the optimum approach for managing energy security risk is effective management of energy demand. They have recommended that "demand-side investments should be given parity with other forms of infrastructure for energy security and be treated as a deployable option rather than as a fixed externality."[14] MaREI has also highlighted that energy efficiency measures to address energy poverty will reduce Ireland's reliance on imported fuels. They note that "[a] typical Irish home built in 2005 with a gas fired boiler will reduce gas demand by 50% if thermally insulated to todays A-rates level." According to the CRU, smart meters could result in a 2.5% reduction in overall electricity demand and a peak-time demand reduction of 8.8%.[15] DCU Energy & Climate Research Network note that "the Review should consider the implications of multiple energy demand scenarios, specifically including scenarios of significant near-term demand constraint."[16]

Most of the energy (80%) used in Ireland is in the heat and transport sectors. Decarbonisation of these sectors may provide significant security benefits. Current targets are for petrol and diesel vehicles to be phased out over the next 10 years. Ireland imports oil primarily from the UK and Norway (and to a lesser extent Nigeria and Algeria). Reduced oil demand should make Ireland more resilient to potential supply disruptions or price shocks due to geopolitical events. As noted by Dr. Paul Deane, reduced car use is also a significant lever in reducing Ireland's oil import dependency and improving energy security. Infrastructure to reduce demand such as bus corridors, light rail, cycle lanes, and shared mobility alternatives must also be considered.[17]

The SEAI 2015 assessment of national energy security concludes that "[d]iversifying the fuel mix enhances energy security, particularly where there is an over-reliance on a single fuel source. In this regard, transport is the least secure energy sector, being almost entirely dependent on oil based products, and has the greatest need of increased fuel diversity. Diversification of the electricity generation fuel mix by increasing indigenous renewable electricity production has reduced the demand for imported fossil fuels and the associated exposure to their variations in price."

Section 3 Power Sector Infrastructure and Renewable Sources

3. To examine and make recommendations regarding additional energy storage, distribution and interconnection infrastructure that will be required to ensure Ireland is energy secure as we move towards 100% renewable electricity, and decarbonisation of all other sectors.

Questions

3.1 What is the potential for renewable energy to address rising energy demand and displace fossil fuels, and what, if any, are the primary obstacles to new renewable infrastructure and associated grid improvements? How should these be overcome?

The ESSR should assess the degree to which progress towards full decarbonisation and 100% renewable would enhance Ireland's energy sovereignty by reducing reliance on fossil fuels and provide a hedge against price volatility. In 2017, 65% of electricity generation came from fossil fuels, of which 52% was natural gas, 12% was coal and 0.5% was oil. Renewable sources are playing an increasingly important role in electricity supply with wind providing 30% in 2018. The CRU notes that "this highlights the impact that continuing wind connections can have on the system and the ability to reduce reliance on a single fuel source." The Government's 2019 Climate Action Plan pledges to increase renewables electricity generation further from 30% to 70% adding 12GW of renewable energy capacity by 2030, including at least 3.5 GW of offshore renewable energy, up to 1.5 GW of grid-scale solar energy and up to 8.2 GW total of increased onshore wind capacity. Other analyses point to the viability of 100% renewable energy systems, which may in the future be provided through a combination of wind generation, hydroelectricity, interconnection, bioenergy, hydrogen and other storage technologies.[18]

EirGrid's *Tomorrow's Energy Scenarios 2019* report sets out pathways for the development of the Irish electricity system over the next twenty years based on a clean energy transition. EirGrid identify three possible scenarios to test the performance of the electricity system, ranging from:

1. Delayed Transition – insufficient decarbonisation due to weak policy implementation, modest behavioural change and poor economic growth;
2. a Centralised Energy scenario which involves a plan-led transformation, with EirGrid coordinating and securing planning consent for the offshore wind connections and including, electrification of transport and heating, strong economic growth and increasing focus on decarbonisation;
3. Coordinated Action - a CO_2-neutral electricity system by 2040 with similarly high levels of offshore wind and electricity of transport and heating combined with a more decentralised system (high levels of microgeneration, storage, digitisation and demand-side responses).

The latter two scenarios both involve Ireland reaching 70% renewables by 2030 and significantly increased electricity demand. In order to progress the Coordinated Action scenario and reach 70% by 2030, EirGrid note that a doubling of the average renewable connection rates is required.[19] It is also important to note that EirGrid do not address in detail potential security benefits of the Coordinated Action scenario, nor does their analysis examine other societal co-benefits of this decentralised approach, for example lower fuel poverty rates and reduced air pollution levels.

3.2 What level of new offshore wind, storage technology and infrastructure (pumped storage, battery, electric vehicles) should be integrated into the grid to improve security as Ireland moves to 70% renewable electricity by 2030 and 100% renewables by 2050 at the latest?

3.3 How should system imbalances associated with wind variability be corrected by battery technology, Hydrogen and synthetic fuels, storage, improved energy efficiency and demand-side measures?

3.4 What is the role of microgeneration and demand side responses, for domestic customers in particular, in balancing the grid?

The Irish Wind Energy Association (IWEA) have outlined a range of challenges and obstacles to reaching the 70% renewables target. They emphasise the need for a new consenting regime for offshore wind and the importance of progressing the 2019 Marine Planning and Development Management Bill. They have called for new strategy to facilitate repowering of existing wind farms. Industry players also highlight lack of consistency and transparency around current timelimes for planning decisions. IWEA state that mandatory time periods for decisions from An Bord Pleanála should be introduced in order to expedite the planning process.[20]

Accommodating increasing renewable electricity requires greater flexibility through "system services" which are required by EirGrid to ensure the electricity system remains stable. Traditionally, system services have been provided in large part by fossil-fuelled power stations. Increasingly 'zero-carbon' flexible technologies such as battery storage and demand side response can provide these system services and avoid the need for fossil-fuelled generators.[21]

The UK National Infrastructure Commission found that increasing interconnection, storage, and demand flexibility could save consumers up to £8 billion a year by 2030 and help the UK meet its 2050 carbon targets, and secure the UK's energy supply for generations.[22] The Chair of the UK Natural Capital Committee, Professor Dieter Helm, notes that, as the economy digitalises, and as the share of electricity grows, the integration of small-scale and large-scale battery storage may become an increasingly important energy security measure, precluding the need for additional large-scale power stations.[23]

DCCAE and the Northern Ireland Department of Trade and Investment commissioned work to model the impact on the electricity grid of different types of storage. The work demonstrated that significant levels of grid-connected storage, would "facilitate more efficient use of the networks, maintain high standards of security of supply, and keep network operating costs lower than they would be without storage."[24] The UK Department of Business, Energy and Industrial Strategy also point to growth in lithium ion battery storage, including in electric vehicles, as well as other storage technologies, providing energy security benefits.[25] McMullen et al (2018) note successful decarbonisation while maintaining energy security necessitates the development of large scale energy storage facilities to buffer variability, using conversion and storage technologies. [26] The IIEA have also noted that solar PV and storage costs will continue to decrease exponentially and may be a significant benefit to grid functioning.[27]

Since 2011 EirGrid and SONI, have operated the "Delivering a Secure, Sustainable Electricity System" (DS3) programme by which technical system services are procured to ensure safe operation of electricity system while achieving 2020 renewable electricity targets. The programme is divided into two separate procurement streams – Volume Capped and

Volume Uncapped Contracts. This approach allowed the maximum levels of renewable generation on the Irish grid to be increased from 50% to 65%. Battery Energy Storage Systems are expected to secure the majority of the awarded contracts at auction stage.[28]

Baringa's 2019 *All Island Energy Storage Roadmap* (commissioned by Energy Storage Ireland and IWEA) examines how system services can be provided from zero carbon sources and analyses benefits, of procuring all system services from zero-carbon technologies, compared with fossil fuels, including in terms of CO2 emissions reduction, operational cost savings and reduced renewable curtailment. This analysis shows that procuring these services from zero-carbon providers could reduce all-island power sector emissions by almost 2 million tonnes of CO2 per year by 2030 and allow for savings between €90m and €117mper year between 2021 and 2030. This approach also reduces the need for renewable curtailment. This study also outlines a range of necessary steps to overcome current obstacles to storage system development. This includes developing a dedicated connection process, progressing the DS3+ programme, reaching System Non-Synchronous Penetration of above 90% and prioritising procurement and dispatch of System Services from zero carbon sources.[29]

3.5 To what extent is further interconnection required beyond 2030 to ensure Ireland can achieve 100% electricity from renewable sources? Are planning, policy and decision-making processes adequate to facilitate such developments over the coming decades?

The 2018 National Policy Statement on Electricity Interconnection emphasises the important role of interconnection for each of the three main pillars of Ireland's energy policy – sustainability, security of supply and competitiveness. The Department is committed to increasing electricity interconnection to the UK and France. Interconnection has assisted the State in decarbonising the power sector and helped to reduce curtailment of wind generation. This will continue to be the case as Ireland seeks to reach 70% renewable electricity by 2030 and beyond. In short, the greater the level of renewable ambition, the higher the scale of electricity interconnection needed, requiring a high degree of coherence and coordination in government policymaking in these two areas.[30]

The Baringa modelling of a 70% renewable electricity target by 2030 envisaged the introduction of two new interconnectors (Celtic and Greenlink) in the mid-2020s.[31]

EirGrid's 2019 Scenario Planning estimates that Ireland may require over 1500 MW of interconnection (with GB and France) by 2030 and over 2500MW by 2040 in order to deliver on renewable energy objectives. Their scenario assumptions include that three key electricity interconnector projects North South, Celtic and Greenlink have EU Project of Common Interest status. In all scenarios they assume North South Interconnector project with NI is commissioned in accordance with project timelines (2023). Both their Centralised and Coordinated Action scenarios assumes that Celtic interconnector is built by 2026, Greenlink by 2023. The Centralised scenario assumes an additional interconnector by 2040 while Coordinated Action includes a second additional interconnector also by 2040.

It is important to note that the benefits of increased electricity interconnection are not limited to better integrationof renewable energies. The CRU has noted: “The proposed second major North-South interconnector connecting Northern Ireland and Ireland will lead to a more secure, stable, and efficient all-island system.” The CRU also note that the Celtic Interconnector to France will provide an important additional supply source, and allow greater diversification of fuel sources, making Ireland less dependent on electricity interconnection to GB.[32] Analysis by Di Cosmo et al found that the addition of the Celtic electricity interconnector from Ireland to France will reduce future natural gas needs in power generation by approximately 7% in Ireland. [33] It is also in this context that additional interconnection with France by 2040 should be examined.

3.6 To what extent is a reliance upon Carbon Capture Storage and negative emissions technologies consistent with the near-term mitigation obligations of natural gas generators and heavy industry under the EU ETS?
3.7 What risks would the development of a Carbon Capture and Storage facility pose to rapid near-term decarbonisation (including compression, transportation, long-term storage and potential carbon leakage)?
3.8 To what extent is the decarbonisation benefit of Carbon Capture Storage related to or limited by the location and geological characteristic of storage sites?

GNI state that their 2050 objective is for half of the gas in Ireland’s network to be comprised of biogas and hydrogen. The other half is to be made up of ‘abated gas’ whereby CO2 has been removed through the process of Carbon Capture and Storage (CCS).[34] Ervia have recommended that the carbon tax placed on natural gas should be used to decarbonise gas to facilitate these developments. GNI have undertaken analysis of abatement costs and potential developments at Cork power stations[35] and have called for a dedicated price support to be offered for CCS.[36]

In 2008, the SEAI examined the potential for CO2 storage at several offshore fields.[37] Only four were deemed effective and feasible. The report noted that the Kinsale Gas Field (330Mt capacity) is the only field which could be developed in the short term (<10 years). Most recently Ervia stated in 2019 that there are two main options for CCS development in Ireland - 1) the depleted offshore Kinsale field for CO2 and 2) An export model where it is compressed into liquid form and shipped out to a dedicated storage field in another jurisdiction. Ervia note that their 2050 vision sees a decision being made on use of Kinsale for CCS in the next 5 years. They have also signed an MoU with Equinor (formerly Statoil) to examine the potential for Ervia to ship CO2 to a field off the coast of Norway.[38]

The Climate Change Advisory Council has stated that “investment in the exploration and recovery of new natural gas reserves can only be justified in the context of early displacement and retirement of existing coal and oil systems, coupled with large scale deployment of CCS with natural gas.” In their energy system modelling, MaREI produced scenarios based on different assumptions to explore greater or lesser decarbonisation from Bioenergy and Carbon Capture and Sequestration. They note that “[n]egative emission technologies are critical for carbon neutrality due to emissions from unmitigable sources, such as cement and lime production, passenger trains, hybrid vehicles." The contention that emissions from all of these source cannot be mitigated should be examined in light of the latest technology developments, as well as the EU's new Green Deal policy framework which will involve the introduction of new obligations and strategies in some these sectors. [39]

Against the above findings, several risks and challenges associated with CCS development and reliance have been raised.

- Ervia acknowledge a "legacy risk" that CO2 may leak from such facilities in in the future. They also note that in the case of transportation to Norway, it is currently not be clear to which country the carbon credit would be applied (Ireland or Norway).[40]
- McMullin et al (2019) note that the expectation of successful sequestration through CCS raises a considerable moral hazard risk to the effect that insufficient decarbonisation would be deemed acceptable on the basis that ongoing shortfalls may be compensated at some future point by CO2 removals through CCS (or other technologies.[41] McMullin (2018) also points out that potentially limited capacity for geological carbon storage within Ireland.[42]
- MaREI acknowledge that while BECCS may be "critical for negative emissions, [the technology] is comparatively more cost intensive and should only be deployed when sufficient biomass supply can be secured."[43]
- The EPA note international studies which show that negative emissions technologies including bioenergy with CCS may only extend the 2050 carbon budget by modest amounts and that they are subject to significant uncertainty.[44]
- E3G have highlighted the production of natural gas is characterised by significant methane emissions along the supply chain and as a result, CCS alone is unlikely to bring emissions down to zero.[45]

Section 4 Natural Gas Phase Out

4. To examine and make recommendations on how to manage a phase-out of natural gas in order to avoid stranded assets while ensuring security of gas supply and preventing further carbon lock-in along with supply disruption.

Questions

4.1 Natural Gas Supply and Assets

4.1.1 To what extent does the exploitation of new offshore gas sources run the risk of natural gas lock-in and run counter to decarbonisation commitments?

Deployment of all new energy supplies and infrastructure must be evaluated in the context of the urgent need for energy system decarbonisation.[46] The long-standing usefulness and availability of natural gas supplies for energy security should not accepted as valid grounds for new gas entry points and/or further investment in natural gas infrastructure. In other words, it is important that the ESSR differentiates between the ongoing necessary safe operation of the existing gas network (including the twinned interconnector capacity to Scotland) and the potential for new supplies and infrastructure to lock-in natural gas demand over the coming decades.

There is considerable body of evidence which shows that fossil fuel production, including natural gas, is at odds with decarbonisation commitments. As noted by Piggot (2018), "The international commitment to limit global average temperature increases to well below 2 °C provides a strong rationale for Parties to the Paris Agreement and the UNFCCC to pursue a phase-down in fossil fuel production, not just consumption."[47] In November 2019, the UN Environment Programme found that "[c]ountries are planning to produce fossil fuels far in excess of the levels needed to fulfil their climate pledges under the Paris Agreement, which themselves are far from adequate." UNEP notes in its *Gas Production Report* that "oil and gas are also on track to exceed carbon budgets, with continued investment and infrastructure locking in use of these fuels, until countries are producing between 40% and 50% more oil and gas by 2040 than would be consistent with limiting warming to 2 °C." Sven Teske underlines this conclusion: "The implementation of the 2.0 °C and 1.5 °C Scenarios will have a significant impact on the global fossil fuel industry…the political debate about coal, oil and gas is focused on the security of supply and price security. However, mitigating climate change is only possible when fossil fuels are phased out."[48]

However, the Government's December 2019 Policy Statement *Petroleum Exploration and Production Activities as part of Ireland's Transition to a Low Carbon Economy* addresses policy and regulatory changes in support of ongoing offshore exploration for natural gas as a "transition fuel" while also conflating considerations of existing gas supply and long-term energy security with current Government policy on offshore fossil fuel exploration. In this way, it appears to deliberately ignore or pre-empt the forthcoming ESSR.[49]

In 2019 the Climate Change Advisory Council advised that exploration and exploitation of offshore oil reserves is not required to ensure energy security. In the Council's accompanying briefing[50], this conclusion was clarified and it was noted that Ireland does "not have national refining infrastructure"; "domestic investment in oil infrastructure would lock-in and become a barrier to transition", "global oil reserves are sufficient and geographically diverse", and "oil market is sufficiently mature to ensure oil security concerns can be addressed using existing supply chains"; and "alternative low carbon technologies exist for critical applications." The reasoning put forward in favour of continued offshore gas exploration merits further interrogation. It is noteworthy that arguments relating to required infrastructure, lock-in barriers, global availability and alternative technologies may be considered to be equally valid grounds against natural gas exploration. It is significant that in this analysis the Council also notes that "[r]ecovery of any new natural gas reserves should be contingent on global and national progress towards achievement 2030 targets, the objectives of the Paris Agreement and scientific evidence including national contribution to global carbon budget."

Indeed, this risk is further expanded in the Council's analysis: "There are risks to achieving Ireland's emissions reductions 2030 targets and 2050 objectives if large reserves of oil and gas are brought ashore. In addition, there are risks to the economy of stranded assets and lock-in to fossil fuel based and emissions intensive energy systems." The potential to bypass natural gas use and avoid this lock-in risk is also noted: "The potential for natural gas to act as a transition fuel is due to its lower emissions per unit energy consumption. However, this transition period has been eroded due to inaction in the past, and the switch to from coal, peat and oil directly to renewables may be the more cost-effective option, by-passing use of natural gas as a transitional fuel." They continue "[d]iscovery of accessible natural gas reserves in Irish waters may enhance security from accidental or other causes of disruption of supply, provided the gas is brought to shore/market in Ireland. But investment in improved interconnection may achieve the same goal, at arguably less cost." It is concerning that none of these conclusions have been highlighted in the Governments 2019 Policy Statement on fossil fuel exploration.

At EU level, the EIB will end financing for fossil fuel energy projects from the end of 2021 and align all its financing activities with the goals of the Paris agreement. The EU Ombudsman has also recently written to Commission President Ursula von der Leyen requesting clarifications about the inclusion of gas projects in the fourth EU list of Projects of Common Interests which may not pose any discernible benefits for sustainability.[51]

MaREI have also highlighted the challenges posed by decarbonisation commitments in relation to fossil fuel demand. They note that "policy requirements for fossil fuel demand destruction, may lead to a fossil fuel supply glut, which will reduce fossil fuel prices, reducing the effectiveness of low carbon technology policies, incentives, carbon taxes and make the transition to a low carbon economy more volatile." It is in view of this potential offshore gas 'glut' that a phase out of gas supply must be considered.[52] McMullin also notes that in the case of an earlier net zero pathway, the window for a temporary transition based on natural gas becomes even shorter, and the case for investment in shorter-lifetime infrastructure becomes correspondingly weaker.[53]

Other assumptions made regarding their viability and operation of offshore gas exploration, particularly by industry proponents should be critiqued as part of the ESSR. It has been posited that new offshore gas supplies would:

a) Come on stream in the medium term (where deemed viable and economic);
b) Take over from Corrib, i.e., constitute a like-for-like replacement in terms of gas supply;
c) Utilise existing gas infrastructure;
d) Align with GNI and EirGrid strategies based on a decarbonised gas system by 2050;
e) Be necessitated by continued significant levels of gas demand.

Each of these assumptions raises separate risks and obstacles to the achievement of Ireland's decarbonisation efforts which should be addressed as part of the Review. A summary of such challenges is set out below:

a) There are particularly significant lead times associated with the construction of major energy infrastructure in Ireland. Such lead times are likely to be on the higher end for offshore gas due to likely public concerns and opposition, taking into account decreasing societal acceptance of fossil fuels and given the experiences of the Corrib gas dispute. Taking a rudimentary estimate, a new offshore field may be expected to come on stream in c. 7 to 10 years. In this scenario, the viability of such supplies may be questionable given the likelihood of increasing renewable penetration over the next decade. It is also to important note that in order to comply with decarbonisation commitments and avoid the worst climate impacts, fossil fuel emissions must reduce rapidly with stronger action necessitated now. As noted above, under Government's Climate Action Plan, emission reductions are projected to reach 7-8% per annum from 2030, i.e. the likely time period that new offshore field may come on stream.
b) Depending on several factors, it is possible that gas supplies will likely continue at low-levels past 2027 from the Corrib field. GNI and the Climate Change Advisory Council have both indicated that the Corrib field may be depleted in approximately 15 years (i.e. potentially continuing with reduced but still substantive supplies into the 2030s).[54] New offshore supplies may not be deemed economic in this context. This is equally the case where fields adjacent to Corrib are expanded or a new LNG facility comes on stream, providing significant gas supplies and in a position to meet the majority of Irish gas demand. It should also be noted that gas supplies via the twinned interconnector system will be available throughout this period.
c) New processing, treatment and transmission infrastructure may have to be developed for any new gas field. As noted in this report, the stranded asset risk of such new infrastructure is significant would have to be closely examined.
d) GNI state that their 2050 objective is for half of the gas in the network to be comprised of biogas and hydrogen with the other is to be made up of 'abated gas' through CCS. EirGrid scenario planning is also made on the basis that natural gas is decarbonised through CCS and/or biogas. The risk that additional volumes of unabated natural gas undermine decarbonisation strategies not only in the power sector, but also in heating must be examined.
e) As noted below, in a scenario where 70% of Ireland's electricity supply is met by renewable sources in 2030 and increasing levels also assumed to be achieved between 2030 and 2050), the demand for new gas supplies for electricity generation may not be guaranteed. The viability of new electricity gas-fired generating stations has also been questioned given that they may not to be in merit in the SEM on account of cheaper renewable generation.

4.1.2 How have other states that mandated a full or partial phase out of fossil fuel exploration in their territorial waters dealt with energy security considerations?

It has been highlighted by the Department that certain states, including Norway, Denmark, Portugal, countries that are continuing with petroleum exploration or production, also have high shares of renewable energy. It is also attested that states such New Zealand, Costa Rica and France, which have put in place legislative bans on offshore exploration, have a very different energy system to Ireland and have the benefit of significant hydropower or nuclear energy. The implication of this point is that they face less of an energy security challenge than Ireland. Legislation to give effect to phase out offshore exploration is also being considered by countries with similar energy challenges to Ireland, such as Iceland (lack of interconnection), Sweden (high renewable penetration) and Spain (high gas dependency). Denmark has already approved the cessation permits for the exploration and drilling of offshore gas in its onshore and inland waters. Notwithstanding the differing systems, lessons may be learned regarding energy security in the context of fossil fuel phase out in analyses undertaken by these states and by the IEA. See also analysis undertaken by the Global Gas and Oil Network regarding managed fossil fuel decline and phase out in the context of Paris Agreement objectives.[55]

4.1.3 To what extent does the twinned interconnector system to Moffat meet system demand and ensure security of gas supply in the medium term, including in the event of an early phase out of Corrib supplies?

4.1.4 What direct emissions are associated with the development, operation and phase out of the Corrib gas field and/or typically associated offshore gas fields?

In 2018 GNI completed the full twinning of the Ireland to Scotland gas interconnector (the onshore Scottish section previously constituted a single pipeline). As noted by GNI, this project addresses the risk of interruptions to energy supplies into Ireland by removing a dependency on a single pipeline, resulting in a complete twinned system between Ireland and the United Kingdom. The completion of the fully twinned connection entails that in the event of a disruption to either pipeline, there is an alternative pipeline which can provide full capacity to meet Ireland's gas demand.[56]

GNI note that by 2026/27 Corrib gas supplies will have declined to less than 30% of initial peak production levels. The reliance on Moffat as the main supply source will therefore re-emerge. The IEA state the high reliance on a limited amount of gas infrastructure at Moffat raises concerns for security of gas supply.[57] However, it is important to note that GNI also project that Moffat has sufficient capacity to meet gas demand over the next 10 years. The CRU have also noted that the maximum capacity of interconnector system will be increased from 31 to 35 mscm/d as a result of the twinning of the onshore Scottish system.[58] The IEA also note that "the [c]ompletion of the project to have independent compressor systems for IC1 and IC2 at Brighouse Bay in 2020 will result in a revision of the largest piece of gas infrastructure for Ireland… N-1 failure will constitute a partial disruption of IC1 or IC2, instead of a complete disruption with failure of IC1 and IC2, as considered at the moment in the 2016 joint risk assessment."[59] It has been noted that a loss of either of the two interconnectors could result in the other exceeding its recommended operational specifications. As part of such considerations, the (low) likelihood of one of the two gas interconnectors being disrupted should also be transparently assessed.

It has also been noted that operational limit of the gas interconnectors to Moffat in Scotland could potentially be reached by the late 2030s. However, is not far from clear whether such analysis factors in the potential for gas demand to be reduced (and energy security increased) through other infrastructure developments and demand side responses, including new electricity interconnectors, increased renewables penetration and greater electrification of transport.[60] GNI has also commenced a project to construct a bypass pipeline around the interconnector infrastructure at Ballough in Dublin in order to further improve the resilience of the interconnector system.

It is important that the ESSR clarifies that Ireland is not dependent by Russian gas and is extremely unlikely to be affected by a Russian gas disruption. Given that Ireland is integrated into the UK gas system via Moffat, it is important that Ireland's geographic position on the periphery of Europe, or conceptions of Ireland as being "at the end of a long line", are not simplistically equated with significant vulnerability with potentially supply disruptions. In 2017 MaREI examined the impact on the European Energy System of a major supply interruption from Russia and found that Ireland could sustain an interruption period of up to 10 months without the need for LNG infrastructure in Ireland.[61]

In 2018 CRU examined potential disruptions to supply from Moffat entry point to Ireland including risk of loss of supply from GB and outside of EU under various scenarios.[62] The CRU found that even for a higher daily demand combined with an infrastructure loss, there is sufficient capability for the GB gas system to meet all required demand, both domestic and expected exports to continental Europe and Ireland, for all disruption scenarios relating to the Russia-Ukraine dispute. It also concluded, based on the 2017BEIS assessment of GB security of gas supply "there is no significant risk to gas supplies to Ireland from GB or from outside the EU via GB." Furthermore, EU gas disruption simulations carried by ENTSOG in 2017 did not highlight any impact on Ireland in any of the relevant risk scenarios.

4.1.5 To what extent may security and sustainability of the power sector be undermined by increasing gas demand, as well as increasing reliance on gas-fired electricity generation for system stability?

Given the increasing levels of renewables, interconnection and storage, gas network infrastructure is particularly exposed to stranded asset risks (see section 4.2 which addresses this risk detail). Notwithstanding this risk, in EirGrid's *Tomorrow's Energy Scenarios 2019* analysis, it is assumed that the vast majority of capacity adequacy is provided by gas-fired generation involving a "heightened dependency on the ongoing resilience of Ireland's gas supply." EirGrid does not examine in detail the associated security risks of depending on a single fossil fuel source for generation adequacy and the clean energy transition.

Increasing the interdependence of the gas and electricity systems itself may constitute an energy security risk. McMullin et al (2018) highlight that such an approach may constrain the necessary scale and speed of energy system decarbonisation. They warn against an assumption that intermittent renewable electricity will only operate provided that there is a significant dispatchable, gas-fired generation and also question a reliance on natural gas for stability and inter-seasonal balancing. The authors also note that it is possible to transition the majority of Ireland's energy requirement to indigenous renewables and storage using synthetic electro-fuels.[63]

EirGrid state that "the decarbonisation of gas supply is a key assumption in us assuming that gas continues to have a strong role in maintaining the demand and supply balance in our scenarios out to 2040." It is noted that a carbon-neutral power system can be achieved through new Combined Cycle Gas Turbines (CCGT) together with Carbon Capture and Storage. However, they outline that if investment decisions in capital intensive CCGTs are made without a strong incentive for CCS development "large volumes of carbon will be locked into the electricity system for another 30 years." This carbon-neutral power system may also be achieved through more flexible Open Cycle Gas Turbine (OCGT) installations coupled with biogas. However, it is noted that OCGTs are unsuitable for CO2 capture via CCS, "meaning that in order to decarbonise such generation capacity, incentives are needed to decarbonise the fuel itself, requiring the gas supply to be 100% renewable." It is important to note that both major CCS development and largescale indigenous biomethane supply are yet to prove feasible at scale and may have significant cost implications (see further below) and these risks merit in-depth examination. [64]

The description of natural gas as "the lowest CO2 emitting fossil fuel" in the Department's public release regarding the ESSR must also be questioned. As noted by DCU Energy & Climate Research Network in their letter to the Minister, this perspective seems to assume an acceptance of natural gas electricity generation in the long-term and fails to take account of upstream emissions associated with natural gas production.[65] In considering the additional challenges to Ireland's decarbonisation objectives, it also appears that no independent analysis has been undertaken regarding the Department's assertion that in the event of phase out of offshore gas production, increased emissions would result from increased operation of compressor stations to transport gas from Moffat. An analysis of emissions associated with extraction, processing and transport, including methane leakage, associated with the Corrib gas field (and/or other new gas fields) does not appear to have been undertaken.

Network developers must base gas and electricity demand, and associated infrastructure planning, on scenarios that ensure the achievement of climate targets, rather than undermining them. A central feature of the ESSR must be on the introduction of integrated planning and infrastructure procedures. Gas infrastructure is planned largely separately from electricity and demand-side infrastructure, despite the interactions between different sectors. As a result, opportunities to make use of electricity infrastructure and demand-side investment for increasing energy security may be missed.[66]

GNI is continuing to seek to connect new domestic customers to the gas network, particularly the c.300,000 homes close to the gas network which currently use oil for heating. Notwithstanding a focus on electrification by national and international authorities, GNI contend that "full electrification of heat is expensive, disruptive and requires significant investment in the electricity network." GNI modelling in 2018 assumes a minimum 10,000 new gas connections per year to 2027 [See Figure 4.6].[67] They also note that they expect to connect 125,000 new domestic customers to the network by 2040. There is also a significant difference in latest GNI gas demand forecasts from a 6.7% increase in their low demand scenario to 23.7% in their media scenario between. GNI state that increased power sector gas demand is currently due to electricity interconnector exports to GB (but this is expected to revert in favour of imports from GB to Ireland given the projected ETS increase). GNI's ten year network development plans take account of electricity demand projections from EirGrid and are approved by the CRU. However, GNI planning is not designed to take account of wider energy system decarbonisation and longer-term reductions gas supplies through electrification and demand-side measures (see Section 5.1 below).[68] GNI scenarios are based on the IEA's *New Policies Scenario* which are not aligned with Paris Agreement objectives. [69]

By contrast, the UK Committee on Climate Changes notes that UK 2050 scenarios that achieve a net-zero target indicate a decline in gas consumption of 32% by 2050 with significant reductions in natural gas consumption across buildings, industry and power. In this context, GNI projections and assumptions of future gas demand should go beyond approval by the CRU through an integrated and independent planning approach across the electricity and gas sectors where gas demand assumptions are assessed prior to GNI modelling. Future GNI gas demand scenarios put forward to the CRU must clearly correlate with decarbonisation commitments.[70]

In their NECP submission, Ervia also note that measures should be put in place to transition to gas those homes in urban setting which are currently using oil and are located close to the gas network and reject deep retrofits as a viable and economic solution to achieve the decarbonisation of the heating sector. It is not surprising that Ervia seek to promote use of their assets, however this rejection of retrofitting fails to take account of significant co-benefits such as reducing energy use. The introduction of heat pumps and upgrading domestic heating systems may cost E15-30,000 in total, however Ervia omit any reference to the considerable ongoing costs to domestic natural gas consumers, as well as increasing carbon costs associated with that natural gas.

4.1.6 What security and sustainability risks arise in the context of converting the Moneypoint power station to natural gas?

4.1.7 What are the costs and benefits of retaining Moneypoint in its current configuration as a limited facility for emergency response purposes?

The Moneypoint generating station is due to come to the end of its operating life in its current configuration in 2025, however its drastically reduced running regime in recent years is highly unlikely to change given carbon price shifts. ESB noted in 2019 that it had written down €142m of the value of Moneypoint power station "based on the estimated impact on projected revenues from the introduction of the new Integrated Single Electricity Market in May."[71]

GNI contend that "a modern CCGT gas plant offers by far the most efficient and cost-effective solution for the Moneypoint site in the long term, by connecting to the ring-main transmission system via a new spur transmission pipeline to Moneypoint." However, it is not clear whether this proposal has examined in terms of potential stranded risks as highlighted below and whether other uses, such as a renewables hub and hydrogen plant, have been considered. The UK Committee on Climate Changes underline that hydrogen is vital to the achievement of their scenarios, requiring "significant volumes of low-carbon hydrogen produced at one or more CCS clusters by 2030." [72]

As noted above, any consideration of converting Moneypoint to a gas-fired power plant must address the risk of a potential overreliance of the electricity system on natural gas. [73] It is important to note that the port location of the facility and its capacity provide a total generation capacity of 915MW presents significant security of supply benefits. Although the running of the facility presents has a significant impact on power sector emissions, the potential for Moneypoint to be maintained in its current form and run as an exceptional emergency response measure should also be examined. This is particularly the case in the context of the risks of long-term natural gas 'lock-in' and over reliance on a single fuel source for system security in the event of conversion of natural gas.

In their 2018 review, the CRU highlighted EirGrid's assessment that "the results for Ireland shows that in the median scenario, Ireland starts in a position of significant generation surplus in 2018. Thereafter, some generation plant is assumed to shut down because of emissions restrictions. This would result in deficit of capacity in 2026." They warn that "with a low availability scenario (worst in 5 years), there would be a much larger deficit of plant by 2024. If high-carbon plant were unavailable from 2026, e.g. Moneypoint coal units, they would need to be replaced." [74] It is important in this regard to examine a full range of non-fossil based options to address both this and future production gaps. The CRU's role in ensuring an transparent approach to examining and responding to this challenge (e.g. beyond regular engagement with network operators to more structured engagement with other stakeholders such as the EPA and the Climate Change Advisory Council) merits further investigation (see also below).

4.2 Stranded Asset Risks

4.2.1 How are stranded asset risks currently identified by the State and the gas network operators?

4.2.2 To what extent does possible stranding of state energy assets in the context of decarbonisation pathways pose a risk to energy security?

4.2.3 To what extent does the prospect of additional gas supplies either in LNG or natural gas form and related infrastructure add to the potential for stranded assets?
4.2.4 Which parts of the gas system are the most fundamental to energy security and which are most vulnerable to stranding risk?
4.2.5 To what extent should the consumer and/or the state meet costs arising from the maintenance of gas-fired generation and transmission, as opposed to allowing for write-down/devaluation?
4.2.6 What additional or increased emissions arise as a result of preventing write-down of natural gas assets and/or expanding the gas network?
4.2.7 To what extent do the CRU and Ervia have regard to the risk of stranded gas infrastructure in the context of mitigation obligations and as part of their network monitoring obligations

The ESSR should asses the risk of stranded energy assets in the context of the current and projected future fuel mix.[75] The ESSR must address the question of whether it is appropriate for the State or commercial semi-state companies to rely on remuneration for assets associated with fossil fuel sources, in particular natural gas, which must be significantly decreased over the next three decades and whose security of supply benefits may be partially or substantially replaced by other technologies. In reaching a decision on whether or not additional gas infrastructure should continue to be underwritten by gas consumers, especially as part of GNI's next price control in 2022, it is essential that the associated costs and risks for both energy security and decarbonisation are fully considered at the earliest stage.

This is particularly the case in the context of electrification of heat and the phase out of gas boilers and the need to limit further connections to the gas distribution network which already results in allowed revenues totalling almost €1billion over five years. The EPA also note that UCC analysis of standing asset risk "point to a potentially significant level of disconnections from the distribution network from 2030 to 2050, caused by fuel switching and energy efficiency, resulting in less system throughput." It is stated that "the levels of disconnections could lead to the decommissioning of sections of the network, which presents a risk to the network operator."[76] The UK Committee on Climate Changes state that the UK gas distribution networks will not be able to continue to provide natural gas on a widespread basis by 2050, requiring decommissioning and where feasible conversion to hydrogen. They conclude that "decisions will be required from the mid-2020s on the balance between electrification and hydrogen in decarbonising heating, and the implications for gas networks."[77]

In 2019 UCC, on behalf of the EPA, produced an in-depth study on how decarbonisation of the power system may undermine investment in energy generation and infrastructure. [78] The authors note that an 80% reduction pathway indicated that the financial viability of gas generation and network assets is not guaranteed. They concluded that "84% of a leading Irish utility's existing fossil fuel-based power generation assets may be incompatible with a 1.5 °C budget and 27% with a 2 °C budget." Two major implications are highlighted: the investment case for natural gas infrastructure is likely to be undermined (by 2030); and security of supply may be impacted in the short term if fossil fuel generators that provide back-up and system balancing are affected.

The authors note that investment in gas infrastructure assets, including biogas and CCS, may extend the life of the network. However, several risks are noted in this regard:

- Biogas is significantly more expensive than conventional gas and CCS technology is yet to prove itself at scale;
- Investment in gas infrastructure with long payback periods "carries a significant investment risk in terms of 'carbon lock-in";
- Increasing investment in gas network assets "puts a greater value at risk in the long term";
- The customer base for natural gas will decrease resulting in higher fees and investment needs of gas-fired generators may results in increases in transmission tariffs;
- New capacity payments to support security of supply may be required, however such payments may prop up inefficient assets that are likely to be stranded delaying the necessary speed of decarbonisation.

The authors therefore conclude that "from a policy perspective, it is important that the market model and payments for energy, capacity and flexibility are designed to expedite the transition to zero carbon and are not sunk costs in fossil fuel generation and infrastructure." It is in this context that the CRU should plan for a long-term phase-out of natural gas and write-down of appropriate elements of gas network assets, as is currently being undertaken by Ofgem in GB (see below), as well as by the California Public Utilities Commission.[79]

This study does not address to what extent write-down of particular gas infrastructure assets may constitute a necessary long-term approach. A more detailed analysis is required as to which gas assets are essential to energy security and whether economic losses may be mitigated by (e.g.) reducing state subsidies, preventing gas lock-in and furthering Ireland's decarbonisation agenda. The report also highlights that many fossil fuel generation assets are in state-owned companies that pay dividends to the state. It is highlighted that deep decarbonisation scenarios impact the use and profitability of such assets, however the potential loss of such dividends to disincline state actors to pursue rapid decarbonisation is not addressed.

More ambitious long-term climate targets require much stronger mitigation efforts by 2030. MaREI has underlined that this in turn "requires phasing out of fossil fuel based technologies before the end of their lifetime, creating stranded assets" such as gas-fired power station, as well as other economic losses.[80] They further note that "[a]dhering to the existing [low] near-term emission target may raise risks of 'lock-in' to an energy system configuration that meets the near-term target but is unsuitable for a long-term 1.5 °C roadmap." They also point to significant challenges and risks in using the gas network to reduce emissions.[81] It is essential that the avoidance of economic losses/reduced dividends is not used as the only or primary factor in assessing future gas infrastructure investment.

4.3 Role of Biogas

4.3.1 How should biogas injection into the gas network be managed to avoid natural gas lock-in by maintaining (or expanding) gas demand?
4.3.2 To what extent do GNI proposed investments in biogas constitute a sustainable and cost-effective mitigation measure, in comparison with (e.g.) electrification, storage and energy efficiency?
4.3.3 To what extent may biogas assist in meeting local and in situ demand for gas considering potential challenges in its development and collection?
4.3.4 Will the environmental risks and emissions impacts of biogas development from anaerobic digestion be adequately assessed under EU directives, including risk of methane leakage and additional use of nitrogen fertiliser?

GNI has a strategic plan to achieve 20% biogas on the gas network by 2030. They are also targeting at least 5% penetration of CNG or Biogas for heavy commercial transport and 10% of the bus market in Ireland by 2025. GNI is seeking to support biogas production through development of anaerobic digesters and by partnering with agri-industry and commercial waste companies. They note that "by 2028 in the region of 15 to 20 Centralised Grid Injection facilities will be geographically dispersed across the country at locations in close proximity to the existing gas grid. Biogas producers within 50km of the existing gas grid will be able to avail of these facilities, using high capacity gas storage trailers to transport their gas via road, and inject into the national gas grid."

A study by Long et al (2019) notes that "diverting the slurry associated with this farming to energy generation can help reduce the GHG emissions by realising the 17.5% emissions saving due to capture of fugitive CH_4 emissions from open storage tanks." They emphasise that biogas has potential to contribute to energy security in terms of the fuel supply, source diversity and as an indigenous source of fuel.[82] The SEAI's 2017 analysis[83] also notes that biogas through AD plants could produce almost 28% of current natural gas supply by 2050 with the majority of feedstock resource expected to come from grass silage with remainder provided by food waste and slurry waste. The analysis undertaken as part of the SEAI's CBA of biogas and biomethane point to a potential net benefits in all scenarios. However, in the event that such biogas production (and/or CCS) emerges as insufficient or is substantially delayed, an unabated/non-biogas system may be inadvertently locked into the system.

This SEAI analysis also underlines that "[t]he scenarios implicitly assume that action is taken in the short term to address the challenges …. of achieving large scale deployment of biogas and biomethane plants." The challenges assumed to be overcome in order to allow for this deployment include that:

- Additional land is freed from grazing and available for additional silage production;
- Farmers use the released land for the production of grass silage for bioenergy;

- The ability to collect and secure food waste separately, as well as the ongoing availability of food waste feedstocks;
- Costs associated with grass silage, feedstock, transportation;
- Difficulties in upgrading biomethane in order to meet sustainability, safety and regulatory standards;
- Other substantial challenges associated with investment, planning, certification, support mechanisms and available expertise.

McMullin et al note that the overall mitigation benefit of bioenergy is highly variable. In relation to anaerobic digestion operations, they note the risk of methane leakage means there is a requirement for potentially costly regulation and monitoring of production sites.[84] The Irish Academy of Engineers also refer to significant challenges, including planning, permitting, timescales public acceptance, scale and costs of infrastructure, gas quality control etc. They conclude that biogas will account for only a small portion of Ireland's gas supply by 2040.[85] In light of these challenges and risks, the contention that biogas can in the medium term allow for the decarbonisation of a significant portion of the gas system and provide significant energy security benefits should be closely interrogated in the ESSR.

A recent report from E3G examined the role of natural gas in the EU's decarbonised future. The report underlines that "none of the Paris-compliant scenarios with renewable or decarbonised gas show increasing gas demand, and most of them show a sharp decline in gas volumes compared to today. This suggests there is no justification for the expansion of the gas networks, in particular not for imports." The report notes that biogas may be best targeted at harder-to-abate sectors, such as heavy industry. However, the authors of the report point to significant uncertainties regarding the technical and economic potential of renewable and decarbonised gas, as well as the lifecycle emissions of these options and their infrastructure implications. They underline that the guiding principle should be whether there are alternative options for decarbonisation and conclude that "the future prospect of renewable and decarbonised gases is no reason to slow down electrification or efficiency at this stage."[86]

It appears that no risk or environmental assessment has been carried out in relation to creating a new long-term linkage between agricultural production (which provides by-products of food waste, slurry waste and crop reside for anaerobic digestion) and the ongoing availability/supply of this new gas source. As noted in the SEAI's analysis "as food waste feedstocks are a by-product or waste from other processes, they are considered a finite resource. This limits how much supply can be increased in relation to increased demand which may lead to price volatility and price increases." They also point out that "farmers may be unwilling to produce energy crops for AD or gasification long term." McMullin et al also point to the need to account for additional use of nitrogen fertiliser at AD sites which would result in increases in Nitrogen Oxide emissions.[87] In the event that on-farm biogas production through AD is strongly incentivised, it may have the perverse effect of locking in intensification of agricultural land and/or expanded ruminant production in opposition to mitigation commitments in the agriculture sector. In other words, the risk is that biogas

demand and the operation of such facilities would drivecontinuous high volumes of these by-products at farm level.
Detailed analysis is required as to what percentage of farmland would be required to produce high volumes of grass for AD plants. The effects such ongoing land use requirements should also be examined including loss for land for domestic fodder production and environmental impacts of higher fertiliser application. It is particularly important that clear sustainability standards are defined for biogas production.

4.4 Impact of Liquefied Natural Gas

4.4.1 What additional security may be provided by the construction of a new LNG import terminal – i.e. over and above other energy supply measures e.g. interconnection and/or renewables sources?
4.4.2 Will the upstream emissions associated with LNG terminals be fully assessed under the planning and approval process, including the likelihood of LNG emanating from hydraulic fracturing sites in the US?
4.4.3 What are the geopolitical risks associated with allowing US energy companies to develop LNG terminals in Ireland?
4.4.4 What is the risk of stranded LNG assets in GNI onshore transmission network and interconnector system and how are these assessed?
4.4.5 To what extent is the addition of new LNG supplies under the PCI process consistent with GNI's commitment to decarbonise the gas system (through biogas, hydrogen and CCS) by 2050?
4.4.6 To what extent would reinforcement of and expansion of the gas transmission network be required as a result of new LNG facilities in Shannon and/or Cork harbour?

GNI, as part of its 2018 long-term resilience study with EirGrid, concluded that "the most economically advantageous option" for Ireland to enhance its security of gas supply is a floating LNG terminal, along with bio-methane integration. The IEA contend that the development of LNG import facilities would enhance gas supply security in Ireland by providing access to a global LNG market. However, it is important that an independent assessment is made as to what extent new LNG supplies are necessary for national energy security, as opposed to merely increasing the availability of gas supplies.

A range of security risks associated with LNG development must be taken into account: LNG supplies are periodic and dependent on ongoing commercial decisions and market signals to the prospective LNG operators. Competition and demand for existing LNG supplies remains high and, as noted by the Oxford Institute for Energy Studies, "the availability of spot market LNG supplies is related to patterns of supply and demand on the global LNG market, and the price spreads between Europe and the Asian market, where the latter has traditionally commanded a price premium and has therefore attracted LNG supplies away from Europe in periods of market tightness."[88]

The ESSR should assess the potential for sudden increases in gas costs in a scenario where Ireland is dependent on LNG and therefore more exposed in global LNG market prices. Higher security risks associated with non-EU gas sources should also be examined. This analysis should also consider that gas volumes potentially provided by LNG can already at the current time be safely provided by the gas interconnector system to onshore Scotland. [89] The question therefore arises as to what additional security is provided over and above the security provided by existing UK imports via Moffat (which also include LNG sources).

In relation to decarbonisation commitments, the Climate Change Advisory Council has noted that "issues with respect to the embedded greenhouse gas emissions associated with the production, compression, distribution and storage of natural gas sourced from a more diverse range of regions and production techniques (e.g. fracking) would need to be addressed."[90] The process of liquefaction and liquefied transport are also energy intensive processes which increases the emissions intensity compared to conventional natural. Further analysis of upstream emissions associated with LNG should be progressed particularly given the current likelihood that LNG supplies would be sourced from hydraulic fracturing in the US (associated with major methane releases) and taking into account that future CCS development will not mitigate upstream emissions.[91]

Section 5 Other Challenges and Risks

5. To examine what are the primary risks and challenges for Ireland's energy security and sustainability in the short medium and long-term and how relevant state actors should respond accordingly

Questions

5.1 Functions and Mandates

5.1.1 In light of the above assessments, how can decision-making processes by government and relevant state bodies be improved?

5.1.2 In light of the above assessments, how should the mandates of relevant government bodies and semi-states be updated?

5.1.3 To what extent are semi state companies and network operators responsive to energy security requirements while still ensuring decarbonisation in accordance with their mitigation obligations?

5.1.4 How are potential conflict of interests taken into account, particularly regarding information and recommended investments and proposed infrastructure developments submitted by such bodies in response to this review?

The ESSR should not only set out technical challenges in providing system security while meeting decarbonisation objectives. The Review should address how system planning and associated government decision-making can be enhanced with independent oversight. The

Review should recognise and acknowledge that state companies are not necessarily impartial players in assessing the long-term usage and development of their assets to deliver decarbonisation objectives. This risk underlines the need for an independent and impartial steering group, as noted in Section 1. The Review should highlight where mandates and functions of relevant public bodies and semi-states which seek to expand fossil fuel infrastructure or use may conflict with decarbonisation objectives. This is particularly the case for GNI and the company's parent body, Ervia.

GNI is responsible for both assessing gas system and supply while at the same time promoting expansion of the gas network. This expansion, and new connections in particular, are based on projected gas demand scenarios which are also produced by GNI. These assessments are examined and approved as part of CRU reviews, this most important of which is its five yearly price control (in which GNI allowed revenues are also approved).

As previously noted, natural gas phase out is now actively necessitated given Ireland's mitigation commitments. While there is no specific obligation at EU level, expansion of natural gas usage runs counter to Paris Agreement commitments. In this way, GNI proposed gas network expansion, gas demand assessments and function to accommodate such gas demand represents particular risks, given that GNI is not an impartial stakeholder.[92]

GNI aim to fully decarbonise the gas network by 2050 with half of this reduction delivered through biomethane injection and/or hydrogen. The other half is to be delivered through 'abated gas' where CO2 has been removed through CCS. As noted above, considerable questions arise as to the viability of each of these proposed mitigation measures.[93] In its submission to the Department's public consultation on the NECP, Ervia contends that there is no credible alternative to Combined Cycle Gas Turbines combined CCS technology in order to provide low emission, dispatchable and secure power at scale. They reject the viability and security of alternative technologies, including biomass, batteries and electrical interconnectors.[94]

Where Ervia and GNI functions remains focused on expansion pipeline infrastructure and increasing gas connection, it is more likely that Ervia and GNI may not be inclined to support a business case for high-electrification scenarios. As noted in section 4.1 Ervia and GNI are continuing to promote a single fossil fuel source for home heating and a fuel which will have to be substantially reduced over the next 30 years. This increases the risk of gas lock-in and itself escalate energy security risks where additional infrastructure is no longer reuired. Their approach also appears to run counter to the Government's Climate Action Plan commitment to ban the installation of gas boilers from 2025 in all new dwellings and the finding that "the most cost-effective abatement measure for the built environment identified in the MACC is to retrofit existing dwellings that use oil boilers to a B2 equivalent BER. While gas may be the cheapest heating source over the period to 2030, opting for such carbon-intensive investments would result in 'carbon lock-in'". It is also unclear how the position of Ervia and GNI aligns with IEA recommendations for the Government "develop a time-bound roadmap for decarbonising the heating sector through energy efficiency and fuel switching. The roadmap should establish clear scenarios and milestones for phasing out fossil fuels".[95] It should also be noted that to date the public has not received comprehensive information on the need to move away from natural gas heating and on what the alternatives might be. As noted by the UK Committee on Climate Change, "there is a limited window to engage with people over future heating choices, to understand their preferences and to factor these into strategic decisions on energy infrastructure." [96]

The CRU has statutory responsibility for monitoring security of gas supplies, ensuring continuity of such supplies and approving GNI infrastructure proposals (including proposed connections). However, climate considerations are not included climate considerations as part of its stated legal remit. As noted in Torney et al (2018)[97], "with the significant challenges posed by transition to a low-carbon energy system, consideration could be given to rebalancing CRU's mandate to give greater emphasis to decarbonisation by refocusing the existing environmental mandate towards a specific decarbonisation mandate." CRU's latest strategic plan includes objectives relating low-carbon pathways and delivery of climate and renewable targets. The CRU's current price control process does not integrate Paris-aligned decarbonisation objectives and scenarios (including and excluding BECCs) for Ireland or make provision for future write down of certain (unnecessary) elements of natural gas assets. EPA research has found that "in future scenarios with a tight top-down carbon constraint, difficult-to-reach projects with high capital costs, along with carbon-intensive reserves, face a high stranding risk." They note that stranding risk may call into question the regulated return model for gas network as customers face progressively higher network charges under decarbonisation scenarios with reduced gas use, potentially causing a "snowball effect" where increasing prices create an incentive to get off the gas network.[98]

By contrast, in response to concerns that its statutory functions are not aligned with climate obligations, the GB regulator, Ofgem, published a dedicated climate plan in February 2020 focused on renewables expansion and electrification of heat and transport in line with a net zero emissions by 2050. In the plan Ofgem outline how it intends to update its operations and plans and commit to working with government and industry to decarbonise heating and support increasing numbers of electric vehicles. In relation to the natural gas phase out, Ofgem significantly commit to carrying out a strategic review of gas network asset depreciation in line with the net zero target. Network companies will also be able to seek changes in their allowed spending during (as opposed to before) price control periods, in order to better adapt investment in clean energy. They will also be required to produce adaptation strategies in view of mounting climate impacts. Net zero investment and innovation funding mechanisms will also be introduced.[99]

5.2 UK Energy Security and Brexit

5.2.1 Given that Ireland and UK energy security are interlinked, what are the latest assessments of UK energy security? What are the primary energy supply/demand assumptions that have the greatest impact when reviewing Irish energy security? Is it *the case that increasing UK gas imports should necessarily be considered to have definitive negative security implications for Ireland?*

A variety of methodologies may be used for assessing energy security. The last publicly available official assessment of national energy security in Ireland was undertaken by the SEAI in 2016. While the report addresses climate commitments, it only briefly notes the interplay and challenges and opportunities between climate change and energy security. In this report it is noted that a decrease in the UK's security of gas supply resulted in a negative effect on Ireland's energy security. This assessment was based on MaREI's 'S/D index assessment.[100] Scores were calculated based on data measurement and weighted according to their relative importance. It is noted that Irish imports from the UK were weighted "in proportion to the percentage of UK imports originating from outside the EU." This weighting had a strong influence on the overall index score.

The report notes that "the change in methodology, whereby UK imports have been weighted by the proportion originating within the EU and Norway, or from further afield, has resulted in considerable differences in the primary energy security score when compared to previous updates." In essence, a lower rating applied to these non-EU imports to Ireland resulted in a significantly greater decline in Irish primary energy security (reducing the scoring by c.20%). While it is noted that "energy security has declined in recent years with or without considering the proportion of UK imports that originate from outside the EU", it is stated that "the depletion of the North Sea Oil and Gas has the largest effect of all elements of Irish energy security." It is essential that any further use of MaREI's S/D index assessment and in particular its lower weighting of non-UK gas imports is independently assessed and reviewed in light of more recent qualitative and quantities analysis by UK authorities (see below). It should also be noted that MAREI's Irish TIMES energy system modelling used as part of this S/D index assessment is now out of date in that it only applied an 80% GHG reduction by 2050 and a carbon tax of €40/tCO2 in 2030.

Fossil fuels accounted for 89% of primary energy use in Ireland in 2018 with majority of imported natural gas and oil stemming from the UK and Norway.[101] The Department of An Taoiseach's in its *National Risk Assessment 2019* state that "Ireland's situation as an island on the periphery of Europe renders it particularly vulnerable to disruptions to the supply or price of oil, gas or electricity which would have significant economic, social and competitive impacts." It is recognised from historical experience that the more reliant a state is on imported gas, the more exposed the economy is to price fluctuations and potential disruptions. However, the variety of long-standing EU and non-EU gas supplies to the UK, the proximity and extent of supplies from Norway, the significance of the UK as a major gas hub, as well as Ireland's and NI's secure connections to Scotland, all merit a more nuanced assessment of the relative security of Ireland's gas imports.

As set out by GNI, Ireland and Northern Ireland are strongly connected to the UK gas system. The UK acts as a particularly important hub for and natural gas production, storage trading and transport. The UK gas market is regarded as one of the most liquid and developed markets in the world and the National Balancing Point is by far one of Europe's largest traded gas markets. Gas production from the UK's Continental Shelf can meet just over half of UK demand with the rest being met through imports. While UK gas production is projected to further decline over the coming decades, the UK is, alongside the Netherlands, one of the two major gas-producing nations in Europe. Norway is the principal source of UK gas imports, meeting about three-quarters of UK import volumes. According to UK authorities, the gas system and is expected to continue to function well, with a diverse range of supply sources.[102] This secure integration to such a major gas hub greatly mitigates Ireland's security of supply risks, in comparison with many other European countries. The ESSR should examine the high level of interconnectedness and interdependence between Ireland and the UK for both gas and electricity.

It is also worth noting that the UK is not dependent on Russian gas imports to meet gas demand (even after accounting for greater Russian LNG imports to the UK in recent years). Analysis in 2018 has shown that less than 1% of UK gas supplies has emanated from Russia.[103] The Oxford Institute for Energy Studies has noted that the UK's primary gas security risk is not Russia supplies but the "increasing exposure to price volatility in line with the ongoing increase in UK gas import dependency and decline in gas storage capacity." The potential for such price volatility to affect the Irish gas market should be examined.[104] This assessment is also supported by analysis by Cambridge Economic Policy Associates (on behalf of the UK Department for Business, Energy & Industrial Strategy) which notes that although reduction in indigenous production raises new risks, diversification of gas sources improves UK security. This study concludes that shocks that lead to unmet gas demand are extremely unlikely with price being the primary determinant of whether sufficient gas is available to meet demand.[105] A strategic assessment of gas security of supply undertaken by the Department of Business, Energy and Industrial Strategy in 2017 found that GB will have enough import capacity to deliver under high demand and the resilience to cope with severe shocks to the system. The UK's gas N-1 assessment also included exports to Ireland and the result of the calculation exceeded the target of 100% with a score of 120%.[106]

In light of the above, in examining security of Irish gas and oil supply it is important to ensure that any analysis of fossil fuels imported into the UK is a relative assessment which takes into both the UK's position as a global hub with well-developed and secure commercial and physical links to Ireland (including with Northern Ireland and the Isle of Man in relation to gas interconnection). The ESSR should assess not only the security associated with the production and transfer of such fuels to the UK but also the relative (low) likelihood that the transportation of these fuels within the UK (to Scotland and Northern Ireland) and onwards to Ireland would be obstructed. The ESSR should also address the findings of the CRU 2018 Risk Assessment that Ireland is not impacted under any major GB gas disruption given the variety of UK gas sources. This assessment should be updated based on the latest available UK analysis, including ongoing availability and accessibility of gas sources to and within GB.

5.2.2 Is there any circumstance in which the UK's EU departure pose may a direct risk to the availability of gas/electricity supplies and relevant interconnector infrastructure? What is the likelihood of this risk occurring?

In relation to Brexit, the UK's EU departure has been raised as a potential risk to the Irish energy market. The Department of An Taoiseach's in its *National Risk Assessment 2019* state that "Brexit poses a particular risk as Ireland imports the vast majority of its energy requirements, oil, gas and transport fuels, from or via the UK."

However, as noted by the Department of Foreign Affairs and Trade in 2019, the CRU, EirGrid and GNI do not envisage a disruption to gas/electricity flows in the event of a 'no-deal' Brexit and contingency plans for the electricity and gas wholesale and network sectors have been prepared by these stakeholders.[107] The Irish Petroleum Industry Association has also noted that their member companies did not have concerns regarding availability of oil supplies. The 2018 UK Withdrawal Agreement includes measures to protect the SEM. The 2019 Brexit Omnibus Act provides for the CRU to modify licences in a no deal Brexit to facilitate operation of the SEM. While the exact nature of the UK's future trading relationship with the EU remains unclear, DCCAE has proactively and successfully led on coordination and engagement with both Irish, as well as NI and GB, authorities in order to main energy supplies and the functioning of the SEM. Regulatory, market and/or legal divergence will likely result in the need for increased engagement with UK counterparts, as well as for updated market and emergency response agreements. However, it is important that in the ESSR such challenges are not framed as necessarily implying supply-side risks.[108] The UK Department of BEIS has also stated that the UK's EU withdrawal is not likely to have an impact on security of supply in GB.[109] There are also bilateral agreements in place between Ireland and the UK regarding energy supply that are separate to EU law and market arrangements.

GNI and the IEA both note that divergence between UK and EU gas regulations and compliance with the EU Security of Gas Supply Regulations will have to be resolved, in particular the fact that Ireland's adherence with N-1 infrastructure standard is only fulfilled when calculated on a regional basis with the UK.[110] However, GNI has underlined that the fact that the supply of gas to Northern Ireland and the Isle of Man is reliant on GNI infrastructure can only serve to underpin continued cooperation between Ireland and the UK in relation to gas supplies. GNI have stated "within the framework of existing intergovernmental agreements in place since 1993 between Ireland and the UK concerning Ireland's two gas interconnectors, GNI and National Grid have agreed a voluntary protocol for dealing with gas emergencies affecting GB and Ireland. We see no reason for these arrangements to change post Brexit."[111] The ESSR should address necessary changes/derogations from relevant EU legislation and set out how gas supply emergency response and solidarity mechanism between Ireland and the UK can continue to be applied.

5.3 Data Centre Demand

5.3.1 To what extent do new data centres risk steep increases in electricity demand and resultant carbon 'lock-in' thus preventing decarbonisation of other sectors?

5.3.2 To what extent may the increased number of date centres envisaged by government policy require significant electricity and/or gas network reinforcement?

5.3.3 Given data centre energy demand, to what extent may this involve increased gas demand and/or possible expansion of the gas network?

5.3.4 How can such facilities ensure their operations are carbon neutral without eroding the rest of the system's capacity to move towards 100% renewable sources and driving up costs for other customers?

5.3.5 Can data centres contribute to local energy security in the context of more localised distributed generation and microgeneration?

The CRU has noted that: "Due to the expected growth in demand from large energy users, the electricity demand in Ireland could grow by up to 57% in the next 10 years. EirGrid's analysis shows that demand from data centres could soon become the largest electricity users, accounting for 31% of all demand by 2027."[112]

The Department should seek to address data centre demand challenges by requiring the development of renewables, storage and demand-side management technologies on the site of such facilities, including where existing facilities are expanded. It is also important that network expansion and reinforcement pressures are managed by incentivising more data centre development in locations outside of Dublin/Leinster – i.e. areas which are not already under pressure and requiring grid reinforcement.

Against this, GNI have that it is "focused on developing a combined offering of Natural Gas, Biogas and Combined Heat and Power (CHP), as the primary source of energy for the Data Centre sector" [emphasis added]. The network operator seeking to actively ensure that natural gas is adopted as the primary energy supply to meet data centre requirements raises questions of potential 'natural gas lock in' which may run counter to decarbonisation objectives.[113] All of the above challenges underline the need for coordination and coherence in policy-making and implementation between the Departments of CCAE, BEI, as well as the IDA and electricity and gas network operators.

In the Government's 2018 *Statement on The Role of Data Centres in Ireland's Enterprise Strategy*, it is noted that a plan-led approach to data centre development will be adopted in order to suitable locations for investment are chosen while minimising deep reinforcement of the electricity grid. It is also noted that data centres will stimulate demand for increased renewable electricity generation and that "[t]he increased renewable electricity requirement linked to energy intensive investments will be mainly delivered by the development of the new Renewable Energy Support Scheme." However, the statement significantly points to the fact that such developments will also likely "result in higher network charges and PSO levies for consumers unless mitigating measures are taken." The statement also highlights that the Government is amending the planning process for data centres over certain size thresholds to reclassify them as strategic infrastructure development "which will streamline the decision-making process" and reviewing judicial review timelines on planning decisions.[114]

5.4 Climate Impacts and Emergency Arrangements

5.4.1 Are existing monitoring and emergency response arrangements in the gas and electricity systems adequate?
5.4.2 Has a risk assessment been carried out into the impact of increasing sea level rise and extreme weather events on Ireland's offshore gas infrastructure?

The CRU already has security of supply monitoring and reporting arrangements with the System Operators. EirGrid, ESB Networks and GNI produce a range of reports relating to security of electricity and supply which are reviewed and approved by the CRU. The CRU chairs a group called the Gas and Electricity Emergency Planning group and gas-fired electricity generators are required to be capable of operating on secondary fuel for five days in the event of a gas supply disruption. The CRU has noted "the current monitoring arrangements are sufficient to identify credible threats to the security of supply of electricity. The CRU is also satisfied that the market framework in place and the new ancillary services and I-SEM arrangements, including a new capacity mechanism, are appropriate to encourage new investment and enhance security of supply."[115]

DCU Energy & Climate Research Network note that "in assessing risks to energy security, the [energy security and sustainability] Review should be required to present and assess worst case scenarios for climate impacts (including cascading effects such as climate-induced conflict) with possible disruption of existing international supply chains, including potential for early, severe and prolonged disruption of supply of fossil fuels."[116]

This should also take into account the likelihood of increasing extreme weather events as a result of the climate emergency. GNI analysis highlights that two separate 1-in-50 peak day events occurred in winter 2009/10 and winter 2010/11.[117] Extreme winter weather in early 2018 resulted in a 1-in-50 year peak day demand in the NDM sector (1st of March 2018). The Department of An Taoiseach's National Risk Assessment 2019 notes that "[s]ea level rise is already being observed and is projected to continue to rise into the future, which will increase both flood and erosion risk to our coastal communities and infrastructural assets."

End Notes

[1] The Terms of Reference commissioned by Stop Climate Chaos is available at: https://www.stopclimatechaos.ie/assets/files/pdf/terms_of_reference_for_energy_security_review.pdf it identifies five key priority objectives that the Review must address:

1. Undertake an impartial and transparent assessment of Ireland's energy security and sustainability through an appointed independent steering group, drawing on relevant technical analysis and public consultation.
2. Examine and make recommendations on how Ireland as an isolated grid with declining indigenous fossil fuel resources achieve full decarbonisation by 2050 at the latest while remaining energy secure.
3. Examine and make recommendations regarding the additional renewable energy resources, energy storage, distribution and interconnection infrastructure that will be required to ensure Ireland is energy secure as we move towards 100% renewable electricity, and decarbonisation of all other sectors.
4. Examine and make recommendations on how to manage a phase-out of natural gas in order to avoid stranded assets while ensuring security of gas supply and preventing further carbon lock-in along with supply disruption.
5. Examine the primary risks and challenges for Ireland's energy security and sustainability in the short, medium and long-term and how relevant state actors should respond accordingly.

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[3] See Paul Deane, https://www.linkedin.com/pulse/common-misconceptions-energy-climate-policy-ireland-paul-deane/
[4] See (inter alia) Electricity Regulation Act, 1999, S.I. 60/2005 Gas (Interim) (Regulation) Act 2002 EU Regulation 2017/1938 concerning measures to safeguard the security of supply of gas.
[5] For example, as part of the development of the National Broadband Plan, the Department appointed a group of expert advisers to provide guidance on the delivery of the NBP strategy. An Independent Expert Panel was also progressed the Terms of Reference developed for the 2014 examination of the EirGrid Grid West and Grid Link projects. The Terms of Reference for the Department's Retail Sector Action Group on Preventing Wasted Food in the Supply Chain includes also included commitment to transparency, including regarding the group's operation and concluding report, which should equally replicated.
[6] https://www.dccae.gov.ie/en-ie/news-and-media/press-releases/Pages/Minister-Bruton-Starts-Single-Use-Plastic-Bottle-Review.aspx
[7] E3g Report December 2017 Infrastructure For A Changing Energy System A Next Generation Of Policies For The European Union Joseph Dutton, Lisa Fischer, Jonathan Gaventa
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[13] Glynn, J., Chiodi, A. & Ó Gallachóir, B. Energy security assessment methods: Quantifying the security co-benefits of decarbonising the Irish Energy System. Energy Strategy Reviews 15, 72–88 (2017).

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[15] CRU, Electricity Security of Supply Report 201
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[17] https://www.irishexaminer.com/breakingnews/views/analysis/paul-deane-enhancing-irelands-energy-security-starts-with-local-bus-lane-975701.html
[18] McMullin point to for example Connolly D, Mathiesen BV (2014) A technical and economic analysis of one potential pathway to a 100% renewable energy system. International Journal of Sustainable Energy Planning and Management. 6 May 2014.
https://journals.aau.dk/index.php/sepm/article/view/497. As noted in Is there a Role for LNG Importation in Ireland's "Fair Share" of Global Climate Action?
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[20] https://iwea.com/images/files/iwea-necp-first-draft-consultation-submission.pdf
[21] https://www.iwea.com/images/files/iwea-baringastorerespondsavereport.pdf
[22] As noted in Dieter Helm Cost of Energy Review 25th October 2017
[23] Dieter Helm Cost of Energy Review 25th October 2017
[24] CRU, Electricity Security of Supply Report 2018
[25] UK Department of BEIS, Statutory Security of Supply Report, 2018
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[37] https://www.seai.ie/publications/Assessment-of-the-Potential-for-Geological-Storage-of-CO2-for-the-Island-of-Ireland.pdf

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[53] McMullin, Is there a Role for LNG Importation in Ireland's "Fair Share" of Global Climate Action? 2019

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