Gas Networks Ireland

Strategic Case

April 2024

Private & Confidential

Strategic Case: Table of Contents

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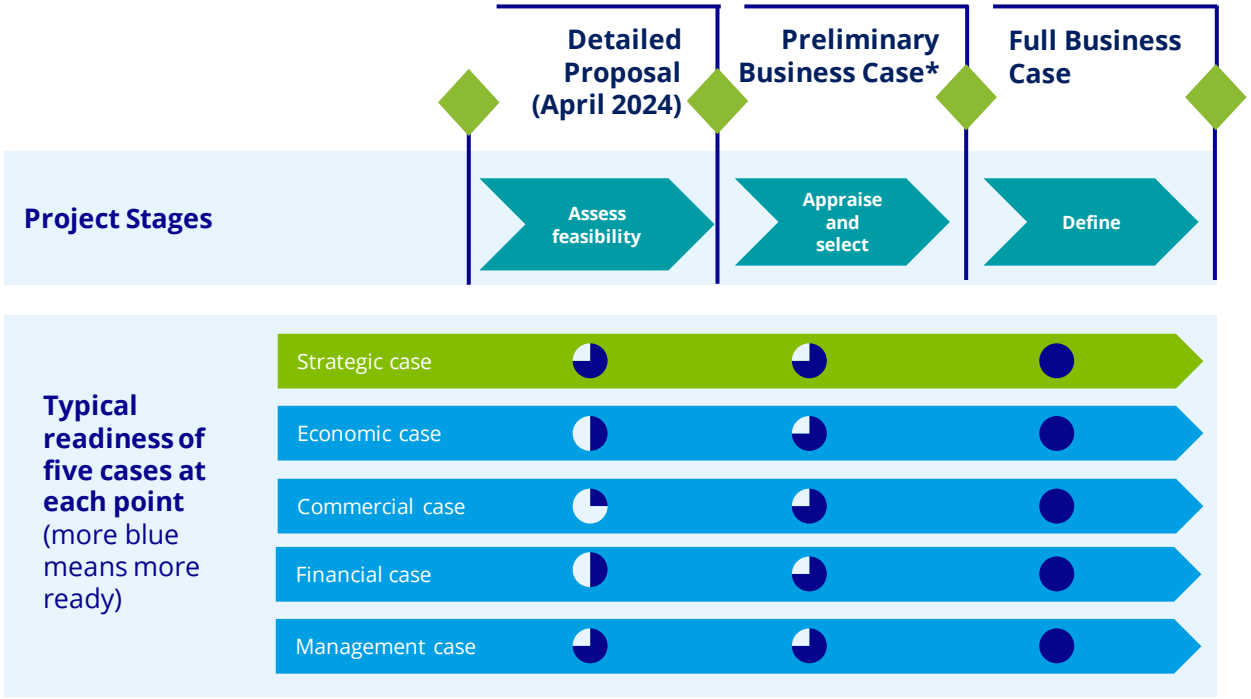
1.1 Introduction

1.1 Introduction

Business Case structure:

- The business case has been prepared in compliance with both the Infrastructure Guidelines: Strategic Assessment and Preliminary Business Case, December 2023 and the UK Infrastructure and Projects Authority's Infrastructure Business Case five-cases model. The business case includes: strategic, economic, commercial, financial and management cases – the five dimensions of the case.
- The Project is currently at the Preliminary Business Case stage, which if approved, will enable the Project to proceed to Final Business Case, where detailed design and procurement activities will determine the final scope, cost and schedule for the project.
- At Preliminary Business Case stage, the Strategic Case should:-
  - Provide the rationale for the project and the case for change;
  - Provide evidence of the strategic fit for the organisation and the strategic fit with wider policy and strategies;
  - Define the project objectives and outline the potential scope for the project;
  - Set the project's scope and boundaries and describe clear project objectives and the outputs required to deliver those objectives.



Source: Infrastructure Project Authority (2022) Project Routemap[3]

*Target for Government submission in June

[1]Department of Public Expenditure NDP Delivery and Reform (2023), Infrastructure Guidelines: Strategic Assessment and Preliminary Business Case. Available here
[2]Infrastructure and Projects Authority (2022), Infrastructure Business Case: International Guidance. Available here
[3]Infrastructure and Projects Authority (2022), Project Routemap. Available here

1.1 Introduction

Natural gas plays a pivotal role in Ireland's power sector, as well as being essential for businesses and domestic consumers. In the short to medium term, natural gas is expected to remain a crucial fuel, being the cleanest fossil fuel. In fact, Irish gas demand is anticipated to rise over the next few years and reach its peak circa 2027.

The EU updated requirements for Member States to meet specific criteria for the security of the gas supply sector under Regulation (EU) 2017/1938[4] concerning measures to safeguard security of supply.

Ireland relies heavily on gas imports from Great Britain (GB) and, since Brexit, the current Irish gas infrastructure no longer satisfies the infrastructure standard under Regulation (EU) 2017/1938 (having done so previously on a regional basis with the GB). This was highlighted in the recent Energy Security Review[5], published in November 2023, which identified the development of a 'Strategic Gas Emergency Reserve' as a transitional action needed to address energy security requirements in the medium term.

The purpose of the Strategic Case ('Strategic Assessment' in the Infrastructure Guidelines) is to examine the rationale for potential policy interventions and ensure the strategic fit of potential investment proposals with Government policy, in particular the National Planning Framework and National Development Plan.

The strategic case for developing a Strategic Gas Emergency Reserve is *"to protect Ireland in the event of a gas supply disruption as Ireland makes a secure transition to majority renewable energy"*. The Energy Security Review states that GNI should develop the proposal in consultation with DECC, with the Minister presenting it to the Government for a final decision in Q2, 2024.

[4] EU (2017), Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of supply and repealing Regulation (EU) No 994/2010. Available here
[5] DECC (November 2023), Energy Security in Ireland to 2030. Available here

1.1 Introduction: Gas Networks Ireland owns, operates, builds and maintains the natural gas networks in Ireland

Gas Networks Ireland

Security of supply

Proven ability to meet demand in the harshest weather conditions, ensuring security of supply

Future proofed

One of the safest and most modern networks in Europe

Flexible

A secure, instantly available energy source which has made renewable deployment possible

14,725km

Of gas pipeline would wrap around Ireland's coastline four times

Diversity

Supplying energy for 720,000 connections in power generation, heat and transport

Renewable ready

€2.7bn network capable of transporting renewable gases, such as biomethane and hydrogen

1.2 Policy Context

1.2 Policy Context: Sustainability

Sustainability legislation and policies influence the future of the energy system through implementing measures to promote the use of infrastructure and commodities which assist the development of a zero-carbon energy system

EU Policies

Green Deal

Initiated in 2020, it comprises a set of policy initiatives aimed at steering the EU towards a green transition, with the overarching objective of achieving climate neutrality by 2050[3].

European Climate Law

Transformed the political commitment to attain climate neutrality by 2050[4] into a legally binding obligation. This law outlines specific targets, mandating the EU to reduce its greenhouse gas ("**GHG**") emissions by a minimum of 55% by 2030 (compared with 1990), achieve net-zero GHG emissions by 2050 at the latest, and strive for negative emissions thereafter.

55 Fit for 55 Package

Sets out the necessary actions to meet the 2030 targets[5]. Increased ambitions on renewable energy and energy efficiency were introduced in the subsequent REPowerEU plan[6], to help the EU deliver the new 55% GHG target. RED III[7], which entered into force in November 2023, increased the EU's binding renewable target for 2030 to a minimum of 42.5%. The aspiration is to further increase this figure to 45%, which will show the EU's commitment to renewable energy.

[3] European Commission (2019) Green Deal. Striving to be the first climate-neutral continent. Available here
[4] European Climate Law - European Commission. Available here
[5] Fit for 55: Delivering on the proposals - European Commission. Available here
[6] EU (May 2022), 'REPowerEU'. Affordable, secure and sustainable energy for Europe. Available here
[7] EU (September 2023), Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast) ('RED II'). Available here

1.2 Policy Context: Sustainability

Applicable Irish Legislation and Policies

The Climate Action and Low Carbon Development (Amendment) Act of 2021[8]

Legal foundation to transition to net-zero by 2050, outlines a 2030 interim target (-51%, relative to 2018), sets five-yearly carbon budgets, establishes sectoral emissions ceilings, mandates annually updated Climate Action Plan, and introduced a long-term climate action strategy.

The Climate Action Plan 2024 (CAP 24)[9]

Builds on the Climate Action Plan 2023 and reinforces a comprehensive roadmap for actions aimed at halving Ireland's emissions by 2030.

Ireland's Long-Term Strategy on Greenhouse Gas Emissions Reduction[10]

Approved by the Government in April 2023, sets indicative pathways beyond 2030 towards achieving carbon neutrality for Ireland by 2050.

The National Hydrogen Strategy[11]

Outlines the strategic vision for the role hydrogen will play in Ireland's energy system, by focusing on its long-term role as a key component of a zero-carbon economy, and the short-term actions that will be implemented in the coming years to facilitate the development of the hydrogen sector in Ireland.

[8] Government of Ireland (2015), Climate Action and Low Carbon Development Act 2015. Available here
[9] Government of Ireland (2023), Climate Action Plan 2024. Available here
[10] Department of the Environment, Climate and Communications (2023), Long-term Strategy on Greenhouse Gas Emissions Reductions. Available here
[11] Department of the Environment, Climate and Communications (2021), National Hydrogen Strategy. Available here

1.2 Policy Context: Sustainability

Other Related Policies

National Planning Framework (NPF)[12]

National Strategic Objective (NSO) 8: *"Transition to a Low Carbon and Climate Resilient Society" national objective of achieving a transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050."*

National Development Plan ("NDP")[13]

A ten-year strategy for public capital investment of almost €116 billion, aligned to strategic planning strategy.

Programme for Government - Our Shared Future[14]

Energy will play an essential role in creating a strong and sustainable Irish economy over the next decade

[12] Government of Ireland (n.d.), National Planning Framework - Project 2040. Available here
[13] Government of Ireland (2018),National Development Plan 2021-2030 . Available here
[14] Government of Ireland (2020),Programme for Government: Our Shared Future. Available here

1.2 Policy Context: Security of Supply

EU and Irish energy legislation and policy has aligned over time

European Commission Regulation[15]

994/2010

Measures to safeguard the security of gas supply, introduced 'N-1 Infrastructure Standard' requiring Member States to take measures in the event of disruption to their largest single piece of gas infrastructure.

EU[16]

2017/1938

Enhances gas security through a new, efficient method to prevent and manage potential supply crises, and establishes a solidarity principle, where neighbouring Member States would be called upon to assist with gas supply to households and essential services during severe crises.

Policy Statement on Security of Electricity Supply[17]

2021

Updates national policy and includes government approval for considering the development of appropriate additional electricity and gas infrastructure.

EU Gas Storage Regulation[18]

2022/1032

Introduced new rules under which gas storage facilities are considered critical infrastructure, a new certification process and sets out the gas storage filling targets that EU countries have to reach including the 90% gas storage target by 1 November each year.

Energy Security in Ireland[19]

2023

A strategy to guarantee energy security and support a sustainable shift to a carbon-neutral energy system by 2050. Included a rigorous review of Ireland's electricity and gas networks ('CEPA report'[20]), public consultation, and an independent review of electricity supply security (the 'McCarthy Report').

2010 **2024**

[15] EU (2010), Regulation No 994/2010 of the European Parliament and of the Council concerning measures to safeguard security of supply and repealing Council Directive 2004/67/EC. Available here
[16] EU (2017), Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of supply and repealing Regulation (EU) No 994/2010. Available here
[17] DECC (2021), Policy Statement on Security of Electricity Supply. Available here
[18] EU (2022), Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage. Available here
[19] DECC (2023), Energy Security in Ireland to 2030. Energy Security Package. Available here
[20] CEPA (2022), Technical Analysis of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems. Available here

1.3 Case for Change

1.3 Case for Change: Irish Energy Sector Context

Ireland's gas and electricity sectors face several broad challenges:

High usage per household

Ireland's energy usage per household remains higher than the EU average, partly driven by poor energy efficiency of buildings. More broadly, there needs to be fundamental improvements in energy efficiency across all sectors.

Import dependent

Ireland is one of the most energy import dependent countries in the EU, with 100% of oil and 71% of natural gas being imported in 2021[21]. The dependency on gas imports is increasing as the indigenous gas supply from Corrib declines.

Renewable energy sources

To help address Ireland's import dependency, Ireland must increase the level of energy produced from a diverse portfolio of renewable energy sources, as well as developing storage, demand side response, and interconnection.

Energy security

Gas supply changes and gas infrastructure attacks are increasingly impacting on Europe's energy security. This presents a challenge for Ireland due to its high dependency on imports.

Expected increase in peak gas demand

While demand for gas will gradually be replaced by growing demand for electricity as the energy system is decarbonised, in the medium term the electricity system will become more dependent on natural gas, particularly in times of low generation from intermittent sources. Therefore, peak demand for natural gas is expected to increase, and the existing infrastructure will not be able to meet this increase. This risk will impact from winter 2024-25[22].

[21] CEPA (2023), Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems. Available here
[22] GNI (2022), Gas Forecast Statement. Available here

1.3 Case for Change: Role of Gas in Ireland

Natural Gas in Ireland[23]

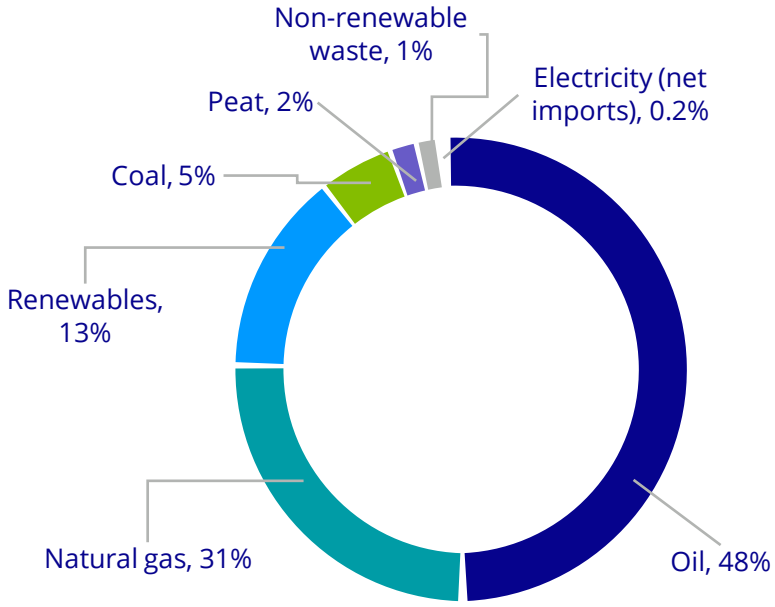
31% of Irelands primary energy needs are met by **Natural Gas.**

47% of electricity is generated using **Natural Gas.**

Natural Gas accounts for 40% of direct energy used in heat.

Ireland Total Primary Energy Requirement (TPER) by Fuel source

Share of primary energy requirement by energy type[24]



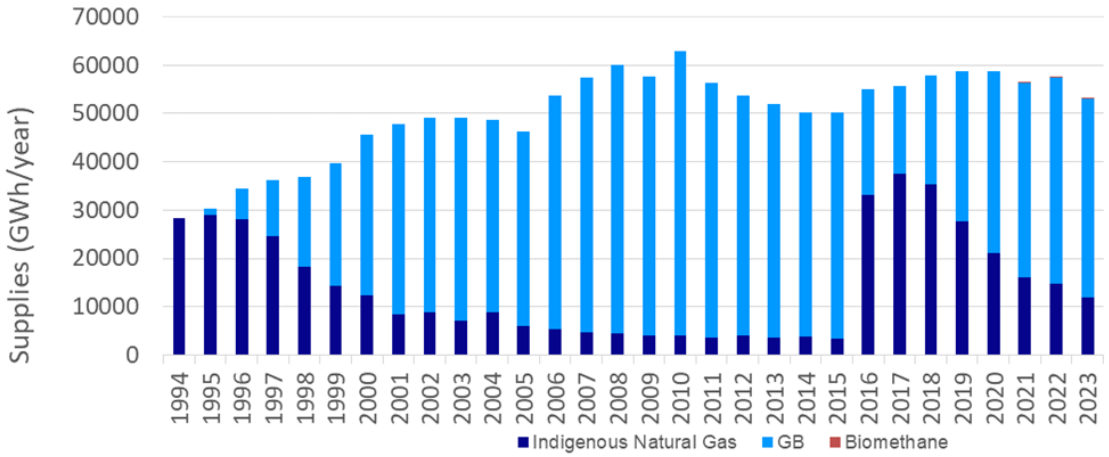
[23] CRU (2023), Consultation Paper on Transmission Development Plan 2023-2032. Available here
[24] SEAI (2023), Energy in Ireland. Available here

1.3 Case for Change: Matters Impacting Policy

Natural gas is essential to Ireland's business and domestic consumers. As the cleanest available fossil fuel, gas will continue to be vital to Ireland's net-zero transition.

Historic Demand and Supply

In 2023, 22.4% of Ireland´s gas demand was met by indigenous sources, specifically from Corrib and biomethane.



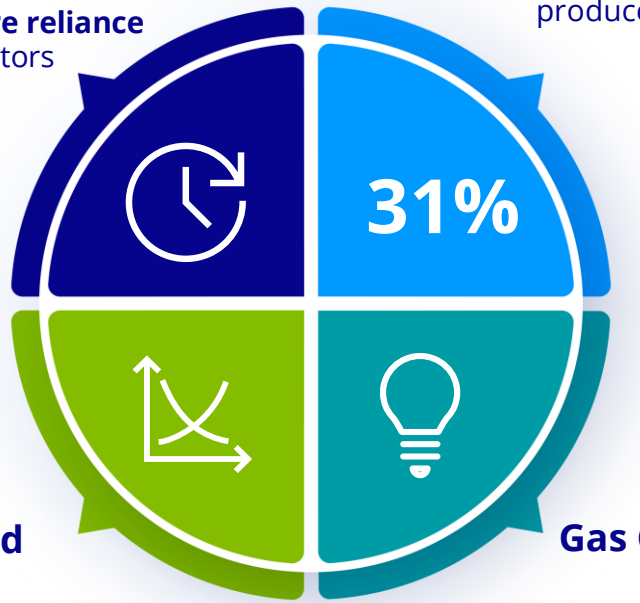
Source: CRU (2023), Consultation Paper on Transmission Development Plan 2023-2032. Available here

Supply Decline

Supply from the Irish gas field, Corrib, is in decline so there will be a **greater future reliance** on GB Interconnectors

Gas Produced

31% of Irish energy is produced by gas



Annual Demand

Annual demand for gas likely to fall, but **peak demand will remain high**[22]

Gas Generated

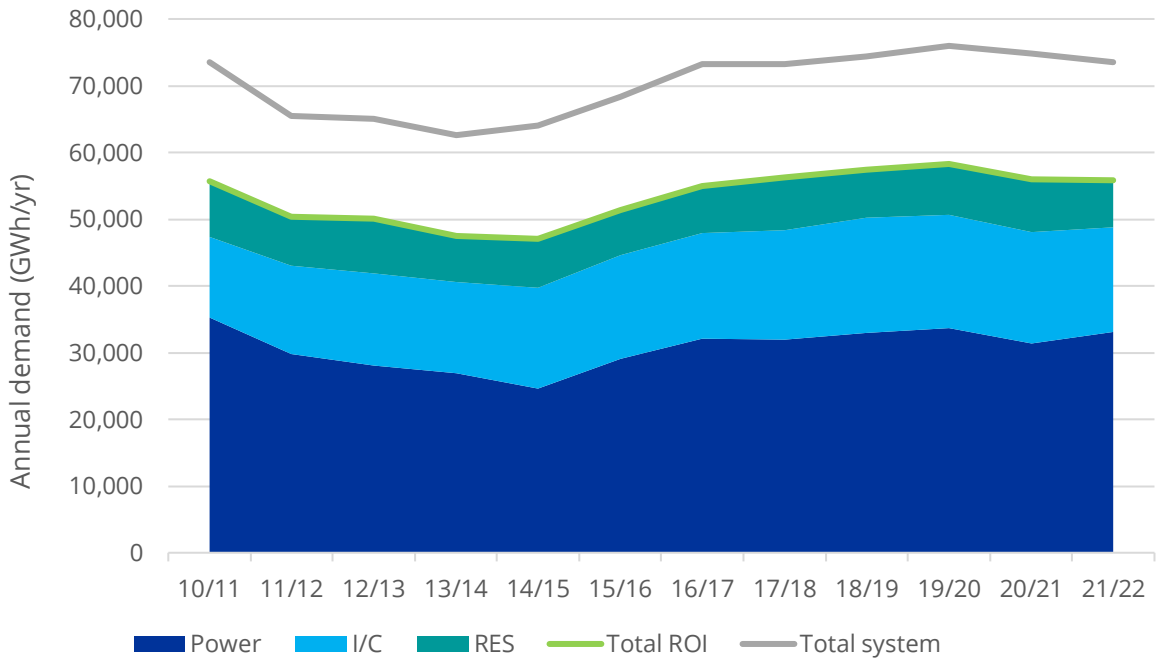
Gas generates **47%** of Irish electricity and accounts for **40%** of heating

[22] *CRU (2023), Consultation Paper on Transmission Development Plan 2023-2032. Available* here

1.3 Case for Change: Role of Gas Historically

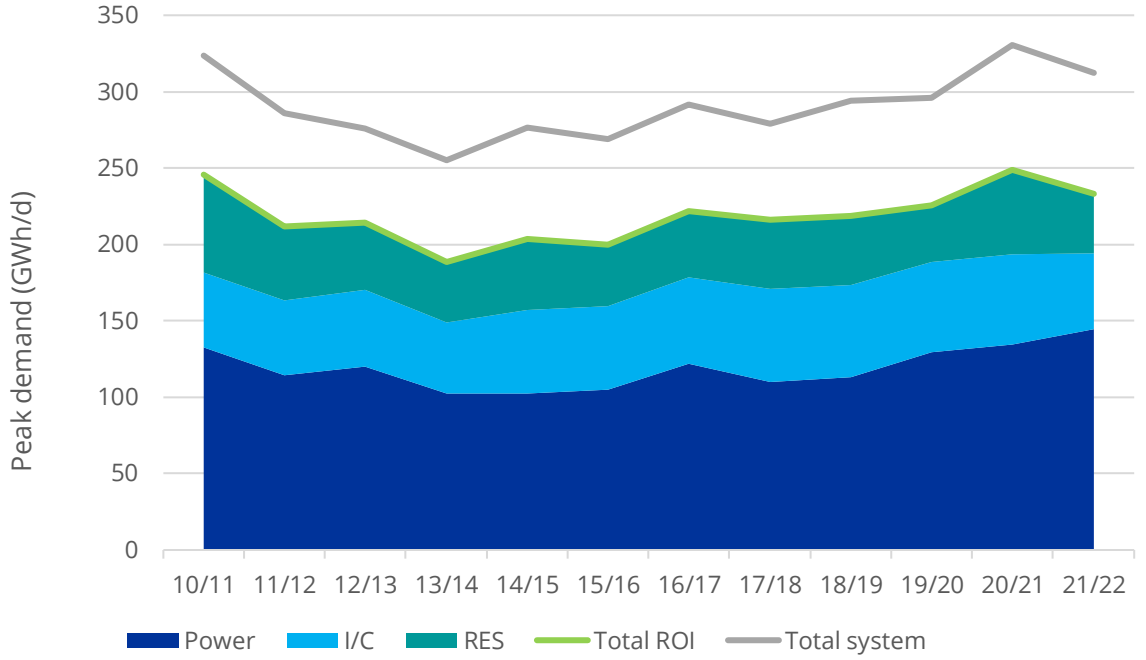
Gas annual and peak day demand has been increasing for a number of years:

Historic annual gas demand



Source: GNI (2022), Gas Forecast Statement

Historic peak day gas demand



Source: GNI (2022), Gas Forecast Statement

1.3 Case for Change: Role of Gas

Natural Gas is a key back-up fuel for electricity generation, particularly for Renewable Energy Sources (RES) such as solar and wind:

Gas plays a particularly important role in periods with low wind, and on certain days, gas can generate as much as 89% of the electricity consumed in Ireland (historic peak recorded in April 2022, average in 2023 was 47%)[25].

The Climate Action Plan[9] includes ambitious RES capacity targets:

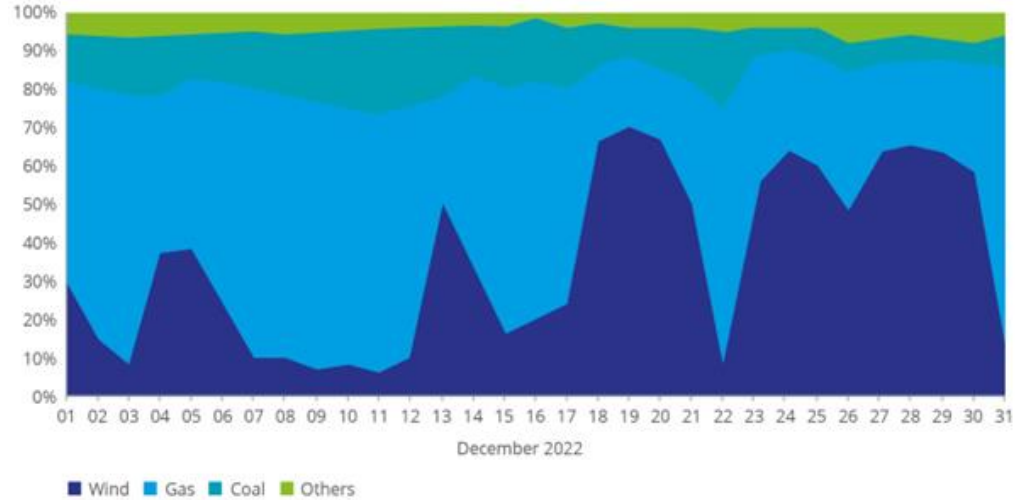
- **Solar: 5 GW by 2025, increasing to 8 GW by 2030**
- **Onshore wind: 6 GW by 2025, rising to 9 GW by 2030**
- **Offshore wind: At least 5 GW by 2030.**

The Climate Action Plan[9] notes that gas-fired generation is required during peak demand in days with low-RES generation:

- **New Flexible Gas Plant: At least 2GW by 2030**

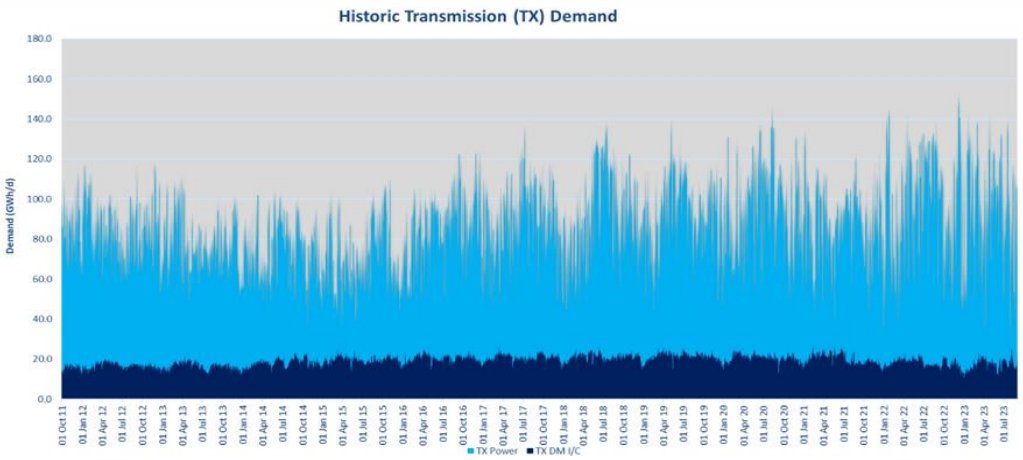
Gas generation acts as a backup to intermittent solar and wind generation and facilitates the targeted increase in RES capacity.

The graphs shown highlight the historical importance of gas power generation between 2010 and 2023 (as well as highlighting a particularly cold winter month in 2022 for context).



Source: GNI

Power Generation mix: December 2022



[25] GNI (2024), Gas Networks Ireland annual demand statement. Available here
[9] Government of Ireland (2023), Climate Action Plan 2024. Available here

1.3 Case for Change: Role of Gas in Ireland, Forecast Demand

GNI published a Gas Forecast Statement ("**GFS**") in 2022 which outlines projections for demand and supply over a ten-year period. In the GFS forecast, GNI estimated three distinct scenarios: Low, Best Estimate, and High.

Two sensitivities were carried out on the 'Best Estimate' scenario as follows:

1) Considering the Low Electricity Demand from EirGrid's Generation Capacity Statement with all other parameters unchanged for the Gas Network's Ireland Best Estimate scenario;
2) Examining the case where some electricity interconnectors are not available on the peak day, i.e. both Greenlink and Celtic interconnectors were considered unavailable for imports/exports in this sensitivity.

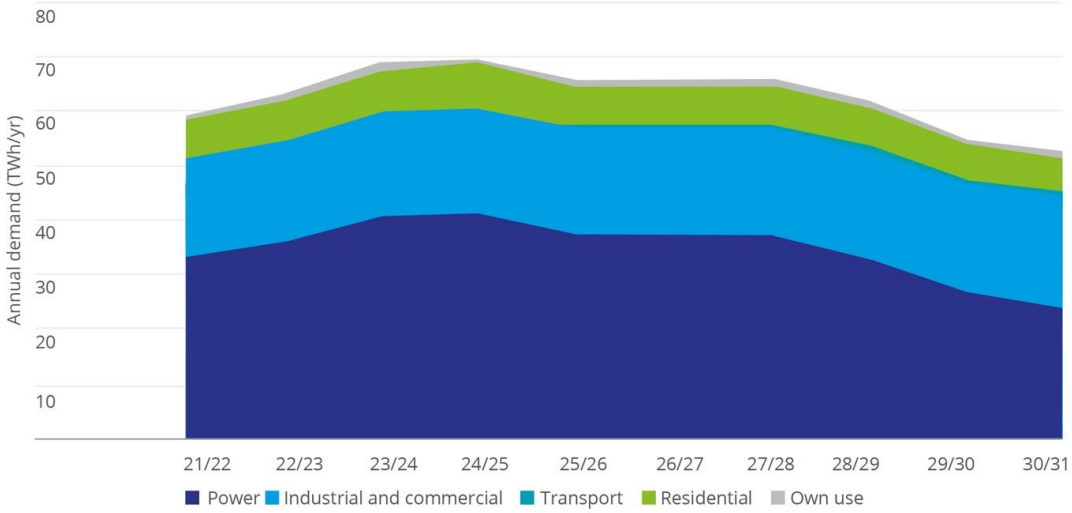
Sensitivity analysis results vs. best estimate (baseline)

Scenario	2021/22 -> 2030/31 % growth (ROI annual)	vs. baseline	2021/22 -> 2030/31 % growth (Gas Networks Ireland 1-in-50 peak day)	vs. baseline
Baseline: best estimate	-12%		+17%	
S1: best estimate + EirGrid low electricity demand	-16%	↓	+17%	—
S2: best estimate with limited interconnection	N/A		+27%	↑

Source: GNI (2022), Gas Forecast Statement

Forecast Gas Demand in ROI (Best Estimate Scenario)

Projections for demand and supply over a ten-year period, while annual demand is falling, peak demand is increasing in the near-term.



Source: GNI (2022), Gas Forecast Statement

1.3 Case for Change: Risks that could materialise

The high dependency on gas to meet the nation's energy demands coupled with demand and supply-side risks, means that Ireland's energy security is vulnerable and intervention is required.

The energy system is subject to demand-side shocks related to unexpectedly low wind and low temperatures occurring together and supply-side shocks are focused on a technical failure of the physical infrastructure from Great Britain and geopolitical disruption, listed below:

Technical disruption

Sabotage/Attack

GB Supply risk

Extent of impact of technical failure dependent on:

Different infrastructure outages

Different durations

- These shocks could result in Ireland not receiving flows, or having limited flows, through the interconnectors. Ultimately, the impact depends on the gas volume and supply route disrupted and the duration of the outage.
- The worst case for these scenarios involves physical sabotage of the subsea section of interconnector system 2 ("**IC2**"), which could take up to six months to repair. This is based on indicative timings from the recent outages on the Nord Stream and Balticconnector pipelines, together with taking account of GNI's emergency preparedness measures.

1.3 Case for Change: Infrastructure and Outages

The Interconnector System

The interconnector system is comprised of two compressor stations in Scotland at Beattock and Brighouse Bay and two subsea interconnectors between Ireland and Scotland; interconnector 1 ("**IC1**") and IC2.

The Irish gas system is connected to the National Gas system in GB at Moffat in Scotland. Subsequently, the gas is compressed at Beattock compressor station. Beattock is connected to Brighouse Bay through two pipelines. A second compressor station at Brighouse Bay compresses the imported gas into the two sub-sea Interconnectors. Gas arrives into Ireland at Loughshinny, County Dublin and Gormanstown, County Meath.

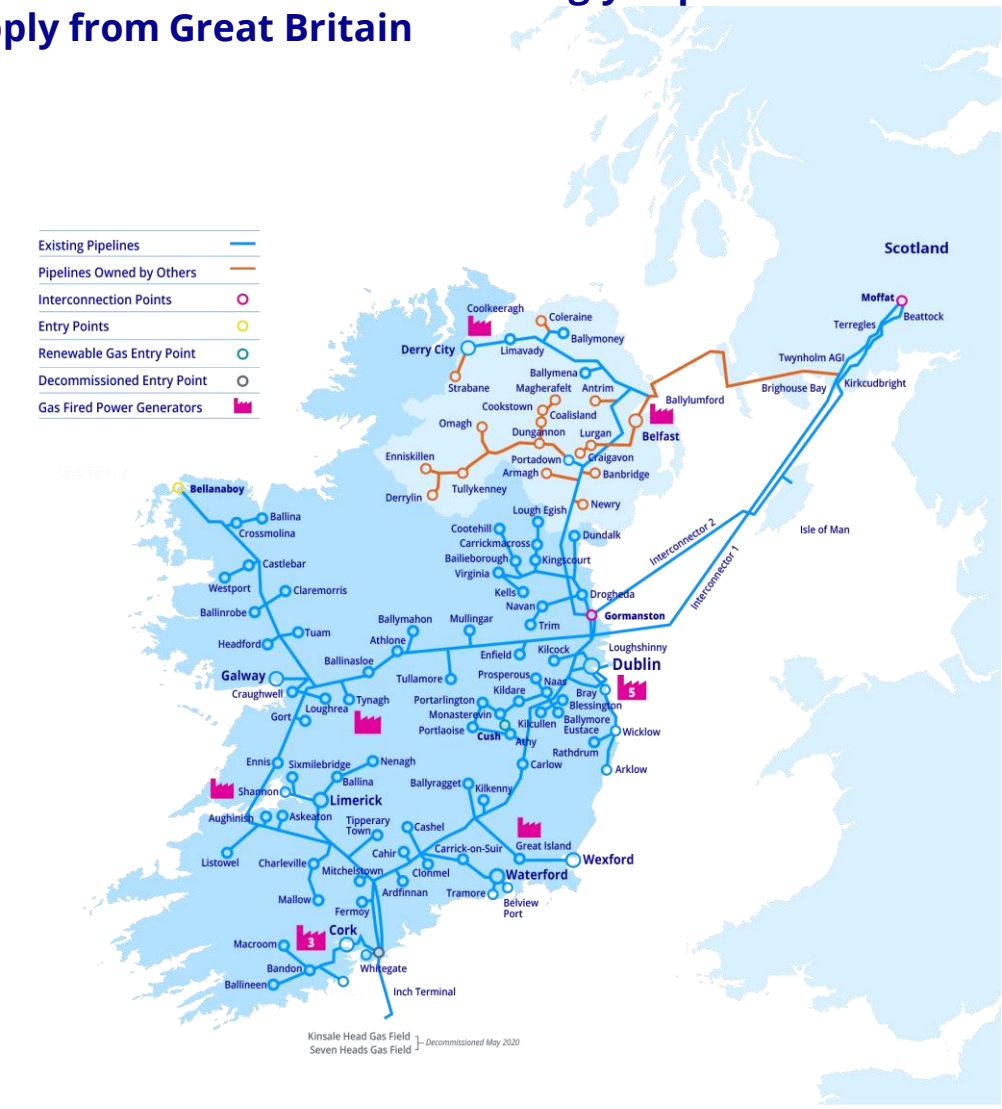
Gas is supplied to the Northern Ireland market from Moffat via the Scotland Northern Ireland Pipeline ("SNIP") which departs from IC1 at Twynholm in Scotland. The Isle of Man ("IOM") is supplied via a spur from IC2.

Infrastructure Outages

1. **N-1 Scenario: represents a disruption to IC2, further detailed in the analysis of the risks section.**

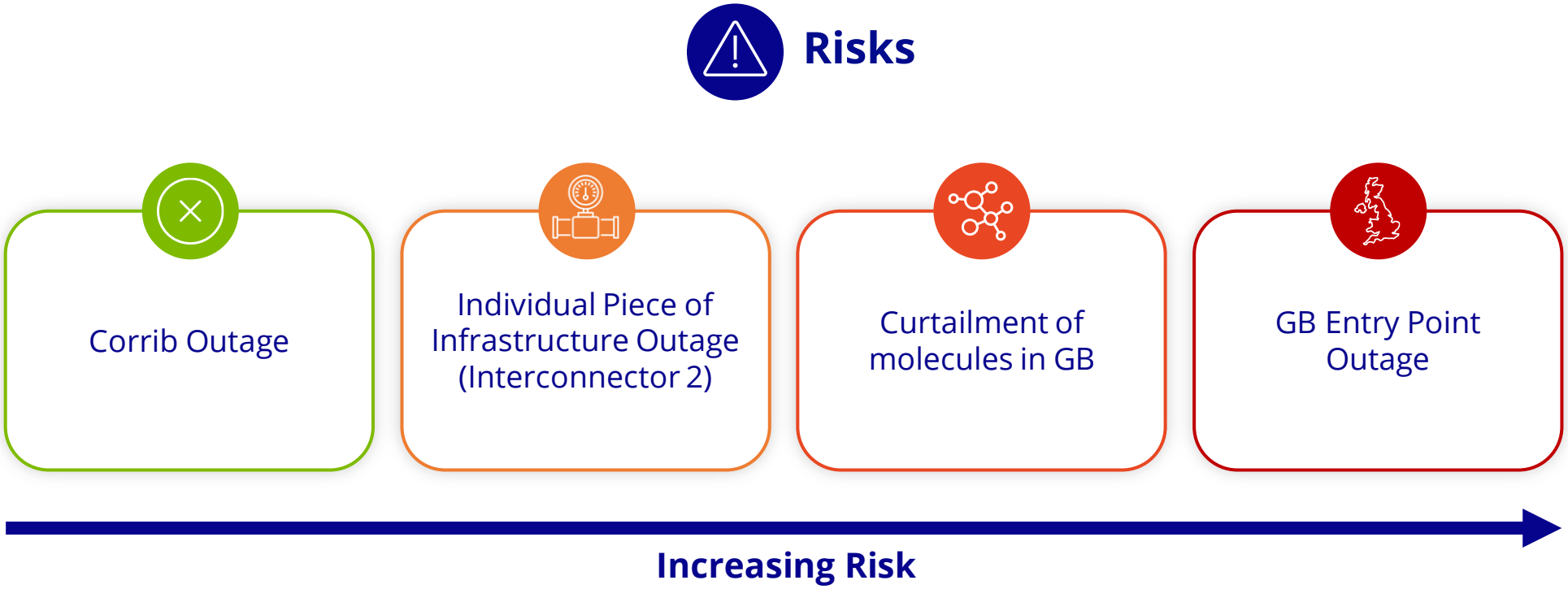
2. **Full GB Outage Scenario: represents a loss of both IC1 and IC2, further detailed in the analysis of the risks section.**

Ireland's Gas Network is increasingly dependent on supply from Great Britain



1.3 Case for Change: Gas Security of Supply Risk Profile

Historically, the ongoing safe and secure operation of the gas network would be considered the exclusive domain of the transmission system operator ("TSO"), however new risks are materialising whereby geo-political levers and sabotage have emerged as credible scenarios that must be considered.



1.3 Case for Change: Potential outage duration

Repair Time

A critical aspect in determining repair times is whether an 'Emergency Pipeline Repair System' ("**EPRS**") is in place prior to an incident taking place.

A robust EPRS ensures that GNI is ready to react to an incident, reducing the response/repair time and thus the duration of the gas outage.

Critical aspects of the EPRS include:

Access and Inspection;

Procedures that cover various repair scenarios;

Readily available materials and equipment;

Competent contractor to carry out repair work, including identification of a suitable installation vessel.

- GNI currently has an emergency pipeline repair contract in place for on-shore repairs and is in the process of implementing a full EPRS contract for subsea repairs, which is expected to be in place in 2025.
- IPC2016-64083, "Risk Based Strategy For The Development Of An Emergency Pipeline Repair System (EPRS)"[26] states that with a 'Full EPRS' in place, for pipelines greater than 20-inch diameter, the estimated 'Mean Time to Repair' is up to 6 months.

Outage Duration

- The outage duration is the amount of time required from the initial loss of containment to affect a repair that re-instates flow *(either N-1 or Full GB Outage, depending on the emergency scenario)*.
- As stated, in accordance with IPC2016-64083, the estimated 'Mean Time to Repair' is up to 6 months.
- Therefore, it is prudent to expect a period of 6 months for a subsea outage.

Recent Incident

- Balticconnector – Repair duration October 2023 to April 2024

Current Risk Resolution:

- In the event that an emergency scenario was to materialise before the Project is delivered, the TSO would affect a repair of the pipeline along with interim mitigation measures as set out in the National Gas Emergency Plan.

[26] ASME (2016), Risk Based Strategy for the Development of an Emergency Pipeline Repair System (EPRS). Available here

1.3 Case for Change: Current Landscape/Challenges

Reliance on GB entry point

Ireland has a dependence on the GB Entry Point, being the only gas source which can cater for 100% of ROI demand in all demand scenarios.

Peak demand growth

Although annual gas demand is expected to decline over the next ten years, peak demand is growing and cannot be met by existing infrastructure. This risk will impact by Winter 24/25.

No domestic gas storage

Ireland is one of five European countries with no domestic gas storage. Three of these States have developed LNG, whilst Luxembourg has multiple pipe supply routes thereby leaving Ireland as an outlier.

Increased risk profile

The risk profile in relation to security of physical infrastructure has increased. Risks that were once considered improbable are now possible and, in some cases, have already occurred (Nord Stream and Baltic Interconnector Pipelines).

Supply curtailment

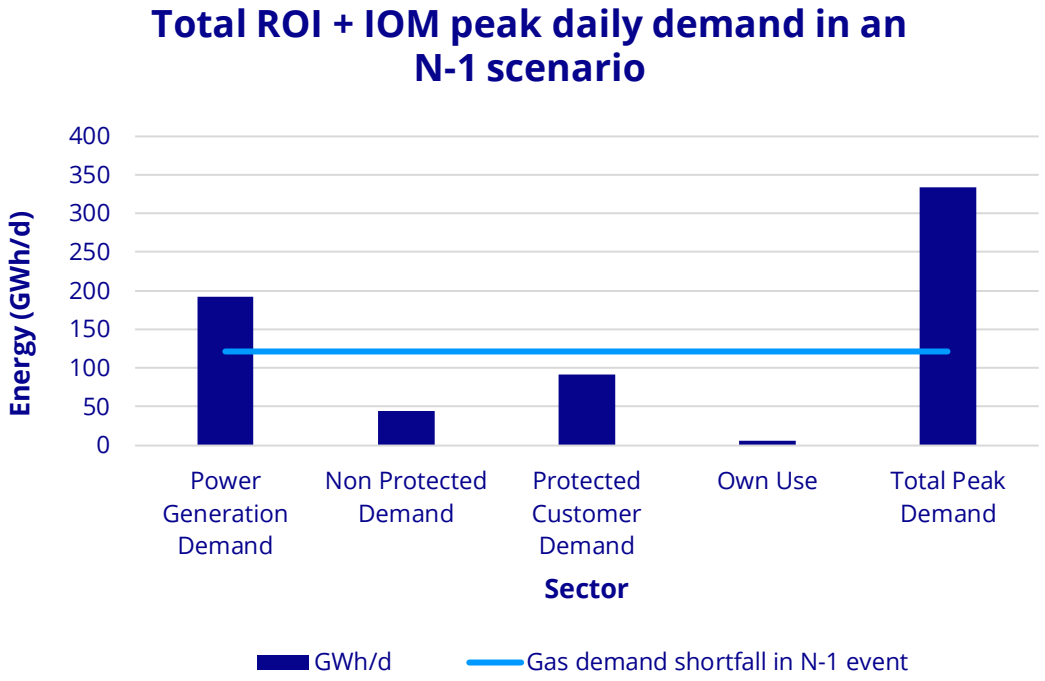
In the event of any curtailment of gas flows, Ireland will not have sufficient supply from indigenous sources to meet all customer demand, specifically power generation customers, resulting in possible blackouts across electricity networks. Per the CEPA report[20], this could have an economic impact on Ireland of €4.6bn over a 30-day period. The accompanying Economic Case to this document provides further analysis on likely the economic impact of outages in the coming years.

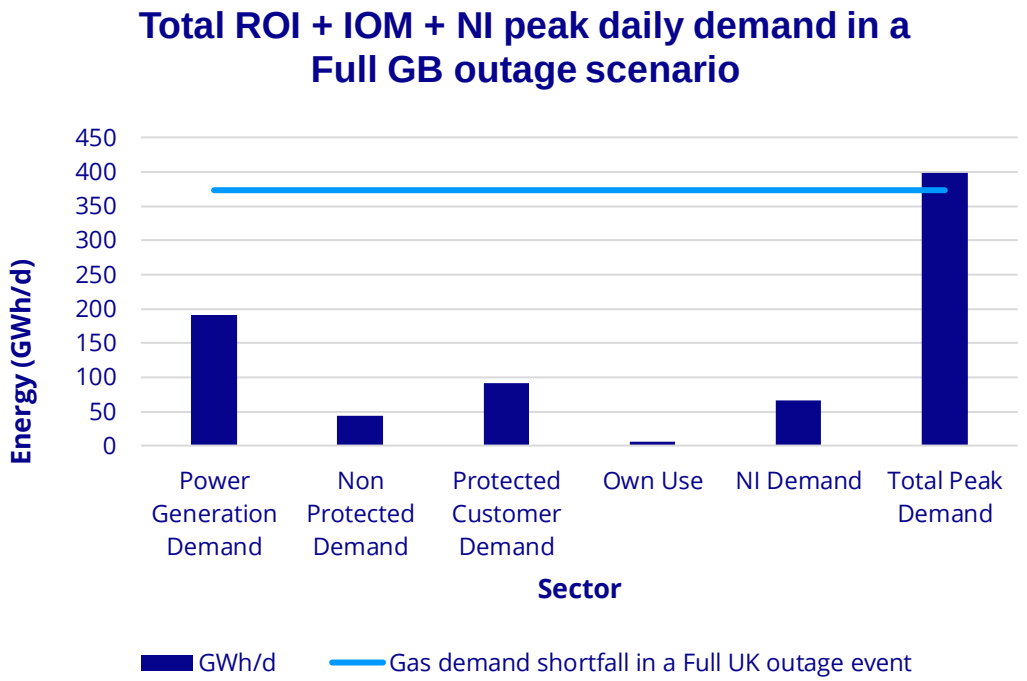
EU peer practice

Several EU Transmission System Operators (TSOs) have invested in floating storage and regassification units (FSRUs) to address short-term capacity shortfalls and / or onshore storage for long-term security of supply with a clear decarbonisation pathway.

1.3 Case for Change: Analysis of the Risks: Peak Demand Shortfall

As Ireland targets ever increasing penetration of renewable energy for the electricity sector, it is increasing the dependence of the energy system on the need for a back-up gas supply.





1.3 Case for Change: Analysis of the Risks: Gas Demand Shortfall (Total Volume)

The tables below show the volume of natural gas shortfall in the two outage scenarios and demonstrates the amount of Irish gas demand that could no longer be served in the event of an outage.

N-1 Scenario

	1-in-20 Peak (NRA 2022 24/'25)			
Gas Demand shortfall with IC2 unavailable (GWh)	10-Day	30-Day	3-mth	6-mth
ROI	[redacted]			
ROI + IOM				
ROI + IOM + NI (via South North)				

Source: GNI modelling based on the National Risk Assessment 2022 published by the CRU and referred to in the Gas Security of Supply Annual Report 2023. Available here

Full GB Outage

	1-in-20 Peak (NRA 2022 24/'25)			
Gas Demand shortfall with Full GB Outage (GWh)	10-Day	30-Day	3-mth	6-mth
ROI	[redacted]			
ROI + IOM				
ROI + IOM + NI (via South North)				

Source: GNI modelling based on the National Risk Assessment 2022 published by the CRU and referred to in the Gas Security of Supply Annual Report 2023. Available here

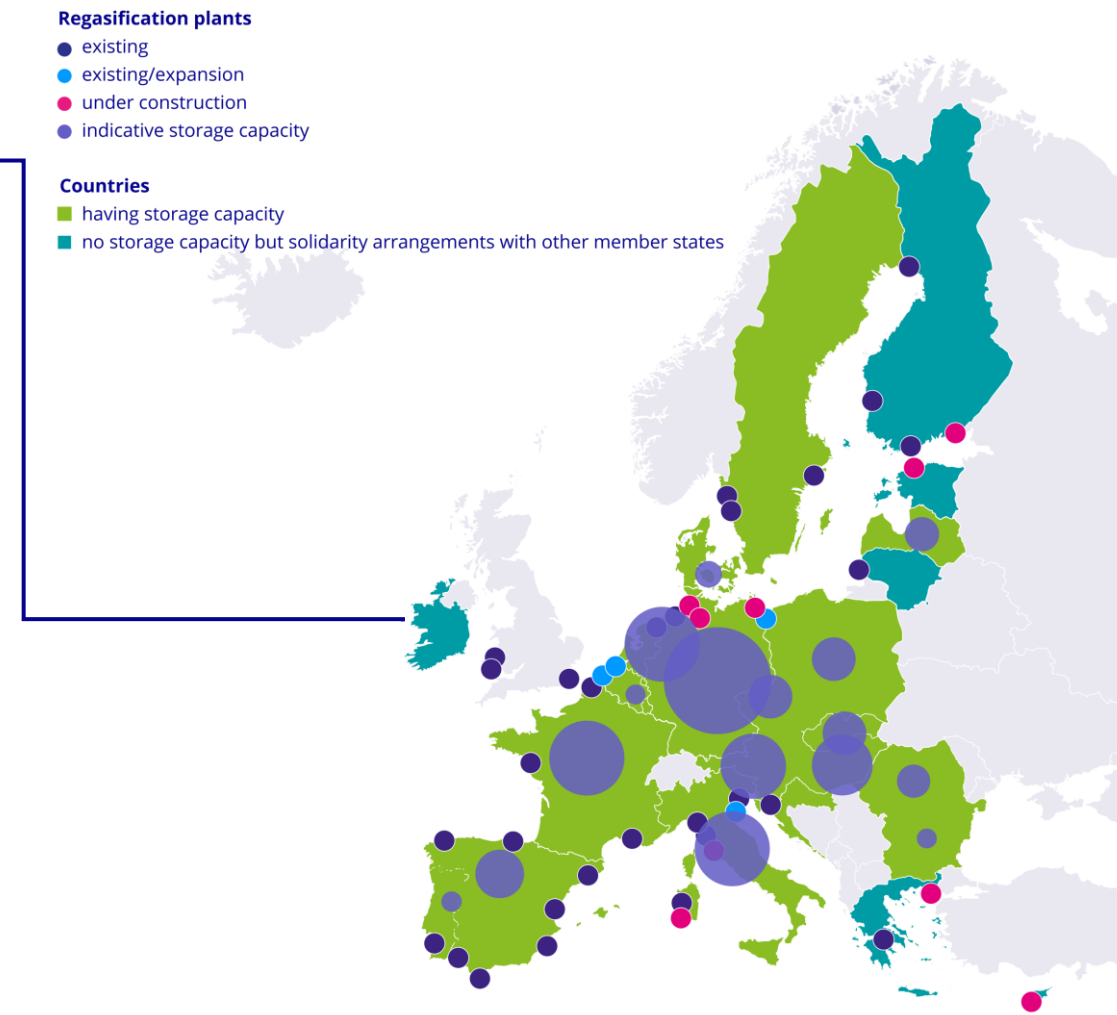
1.3 Case for Change: Other Member States

Ireland's absence of diversified gas supply and storage makes it an outlier within the EU.

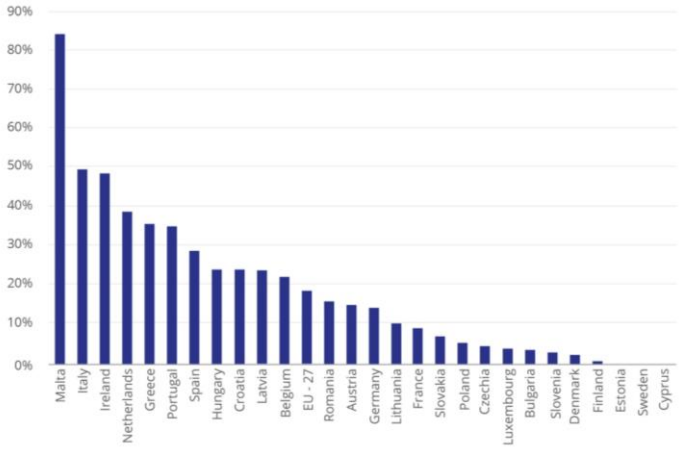
Neighbouring EU countries with similar gas and electricity dependencies have greater security of supply and gas storage, and LNG/FSRU facilities are common across the continent.

All but two of the FSRU terminals in the EU, and most onshore LNG terminals, are owned and/or operated by gas transmission system operators via legally separate LNG System Operator ("LSO") structures.

Ireland's gas security compared to Europe



Ireland's reliance on electricity generated with natural gas compared to Europe (2022)



Source: Eurostat (2024), Production of electricity and derived heat by type of fuel. Available here

1.3 Case for Change: Gas Security comparison of EU countries with similar dependency on gas for electricity generation

Ireland

FSRU	LNG Import Terminal	Geological Storage	Number of interconnector entry points	Gas Power Gen (% of net electricity generation)
✗	✗	✗	1	48%

Italy

FSRU	LNG Import Terminal	Geological Storage	Number of interconnector entry points	Gas Power Gen (% of net electricity generation)
✓	✓	✓	6	52%

Netherlands

FSRU	LNG Import Terminal	Geological Storage	Number of interconnector entry points	Gas Power Gen (% of net electricity generation)
✓	✓	✓	6	40%

Greece

FSRU	LNG Import Terminal	Number of interconnector entry points	Gas Power Gen (% of net electricity generation)
✓	✓	2	38%

Portugal

LNG Import Terminal	Geological Storage	Number of interconnector entry points	Gas Power Gen (% of net electricity generation)
✓	✓	2	34%

*See Appendix S1 for detailed summary of EU security of gas supply

Source: ENTSOG (2024), EU System Capacity Map - January 2024, Eurostat electricity datasets. Available here

1.3 Approaches of other EU TSOs

EU TSO Gas Security of Supply Activities				
TSO*	Country	Geological Storage	Onshore LNG Import Terminal	FSRU Import Terminal
REN	Portugal	✓	✓	-
RAG Energy Storage	Austria	✓	-	-
GASGRID	Finland	-	✓	✓
KN Energies	Lithuania	-	✓	✓
Multiple Storage operators	Germany	✓	-	-
gasunie crossing borders in energy	Germany	-	-	✓
	Netherlands	-	✓	✓
energystock fast cycle gas storage	Netherlands	✓	-	-
enagas	Germany	-	✓	-
	Spain	✓	✓	-
conexus BALTIC GRID	Latvia	✓	-	-
ENERGINET	Denmark	✓	-	-
GAZ system	Poland	✓	✓	✓
snam	Italy	✓	✓	✓
elengy	France	-	✓	-
storengy	France	✓	-	-
fluxys	France	-	✓	-
	Belgium	✓	✓	-
LNG Croatia	Croatia	-	✓	✓
PSP	Croatia	✓	-	-
DESFA	Greece	-	✓	✓

*TSO's or part of a group of companies that operate as a TSO

Source: ENTSOG EU System Capacity Map - January 2024, Eurostat electricity datasets (2024)

1.3 Case for Change: Ireland's Long-term Plan for the Gas Sector

While there is a short-term need to improve security of supply as a transitional measure, the Energy Security in Ireland to 2030[2] report provides an overview of Ireland's long-term plan for the gas sector, to ensure that measures taken in the transitional term should be compatible with future needs.

In the Energy Security review, four aims are identified for the long-term plan:

- **Decrease demand for natural gas, both average and peak**
- **Increase the production of renewable gas**
- **Develop long-term gas storage solutions capable of storing renewable gas, particularly hydrogen**
- **Ensure a fit-for-purpose gas grid that supports Ireland's energy and climate ambitions**

[2]DECC (November 2023), Energy Security in Ireland to 2030. Available here

1.3 Case for Change: Impact of "Do Nothing"

A loss of interconnection with no alternative supply could lead to damaging social and economic consequences, estimated by CEPA[20], on behalf of DECC, to be **€4.6 billion** for a 30-day loss of gas import from Great Britain. In the event of an outage to the largest piece of gas infrastructure, IC2, which GNI estimates would lead to a 6-month outage duration, the CRU has estimated that Ireland would be vulnerable to a gas supply deficit of up to **35% of peak gas demand** for the duration of the outage. This equates to **62% of total power generation in Ireland**.

- **Failing to comply with EU legislation**
- **Reputational damage**
- **Unserved demand**
- **Supply chain impacts**
- **Productivity hits to Irish businesses**
- **Realisation of the risks previously identified**
- **Impact of outages in homes of vulnerable populations**
- **Potential disruption to schools and hospitals**

[20] CEPA (2022), Technical Analysis of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems. Available here

1.4 Potential Scope of the Solution

1.4 Potential Scope of the Solution

DECC, in its Energy Security Review[2], identified a number of infrastructure and supply side risks to security of supply in Ireland

The **risks** identified include the following.

- Technical disruption of infrastructure
- Sabotage or attack on infrastructure
- GB supply risk
- Inability to meet increasing Peak Day Gas Demand during a winter spell
- Climate action delivery risk

The Energy Security Review identified a number of potential mitigation options for these risks

1. **A new gas discovery** would enhance the security of our gas supplies
2. **Underground gas storage** available in case of a supply shortfall is a well-established measure in Europe and globally
3. **Third interconnector to GB** if situated at a different location for both countries would de-risk the single point of failure risk associated with the two current gas interconnectors
4. **Permanent onshore LNG facility** can provide a short-term response (depending on level of gas in the storage tanks) in case of supply problems and, following the securing of additional LNG cargoes, an alternative flow of gas from a global market
5. **Offshore gas emergency reserve** (typically a Floating Storage, Regasification & Unloading vessel or 'FSRU') establishes a diversity of supply sources and provides insurance against the risks of infrastructure failure or the risk of a sabotage/attack on main gas infrastructure

[2]DECC (November 2023), Energy Security in Ireland to 2030. Available here

1.4 Potential Scope of the Solution

The Energy Security Review states that GNI should formulate a detailed proposal in accordance with criteria and guidelines stipulated by the Government

Department High-level Criteria:

- **Energy security**:
  Ensure future energy demand is reliably met and able to rapidly recover from system disruption. At a minimum, the proposal must satisfy Ireland complying with EU N-1 infrastructure standard based on 2030 gas demand projections
- **Implementation**:
  A proposal which can be implemented quickly
- **Affordability**:
  The impact on energy prices and operating costs minimised to ensure access to affordable energy for domestic and commercial use remains
- **Sustainability**:
  At a minimum, align with the Climate Action and Low Carbon Development (Amendment) Act 2021 – avoid inadvertently increasing gas demand by expanding the available supply on the market

There are generally two ways in which Ireland's security-of-supply concern could be addressed

- **Diversify gas supply to Ireland:**
  By building additional gas interconnectors, exploring for new gas fields, or having LNG terminals which can receive LNG gas (including Floating Storage Regasification Unit vessel "FSRU")
- **Gas storage:**
  Including underground gas storage (for example in salt caverns) or LNG storage tanks / FSRU

1.4 Potential Scope of the Solution: Vision & Strategic Objectives

Based on the Government's requirements, GNI has defined the Strategic Gas Emergency Reserve project's Vision:

Safeguarding our energy system today to enable our energy transition tomorrow

GNI has defined five strategic objectives

1. Deliver a solution as early as possible that will:
   - Satisfy Ireland's compliance with the EU N-1 infrastructure standard
   - Enable rapid recovery from a system disruption
   - Provide sufficient resilience of gas supply to ensure future (2030) energy gas demand is reliably met
2. Achieve a cost-effective, affordable solution that optimises EU grant funding and cost recovery options
3. Design permanent or onshore enabling infrastructure in a manner that maximises potential future renewable gas uses to the extent possible, balancing cost and other efficiencies such as time to deployment
4. Achieve a solution that is, in so far as practicable, consistent with the Climate Action and Low Carbon Development Act 2015–2021[8]
5. Meet or exceed industry best practice in relation to safety and the environment

Outputs developed from the project's strategic objectives can be found on the next slide.

[8] Government of Ireland (2015), Climate Action and Low Carbon Development Act 2015. Available here

1.4 Potential Scope of the Solution

Strategic Objective	Outputs
Deliver a solution to satisfy compliance with EU N-1 infrastructure standard as early as possible.	1. 2. 3. 4. ext
Achieve a cost-effective, affordable solution that optimises EU grant funding and cost recovery options.	5. 6. 7. 8.
Design infrastructure to maximise future repurposing to renewable gas use to the extent possible. **Achieve a solution that is consistent with the Climate Action and Low Carbon Development Act 2015-2021[27].** **Meet or exceed industry requirements in relation to safety and the environment.**	9. oth 10. (A 11. 12. tec av

1.5 Main Benefits and Risks

1.5 Main Benefits and Risks: Goals and Benefits Summary

Improve security of gas supply

Facilitate an expansion of renewable energy

Facilitate the switch to renewable gas in the future

Economic

- Avoids the economic consequences of failing to meet gas demand in the event of a shortage.
- Avoids or reduces the costs of alternative strategies for improving security of supply.
- Protects the reputation of Ireland as an energy-secure economy.
- Reduces the need to reinforce entry point capacity in the future.

Social

- Avoids social cost of failing to meet gas demand.
- Provides local employment opportunities.
- As well as providing employment, the solution implemented could help develop skills required for the energy transition and other infrastructure projects.

Environmental

- Reduce emissions from use of secondary fuels in electricity generation during an outage.
- Supports the delivery of renewable electricity through a secure back-up gas supply.
- Supports future potential conversion of an existing gas interconnector to hydrogen.
- Provides hydrogen-enabled permanent infrastructure that supports transition to renewable gases.

Regulatory

- Allows Ireland meet the legal requirement set out in Regulation (EU) 2017/1938. Ireland is currently operating outside the legal requirement set by the EU.

1.5 Main Benefits and Risks: Strategic Risks

The over-arching risk is that a gas supply emergency materialises before the Project is delivered.

Economic

[redacted]

Social

[redacted]

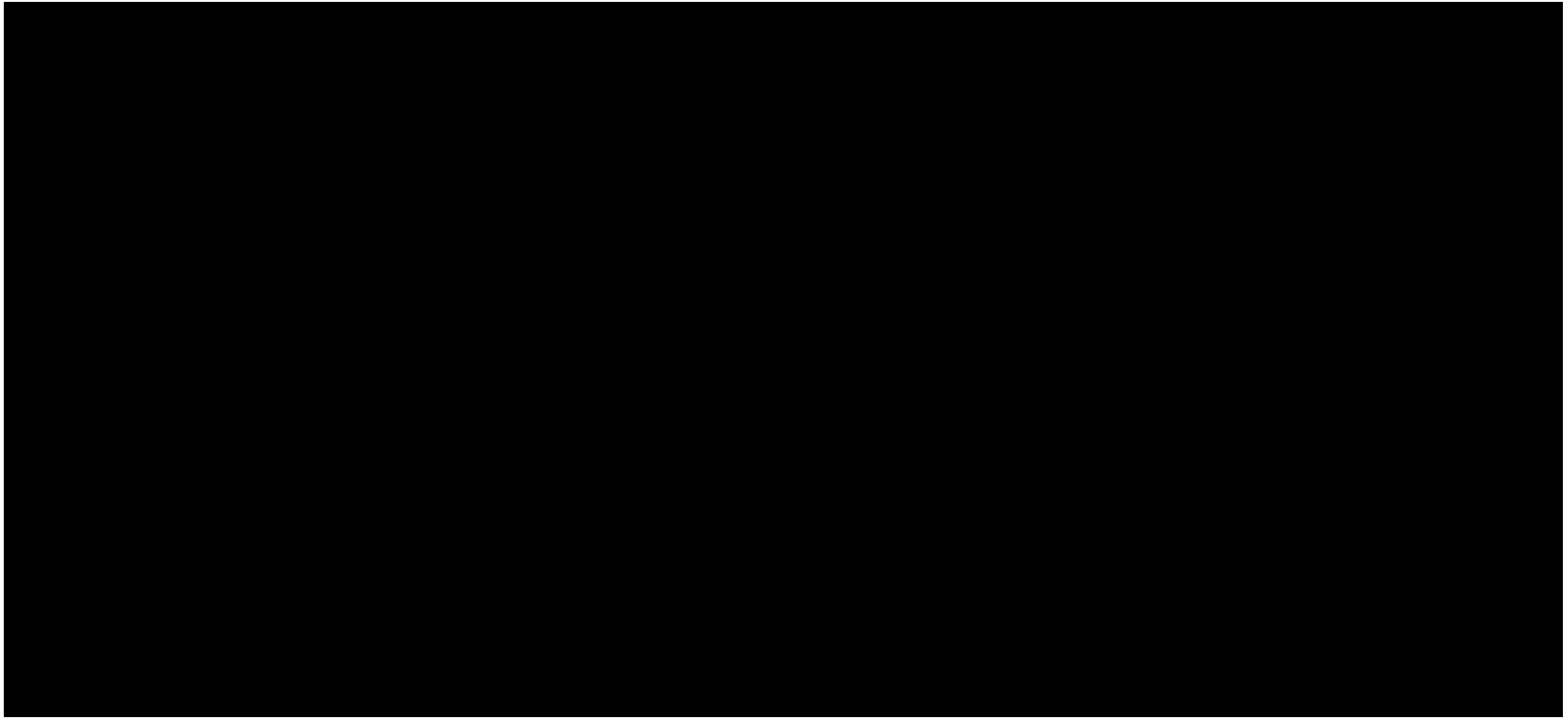
Environmental

[redacted]

Regulatory

[redacted]

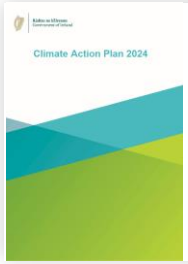
1.5 Main Benefits and Risks: Key Delivery Risks



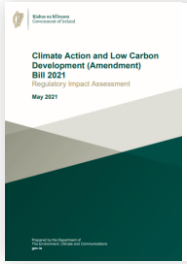
1.6 Conclusion

1.6 Conclusion: Strategic Alignment

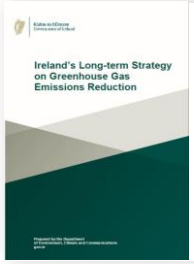
The Strategic Gas Emergency Reserve Project is fully aligned with existing policy objectives. It is closely aligned with key government policies and objectives, across Ireland and the EU.



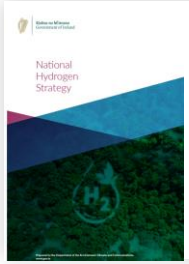
Climate Action Plan 2024[9]



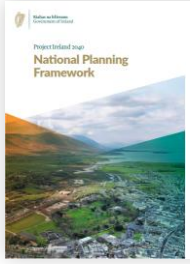
Climate Action and Low Carbon Development (Amendment) Act 2021[8]



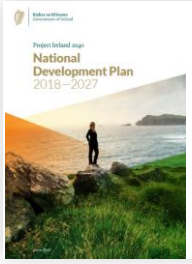
Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2023[10]



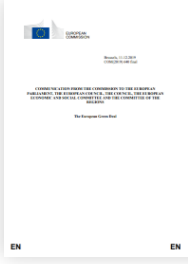
National Hydrogen Strategy 2023[11]



Project Ireland 2040 National Planning Framework[12]



The National Development Plan 2018 – 2027[13]



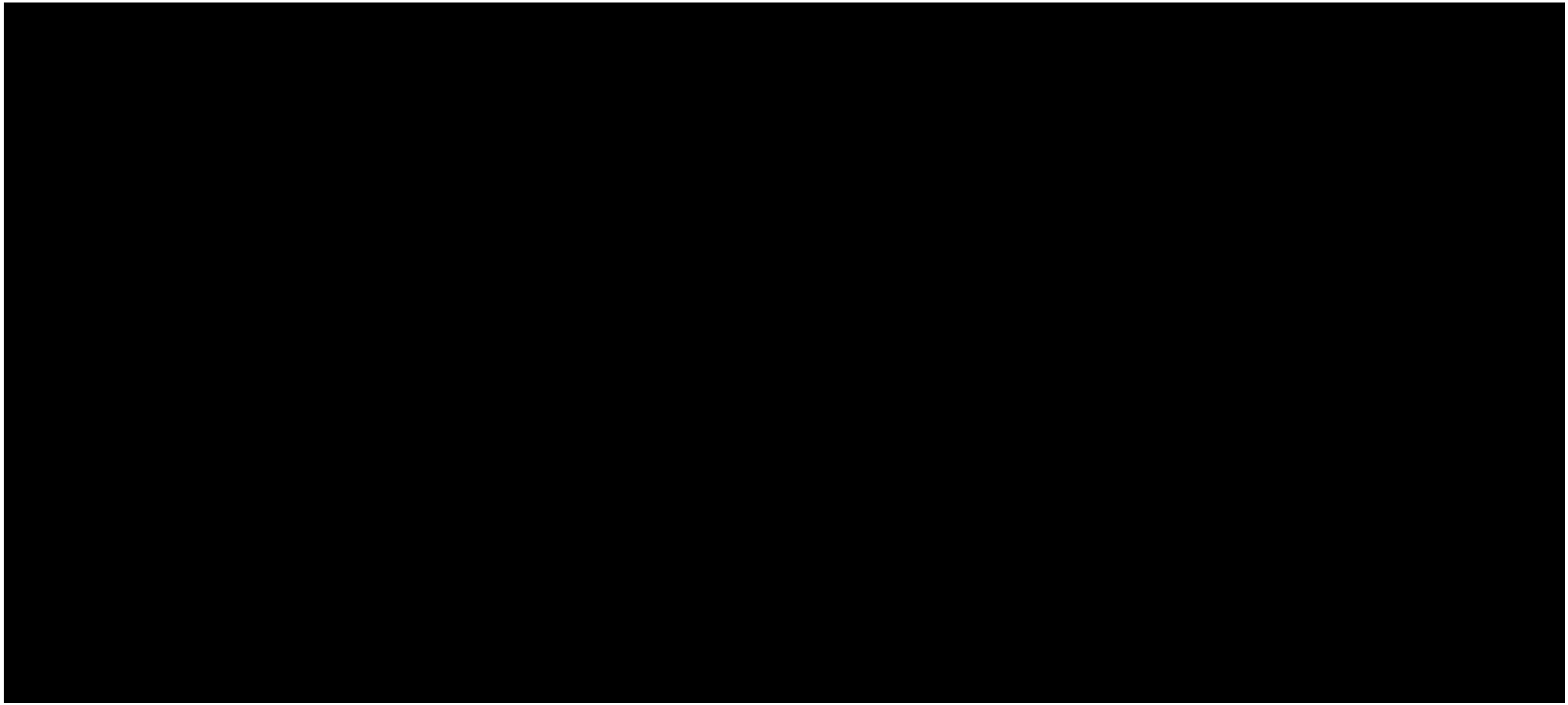
The European Green Deal[3]

European Climate Law[27]

Fit for 55 Package[5]

[3]European Commission (2019) Green Deal. Striving to be the first climate-neutral continent. Available here
[5]Fit for 55: Delivering on the proposals - European Commission. Available here
[8]Government of Ireland (2021), Climate Action and Low Carbon Development (Amendment) Act 2021. Available here
[9]Government of Ireland (2023), Climate Action Plan 2024. Available here
[10]Department of the Environment, Climate and Communications (2023), Long-term Strategy on Greenhouse Gas Emissions Reductions. Available here
[11]Department of the Environment, Climate and Communications (2021), National Hydrogen Strategy. Available here
[12]Government of Ireland (n.d.), National Planning Framework - Project 2040. Available here
[13]Government of Ireland (2018),National Development Plan 2021-2030 . Available here
[27]European Commission (n.d.), National Planning Framework - Project 2040. Available here

1.6 Conclusion: Strategic Alignment, Bridge to Action 14



1.6 Conclusion: Infrastructure Guidelines Logic Path

Situation

- Risk to Ireland's security of gas supply
- Ireland is not compliant with EU N-1 Infrastructure standard
- Ireland has ambitious RES deployment targets
- NI is dependent on the North-South interconnector in case of a disruption to the Scotland-NI interconnector
- There are existing constraints in compressor capacity at the Moffat entry point

Input and Activities

- GNI is collaborating with other authorities to advance the planning of the Strategic Gas Emergency Reserve, with special consideration given to scalability, minimising costs, affordability, safety and the energy transition

Outputs

- Strategic Gas Emergency Reserve Project commissioned
- Meets the ALARP principles
- Agreement on an appropriate and sustainable revenue recovery model

Outcomes

- Future energy demands is reliably met and able to rapidly recover from system disruption
- Ireland is compliant with the EU N-1 infrastructure standard and can potentially mitigate bigger outages
- Project delivers storage capacity (and resupply where necessary)
- Cost-effective, affordable solution that optimises EU grant funding and cost recovery options
- Local employment and skills development
- Avoids use of more-polluting secondary fuels in electricity generation during an outage

Impacts

- Avoids the economic consequences of failing to meet gas demand in the event of a shortage
- Protects the reputation of Ireland as an energy-secure economy
- Avoids or reduces the costs of alternative strategies for improving security of supply
- Reduces the need to reinforce the Moffat entry point
- Avoids the social costs of failing to meet gas demand
- Support the delivery of renewable electricity generation through a secure back-up gas supply
- Enables potential conversion of an existing interconnector to hydrogen in the future
- Potentially provides renewable-gas-compatible infrastructure that supports this transition

Risks:

1.6 Conclusion

Gas plays a central role in Ireland's energy now and into the future: it facilitates the expansion of RES electricity generation targeted in the Climate Action Plan.

Ireland is an outlier for diversification of gas sources and storage, lacking both gas storage facilities and LNG terminals. This is particularly acute when compared to EU peers who have a similar reliance on gas for electricity generation.

Therefore, Irish security of energy supply is vulnerable, and the required intervention makes the **Case for Change**.

There are two ways in which the security-of-supply concern can be addressed:

Diversify gas supply to Ireland:
e.g. by building additional gas interconnectors or having LNG terminals which can receive LNG gas

Gas storage:
including underground gas storage (for example in salt caverns)

These options are explored in the Economic Case.

Main Benefits:

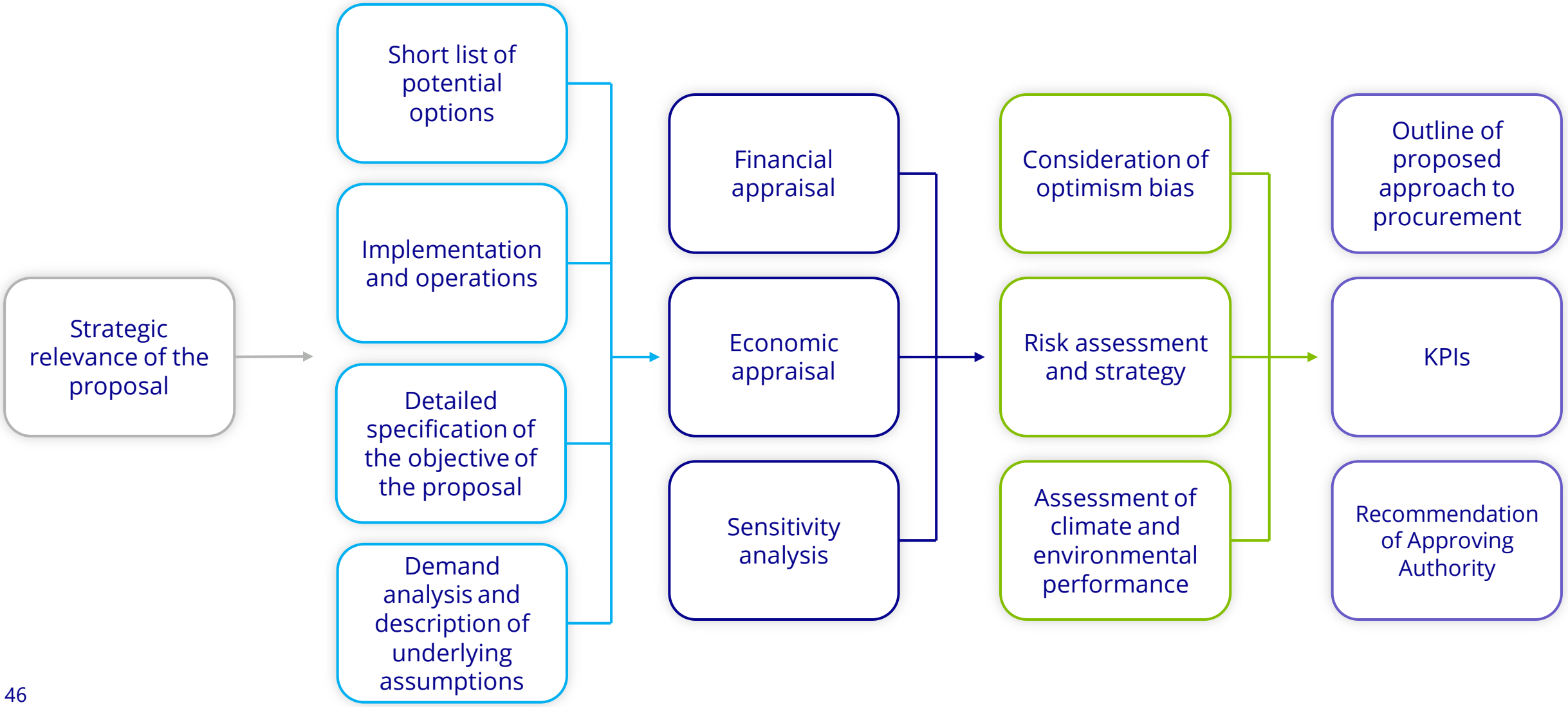
Economic & Social:
Avoids the economic consequences to Irish consumers and social cost of failing to meet gas demand in the event of a shortage

Environmental:
Supports renewable electricity through a back-up gas supply and provides hydrogen-enabled permanent infrastructure that supports transition to renewable gases

Regulatory:
Avoids Infringement Notice and/or fines from European Commission

Appendix S1

Appendix S1: The Detailed Proposal/Preliminary Business Case covers the following:-



Appendix S1: EU security of gas supply overview

EU Technology Overview						
Country	FSRU	LNG Import Terminal	Geological Storage	Number of interconnector entry points	Gas Power Gen Capacity (MW)	Gas Power Gen (% of net electricity generation)
Ireland	×	×	×	1	4,265	48%
Portugal	×	✓	✓	2	4,585	34%
Austria	×	×	✓	5	4,204	16%
Finland	✓	✓	×	2	1,780	2%
Estonia	×	×	×	4	110	0%
Lithuania	✓	✓	×	3	1,518	15%
Latvia	×	×	✓	2	1,157	24%
Denmark	×	×	✓	3	1,568	3%
Poland	✓	✓	✓	3	3,789	7%
Italy	✓	✓	✓	6	44,210	52%
France	×	✓	✓	4	12,890	11%
Germany	✓	✓	✓	9	31,800	14%
Belgium	×	✓	✓	5	6,915	24%
Netherlands	✓	✓	✓	6	18,350	40%
Croatia	✓	✓	✓	0	760	24%
Greece	✓	✓	×	2	6,030	38%
Spain	×	✓	✓	3	29,900	29%

Source: ENTSOG EU System Capacity Map - January 2024, eurostat electricity datasets (2024)

Appendix S2
Miscellaneous

Appendix S2: References

1. EU (2017), Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of supply and repealing Regulation (EU) No 994/2010. Available here
2. DECC (November 2023), Energy Security in Ireland to 2030. Available here
3. European Commission (2019) Green Deal. Striving to be the first climate-neutral continent. Available here
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5. Fit for 55: Delivering on the proposals - European Commission. Available here
6. EU (May 2022), 'REPowerEU'. Affordable, secure and sustainable energy for Europe. Available here
7. EU (September 2023), Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast) ('RED II'). Available here
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15. EU (2010), Regulation No 994/2010 of the European Parliament and if the Council concerning measures to safeguard security of supply and repealing Council Directive 2004/67/EC. Available here

Appendix S2: References

16. EU (2017), Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of supply and repealing Regulation (EU) No 994/2010. Available here
17. DECC (2021), Policy Statement on Security of Electricity Supply. Available here
18. EU (2022), Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage. Available here
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22. CRU (2023), Consultation Paper on Transmission Development Plan 2023-2032. Available here
23. CRU (2023), Consultation Paper on Transmission Development Plan 2023-2032. Available here
24. SEAI (2023), Energy in Ireland. Available here
25. GNI (2024), Gas Networks Ireland annual demand statement. Available here
26. ASME (2016), Risk Based Strategy for the Development of an Emergency Pipeline Repair System (EPRS). Available here

Appendix S2: Project Acronyms (1/2)

Acronym	Description
ABP	An Bord Pleanála
ACER	Agency for the Cooperation of Energy Regulators
AGI	Above Ground Installation
ALARP	As Low As Reasonably Practicable
AMP	Asset Management Plan
ARC	Audit & Risk Committee
BAT	Best Available Techniques
BAU	Business as Usual
BIM	Building Information Management
BIMCO	Baltic and International Maritime Council
BOG	Boil Off Gas
CAP	Climate Action Plan
CAPEX	Capital Expenditure
CBA	Cost Benefit Analysis / Assessment
CBCA	Criteria Based Content Analysis
CEPA	Cambridge Economic Policy Associates
CLO	Community Liaison Officer
CoDG	Cost of Disruption of Gas
COMAH	Control of Major Accident Hazards
CPO	Compulsory Purchase Order
CRU	Commission for Regulation of Utilities
CSF	Critical Success Factors
CSO	Central Statistics Office
D&A	Depreciation & Amortisation
DAERA	Department of Agriculture, Environment and Rural Affairs
DB+OM	Design Build + Operate Maintain

Acronym	Description
DECC	Department of the Environment, Climate and Communications
DG COMP	Directorate General for Competition
DHLGH	Department of Housing, Local Government and Heritage
DofE	Department of Energy (Northern Ireland)
DofF	Department of Finance (Northern Ireland)
DPENDR	Department of Public Expenditure, NDP Delivery and Reform
DPER	Department of Public Expenditure and Reform
EAC	Expenditure Approvals Committee
EC	European Commission
EGIG	European Gas Pipeline Incident Group
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EP	Equator Principles
EPA	Environmental Protection Agency
EPC	Engineer Procure Construct
EPO	Emerging Preferred Option
EPRS	Emergency Pipeline Repair System
ESBN	ESB Networks
ESG	Environmental Social and Governance
ESG	Energy Security Group
ESP	Engineering Services Provider
FBC	Final Business Case
FEED	Front End Engineering Design
FFO	Funds From Operations
FID	Final Investment Decision

Acronym	Description
FIDIC	International Federation of Consulting Engineers
FSRU	Floating Storage and Regasification Unit
FTE	Full Time Equivalent
GB	Great Britain
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HSA	Health and Safety Authority
HVO	Hydrogenated Vegetable Oil
IAAP	Integrated Assurance and Approvals Plan
IBP	Integrated Business Planning
IC	Interconnector
IChemE	Institution of Chemical Engineers
IEA	International Energy Agency
IED	Industrial Emissions Directive
IoM	Isle of Man
IPA	Infrastructure and Projects Authority (UK)
ISO	International Organisation for Standardisation
KPI	Key Performance Indicator
LNG	Liquefied Natural Gas
LNGC	Liquefied Natural Gas Carrier
LSO	LNG System Operator
MAC	Maritime Area Consent
MARA	Maritime Area Regulatory Authority
MSCM	Millions of Standard Cubic Metres
MSm	Mega Standard Cubic Metres

Appendix S2: Project Acronyms (2/2)

Acronym	Description
NDP	National Development Plan
NEC4	New Engineering Contract 4
NGEM	Natural Gas Emergency Manager
NGEP	National Gas Emergency Plan
NI	Northern Ireland
NPF	National Planning Framework
NPV	Net Present Value
NPWS	National Parks and Wildlife Service
NSO	National Strategic Objective
O&M	Operation & Maintenance
OJEU	The Official Journal of the European Union
OOM	Order Of Magnitude
OPEX	Operating Expenditure
PDA	Planning and Development Act 2000 (as amended)
PID	Piping Instrumentation Diagram
PLT	Project Leadership Team
PMO	Project Management Office
PP JV	Public-Private Joint Venture
PPP	Public-Private Partnership
PRAM	Project Risk Analysis and Management
PSO	Public Service Obligation
QA	Quality Assurance
QRA	Quantitative Risk Assessment
QSRA	Quantitative Schedule Risk Analysis
RAB	Regulated Asset Base
RACI	Responsible Accountable Consulted Informed
RAG	Red, Amber, Green
RCF	Reference Class Forecasting
RED	Renewable Energy Directive (EU) 2023/2413
RES	Renewable Energy Source
ROI	Republic of Ireland
RPE	Real Price Effect
RTP	Route to Procurement
S&P	Standard & Poor's
SBC	Strategic Business Case
SCRT	SCR + CRT (Selective Catalytic Reduction + Continuous Regenerating Technology)
SDG	Sustainable Development Goal
SEM	Single Electricity Market
SGER	Strategic Gas Emergency Reserve
SGERP	Strategic Gas Emergency Reserve Project
SGR	Sustainable Growth Rate
SID	Strategic Infrastructure Development
SME	Small and Medium-sized Enterprises
SNIP	Scotland-Northern Ireland Pipeline
SNP	South North Pipeline
SoLR	Supplier of Last Resort
SoS	Security of Supply
SRO	Senior Responsible Owner
SWOT	Strengths, Weaknesses, Opportunities, Threats
TBC	To Be Completed
TEG	Temporary Emergency Generation (Act)
TOC	Table of Contents
TPA	Third Party Access
TPER	Total Primary Energy Requirement
TSO	Transmission System Operator
UGS	Underground Gas Storage
VfM	Value for Money
VoLL	Value of Lost Load
WACC	Weighted Average Cost of Capital