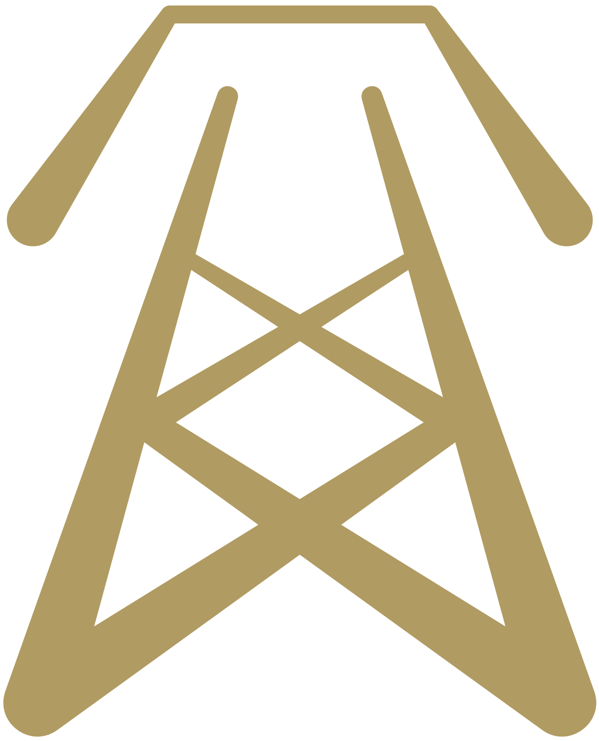
All-Island Ten-Year Transmission Forecast Statement 2024



EirGrid SONI

eirgrid.com soni.ltd.uk

Disclaimer

EirGrid PLC and SONI Limited have followed accepted practice in the collection and analysis of data available. While all reasonable care has been taken in the preparation of this statement, EirGrid and SONI are not responsible for any loss that may be attributed to the use of this information. Prior to taking business decisions, interested parties are advised to seek separate and independent opinion in relation to the matters covered by this statement and should not rely solely upon data and information contained herein. Information in this document does not amount to a recommendation in respect of any possible investment. This document does not purport to contain all the information that a prospective investor or participant in the wholesale electricity market may need. Furthermore, all interested parties are strongly advised to channel any enquiries through EirGrid and SONI.

This document incorporates the Transmission System Capacity Statement for Northern Ireland and the Transmission Forecast Statement for Ireland.

For queries relating to this document or to request a copy contact info@soni.ltd.uk or info@eirgrid.com.

SONI

12 Manse Rd, Belfast, BT6 9RT, Northern Ireland

EirGrid

The Oval, 160 Shelbourne Road, Ballsbridge, Dublin 4, Ireland

Document Structure

This document contains an Abbreviations and Terms section, an Executive Summary, eight main sections and eight appendices. The structure of the document is as follows:

Abbreviations and Terms provides a list of abbreviations and terms used in the document.

The Executive Summary gives an overview of the main highlights of the document.

Chapter 1: Introduction: presents the purpose and context of the All-Island Transmission Forecast Statement. Our statutory and legal obligations are also introduced.

Chapter 2: The Electricity Transmission System: describes the existing all-island transmission system. A brief outline of transmission system development plans for both Ireland and Northern Ireland is also given.

Chapter 3: Demand: describes the demand forecast assumptions over the study period of 2024 – 2033.

Chapter 4: Generation: describes the projected generation connection assumptions over the study period of 2024 – 2033.

Chapter 5: Transmission System Performance: provides information on power flow and short circuit study results.

Chapter 6: Overview of Transmission System Capability Analysis: outlines the analysis methods used to carry out the demand and generation opportunities' analyses.

Chapter 7: Transmission System Capability for New Generation: describes the opportunities for connection of new generation on the all-island transmission system.

Chapter 8: Transmission System Capability for New Demand: describes the opportunities for connection of new demand on the all-island transmission system.

Appendix A: Maps and Schematic Diagrams

Appendix B: Transmission System Characteristics

Appendix C: Demand Forecasts at Individual Transmission Interface Stations

Appendix D: Generation Capacity and Dispatch Details

Appendix E: Short Circuit Currents

Appendix F: Approaches to Consultation for Developing the Grid

Appendix G: References

Appendix H: Power Flow Tables

Abbreviations and Terms

1.1 Abbreviations

AC	Alternating Current
ACS	Average Cold Spell
BETTA	The British Electricity Trading and Transmission Arrangements
BSP	Bulk Supply Point
CCGT	Combined Cycle Gas Turbine
CHP	Combined Heat and Power
CRU	Commission for the Regulation of Utilities
DC	Direct Current / Double Circuit
DfE	Department for the Economy
DSO	Distribution System Operator
ESB	Electricity Supply Board
EU	European Union
GCS	Generation Capacity Statement
GIS	Gas Insulated Switchgear
HVDC	High Voltage Direct Current
IA	Interconnector Administrator
IRL	Ireland
ITC	Incremental Transfer Capability
kV	Kilo Volts
LFG	Land Fill Gas
MIL	Moyle Interconnector Limited
MEC	Maximum Export Capacity
MIC	Maximum Import Capacity
MVA	Megavolt-Amperes
MW	Megawatt
NI	Northern Ireland
NTC	Net Transfer Capacity
PU	Per Unit
PST	Phase Shifting Transformer
RES	Renewable Energy Schemes
RIDP	Renewable Integration Development Project
RMS	Root Mean Square
SEM	Single Electricity Market
SONI	System Operator for Northern Ireland
SOEF	Shaping Our Electricity Future
SVC	Static Var Compensator
SP	Summer Peak
SS	Substation
SV	Summer Valley
TDP IE	Transmission Development Plan Ireland
TDPNI	Transmission Development Plan Northern Ireland
TYTFS	Ten Year Transmission Forecast Statement
TSO	Transmission System Operator
TX	Transformer
WP	Winter Peak

1.2 Terms

Active Power
The product of voltage and the in-phase component of alternating current measured in Megawatts (MW). When compounded with the flow of 'reactive power', measured in Megavolt-Amperes Reactive (Mvar), the resultant is measured in Megavolt-Amperes (MVA).

Autumn Peak
This is the maximum Northern Ireland demand in the period September to October inclusive.

Bulk Supply Point
A point at which the transmission system is connected to the distribution system.

Busbar
The common connection point of two or more circuits.

Capacitor
An item of plant normally utilised on the electrical network to supply reactive power to loads (generally locally) and thereby supporting the local area voltage.

Circuit
An element of the transmission system that carries electrical power.

Combined Cycle Gas Turbine
A collection of gas turbines and steam units; waste heat from the gas turbine(s) is passed through a heat recovery boiler to generate steam for the steam turbine(s).

Combined Heat and Power
A plant designed to produce both heat and electrical power from a single heat source.

Constraint
A transfer limit imposed by finite network capacity.

Contingency
The unexpected failure or outage of a system component, such as a generation unit, transmission line, transformer or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages.

Commission for Regulation of Utilities
The Commission for Regulation of Utilities (CRU) is the regulator for the electricity, natural gas and public water sectors in Ireland.

Data Freeze Date
The dates on which the Transmission Forecast Statement data was effectively "frozen" for both EirGrid and SONI. Changes to transmission system characteristics made after these dates do not feature in the analyses carried out for this Transmission Forecast Statement.

Deep Reinforcement
Refers to transmission system reinforcement additional to the shallow connection that is required to allow a new generator or demand to operate at maximum capacity.

Demand
The peak demand figures in Table 3-1 in the introduction refer to the power that must be transported from transmission system-connected generation stations to meet all customers' electricity requirements. These figures include transmission losses.

EirGrid
EirGrid plc is the state-owned company established to take on the role and responsibilities of Transmission System Operator in Ireland as well as market operator of the wholesale trading system.

Embedded Generation
Refers to generation that is connected to the distribution system or at a customer's site.

Generation Dispatch
The configuration of outputs from the connected generation units.

Grid Code (EirGrid)
The EirGrid Grid Code is designed to cover all material technical aspects to the operation and use of the transmission system of Ireland. The code was prepared by the TSO (pursuant to Section 33 of the Electricity Regulation Act, 1999) and approved by the CER. The Grid Code is available on www.eirgrid.com.

Grid Code (SONI)
The SONI Grid Code is designed to permit the development, maintenance and operation of an efficient, co-ordinated and economical transmission system in Northern Ireland. It is prepared by the TSO (SONI) pursuant to condition 16 of SONI's Licence. The SONI Grid Code is available at www.soni.ltd.uk

Interconnector Administrator
An Interconnector Administrator (IA) facilitates the allocation of capacity and energy trading. Trading is carried out using an Interconnector Management Platform (ICMP) for the Moyle and East West Interconnectors.

Incremental Transfer Capability
A measure of the transfer capability remaining in the physical transmission system for further commercial activity over and above anticipated uses.

Interconnector
The tie line, facilities and equipment that connect the transmission system of one independently supplied transmission system to that of another.

Load flow
Study carried out to simulate the flow of power on the transmission system given a generation dispatch and system load.

Maximum Export Capacity
The maximum export value (MW) provided in accordance with the generator's connection agreement. The MECs are contract values which the generator chooses to cater for peaking under certain conditions that are not normally achievable or sustainable e.g., a CCGT plant can produce greater output at lower temperatures.

Net Zero Emissions
Net zero emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.

Node
Connecting point at which several circuits meet. Node and station are used interchangeably in this Transmission Forecast Statement.

Per Unit (pu.)
Ratio of the actual electrical quantity to the selected base quantity. The base quantity used here for calculation of per unit impedances is 100 MVA.

Phase Shifting Transformer
An item of plant employed on the electrical network to control the flow of active power.

Power Factor
The power factor of a load is a ratio of the active power requirement to the reactive power requirement of the load.

Reactive Compensation
The process of supplying reactive power to the network.

Reactor
An item of plant employed on the electrical network to either limit short circuit levels or prevent voltage rise depending on its installation and configuration.

RES-E
Renewable Electricity.

Shallow Connection
Shallow Connection means the local connection assets required to connect a customer to the Transmission System and which are for the specific benefit of that particular customer.

Single Electricity Market
The Single Electricity Market (SEM) is the wholesale electricity market operating in Ireland and Northern Ireland. Further information is available at at www.sem-o.com/ and www.semcommittee.com/

SONI
System Operator for Northern Ireland (SONI) Ltd is owned by EirGrid plc. SONI ensures the safe, secure and economic operation of the high-voltage electricity system in Northern Ireland and in cooperation with EirGrid is also responsible for running the all-island wholesale market for electricity.

Split Busbar
Refers to the busbar(s) at a given substation which is operated electrically separated. Busbars are normally split to limit short circuit levels or to maintain security of supply.

Static Var Compensator
Device which provides fast and continuous capacitive and inductive reactive power supply to the power system.

Summer Valley
This is the minimum system demand. It occurs in the period March to September, inclusive in Ireland and May to August, inclusive in Northern Ireland

Summer Peak
This is the maximum system demand in the period March to September, inclusive in Ireland and May to August, inclusive in Northern Ireland.

Total Transfer Capability
The total capacity available on cross-border circuits between Ireland and Northern Ireland for all flows, including emergency flows that occur after a contingency in either system.

Transformer
An item of equipment connecting busbars at different nominal voltages. (see also Phase Shifting Transformer)

Transmission Interface Station
A station that is a point of connection between the transmission system and the distribution system or directly-connected customers.

Transmission Losses
A small proportion of energy is lost mainly as heat whilst transporting electricity on the transmission system. These are known as transmission losses. As the amount of energy transmitted increases, losses also increase.

Transmission Peak
The peak demand that is transported on the transmission system. The transmission peak includes an estimate of transmission losses.

Transmission Planning Criteria
The set of standards that the transmission sytem of Ireland is designed to meet.

Transmission System
The transmission system is a meshed network of high-voltage lines and cables (400 kV, 275 kV, 220 kV and 110 kV) for the transmission of bulk electricity supply around Ireland and Northern Ireland. The transmission system and network are used interchangeably in this Transmission Forecast Statement.

Uprating
To increase the rating of a circuit. This is achieved by increasing ground clearances and/or replacing conductor, together with any changes to terminal equipment and support structures.

Utility Regulator (UR)
UR is an independent non-ministerial government department set up to ensure the effective regulation of the Electricity, Gas and Water and Sewerage industries in Northern Ireland.

Winter Peak
This is the maximum annual system demand. It occurs in the period October to February, inclusive in Ireland and in the Period November to February in Northern Ireland.

Contents

Foreword, Eirgrid

I'm pleased to present The All-Island Ten-Year Transmission Forecast Statement (TYTFS) 2024.

Meeting the energy demands of tomorrow presents many complex challenges and moving towards a more sustainable future will require significant transformation.

As part of our planning, we are examining how we can best facilitate the transition to renewable energy, while ensuring the secure and resilient operation of the electricity system which supports a sustainable and affordable social and economic growth into the future.

The Ten-Year Transmission Forecast Statement forms an important step in our planning and examines how the transmission system on the island of Ireland is likely to evolve from 2024 to 2033. To do this, we look at the forecast generation capacity and demand growth, as well as the predicted changes in power flow. This information allows us to assist users and potential users in identifying opportunities to connect to, and make use of, the transmission system.

Renewable energy is fundamental in unlocking greater energy independence and security, as well as economic growth and the development of a stronger society. As the transmission system operator for Ireland, EirGrid has been tasked with making Ireland's grid renewable-ready in line with the Government's Climate Action targets.

In order to meet these targets, we're currently progressing the most ambitious programme of work ever taken on the transmission system in Ireland. This includes reinforcements, upgrades and new infrastructure across the whole of the country. We are already in the process of connecting significant volumes of offshore and onshore wind, solar and conventional generation while also reinforcing the power system. By 2030, we anticipate the completion of over 350 projects, representing an investment of over €3bn.

In addition, this work is being accelerated by the Government's 2025 Programme, 'Securing Ireland's Future' which outlines the Government's plans for economic growth and reform over the next five years. The programme identifies key priorities for investment including offshore wind development, the rollout of new electricity interconnectors and also ensuring the grid can support the transition to renewable energy while maintaining energy security.

This means Ireland's contracted generation portfolio is significant with onshore renewables forecast to increase from 5.8 GW to more than 14 GW. In addition, offshore contracted windfarms are expected to connect an extra 4.3 GW following completion. This is a major step towards the Government targets of 17GW of onshore wind and solar and 5GW of offshore wind which will be studied once contracted.

Our focus now is to work closely with key stakeholders including the Government, our Regulators and Industry, to understand how best to support this substantial growth in generation and demand with the continued development of a resilient onshore transmission system, powered by renewables.

We hope you find this document insightful, and we look forward to gathering valuable insights and feedback from stakeholders, to inform the next stages of our planning.

Liam Ryan
EirGrid Chief Transformation and Technology Officer

Foreword, SONI

I'm pleased to present The All-Island Ten-Year Transmission Forecast Statement (TYTFS) 2024.

Meeting the energy demands of tomorrow presents many complex challenges and moving towards a more sustainable future will require significant transformation.

As part of our planning, we are examining how we can best facilitate the transition to renewable energy, while ensuring the secure and resilient operation of the electricity system which supports future economic and social growth.

The Ten-Year Transmission Forecast Statement forms an important step in our planning and examines how the transmission system on the island of Ireland is likely to evolve from 2024 to 2033. To do this, we look at the forecast generation capacity and demand growth, as well as the predicted changes in power flow. This information allows us to assist users and potential users in identifying opportunities to connect to, and make use of, the transmission system.

Renewable energy is fundamental in unlocking greater energy independence and security, as well as economic growth and the development of a stronger society. As the transmission system operator for Northern Ireland, SONI has been tasked with making the electricity grid renewable-ready in line with Government targets.

In order to meet these targets, we're currently progressing the most ambitious programme of work ever taken on the transmission system across the island of Ireland, including reinforcements, upgrades and new infrastructure. We are already in the process of connecting significant volumes of wind, solar and conventional generation while also reinforcing the power system. As part of our Transmission Development Plan, we are investing £630 million into our energy system over 10 years to make essential upgrades that will improve reliability and strengthen the electricity network.

In addition, this work is being accelerated by the Northern Ireland Energy Strategy which sets a pathway for energy to 2030 and takes us towards the ultimate goal of delivering a net zero power system by 2050. The strategy identifies key priorities for investment including offshore wind development, the rollout of new electricity interconnectors and also ensuring the grid can support the transition to renewable energy while maintaining energy security.

This means Northern Ireland's planned generation portfolio is significant with onshore renewables forecast to increase from 1.48 GW to 2.1 GW. Offshore wind is also set to grow but is currently in the early planning and development stage.

Our focus now is to work closely with key stakeholders including the Government, our Regulators and Industry, to understand how best to support this substantial growth in generation with the continued development of a resilient onshore transmission system, powered by renewables.

We hope you find this document insightful, and we look forward to gathering valuable insights and feedback from stakeholders, to inform the next stages of our planning.

Gerard Carlin
SONI Director of Networks and Innovation

Executive Summary

The All-Island Ten-Year Transmission Forecast Statement (TYTFS) 2024 provides the following information:

- Network models and data for the all-island transmission systems;
- Forecast generation capacity and demand growth;
- Maximum and minimum fault levels at transmission system stations;
- Predicted transmission system power flows at different points in time; and
- Demand and generation opportunities on the transmission system.

Introduction

TYTFS 2024 is prepared in accordance with the statutory and licence obligations outlined in Table S-1.

Table S-1: Statutory Regulations requiring the TSOs to produce a Transmission Forecast Statement	
Ireland	**Northern Ireland**
Section 38 of the Electricity Regulation Act 1999 (as amended)	Condition 33 of the Licence to participate in the Transmission of Electricity

TYTFS 2024 describes the transmission system on the island of Ireland, from 2024 to 2033. EirGrid and SONI have jointly prepared TYTFS 2024. This document supersedes the All-Island Ten-Year Transmission Forecast Statement 2022-2031.

This document presents information available for the all-island transmission system at the data freeze date of January 2024. Where applicable we provide information on transmission system projects under development. Where multiple solutions are presented for a transmission system project, no preference is given to one solution.[1]

Context

In December 2023 the Irish Government published the next iteration of its Climate Action Plan (CAP) 2024[2]. The 2024 plan reflects increased ambitions for the decarbonisation of Ireland's economy, including measures to meet the revised targets for Renewable Energy Sources (RES-E) introduced in the 2023 update.

The CAP 2024 set out a renewable electricity target of 80% by 2030 and a target of 9 GW from onshore wind, at least 5 GW of offshore wind energy plus 2 GW of offshore wind energy for off-grid green hydrogen production, 8 GW from solar including 2.5 GW of new non-utility solar, and finally green hydrogen production from renewable electricity surplus generation. In order to meet these targets, and the requirements introduced under the CAP 2024, investment will be needed in new renewable generation capacity, system service infrastructure and electricity networks.

1 In line with our strategy to consider all practical technology options for network development.
2 Climate Action Plan 2024

Table S-2: Extract from the Climate Action Plan – Electricity Sector 2024 Targets		
National Target	**2025**	**2024**
Renewable Electricity Share	50%	80%
Onshore Wind	6 GW	9 GW
Solar	Up to 5 GW	8 GW
Offshore Wind	-	At least 5 GW
New Flexible Gas Plant	-	At least 2 GW
Demand Side Flexibility	15–20%	20–30%

In December 2021, the Northern Ireland[3] Executive published its Energy Strategy for Northern Ireland, setting a target of 70% RES-E by 2030. This target was changed to 80% RES-E by 2030 following the introduction of the Climate Change Act (Northern Ireland) in June 2022. The Climate Change Act mandates the publication of a Climate Action Plan for Northern Ireland which will include the first carbon budgets for Northern Ireland.

The Department for the Economy is currently consulting on the Draft Offshore Renewable Energy Action Plan, which contains the ambition to deliver 1GW of offshore wind from 2030[4]. The Department recently consulted on the design considerations for a Renewable Electricity Support Scheme for Northern Ireland[5].

In order to meet Ireland's and Northern Ireland's future commitments, investment will be needed in new renewable generation capacity, system service infrastructure and electricity networks. The transition to low-carbon and renewable energy will have widespread consequences; it will require a significant transformation of the electricity system.

In 2019 EirGrid and SONI launched new corporate Strategies 2020-2025 which are shaped by two factors: climate change and the impending transformation of the electricity sector. In February 2025, SONI launched a new corporate Strategy 2025-2031 focused on meeting Northern Ireland's collective renewable energy ambitious through significant collaboration and partnership working with the Northern Ireland Executive and the Utility Regulator.

3 https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy
4 https://consultations.nidirect.gov.uk/dfe/consultation-on-the-draft-oreap/
5 https://www.economy-ni.gov.uk/consultations/design-considerations-renewable-electricity-support-scheme-northern-ireland

Together, EirGrid and SONI are committed to leading the change towards a carbon-free electricity system and achieving the renewable energy ambitions of both jurisdictions.

To realise these ambitions and to enable transformation of the electricity system, EirGrid and SONI launched Shaping Our Electricity Future (SOEF) Roadmap in November 2021. The roadmap was informed by a comprehensive consultation process with stakeholders across society, policy makers, industry, market participants and electricity consumers. The valued feedback contributed to our growing body of knowledge on how to decarbonise the electricity system and to support decarbonisation of the broader economy while maintaining a safe and secure supply of electricity for consumers.

The roadmap provided an outline of the key developments from a networks, engagement, operations and market perspective needed to support a secure transition to at least 70% renewables on the electricity grid by 2030 – an important step on the journey to 80% and to net zero by 2050.

Inherent in this is a secure transition to 2030 whereby we continue to operate, develop and maintain a safe, secure, reliable, economical and efficient electricity transmission system with a view to ensuring that all reasonable demands for electricity are met.

An updated version of the Shaping Our Electricity Future Roadmap: Version 1.1 was published in 2023 and is reflected in TYTFS 2024, ensuring due consideration for the impact of 80% RES-E in both Ireland and Northern Ireland for 2030.

EirGrid and ESB Networks are working together to deliver the necessary transmission reinforcements that are needed to enhance and prepare the network. SONI and NIE Networks are also collaborating closely to reinforce the power system for the integration of renewable energy and the challenge in demand growth. For both jurisdictions, the successful delivery of transmission reinforcements in a timely manner depends on several factors including public acceptance, programme for Government, local and national support and the allocation and efficient use of transmission outages. It is important to note that relevant transmission reinforcements need local and national support to meet ambitions for housing growth, decarbonisation, economic growth and for supporting local industry.

High Level Results

Short Circuit Analysis

TYTFS 2024 includes maximum and minimum short circuit current levels for each transmission system station. Short circuit levels at each transmission system station are provided for the following years: 2024, 2027, and 2030.

Results show that for certain network conditions several stations on the island are approaching, or have the potential to exceed, their rated short circuit current level. We manage the transmission system and generation scheduling to mitigate possible risks while investment plans are in place to resolve these issues. Information on short circuit current levels is presented in Chapter 5.

Generation Growth

Significant installed generation growth is expected over the period of this TYTFS as described in Chapter 4.

In Ireland, contracted renewables are forecast to increase from 5.8 GW in 2024 to more than 14 GW by 2033. Offshore Phase 1 windfarms are included in this year's TYTFS analysis with 4.3 GW of projects under development. Powering Up Offshore South Coast is a project to build the new transmission grid infrastructure necessary to bring power generated by offshore windfarms from Ireland's south coast into the national grid[6]; these ORESS phase 2 projects will be included in future TYTFS.

In Northern Ireland onshore renewables are forecast to increase from 1.48 GW in 2024 to 2.1 GW by 2033. Offshore wind is at an early stage of planning and developments will be included in future TYTFS.

These large increases in installed capacity in the TYTFS model, coupled with the study methodology, result in low opportunities for additional capacity.

A significant amount of conventional generation in Ireland and Northern Ireland is expected to close over the period covered by this statement. For the purpose of the TYTFS 2024 analysis, it is assumed that sufficient generation capacity will be delivered in appropriate locations to ensure generation adequacy and security of supply are maintained.

Generation Opportunity

Generation opportunity is assessed at a number of nodes across the all-island transmission system. In general, opportunities for additional generation capacity are low in many areas.

As there are several generation connections and reinforcements needed and planned over the next decade, this document evaluates the generation opportunity for the year 2033. The purpose is to have a scenario with a longer time frame to evaluate the integration of generation opportunities.

6 https://www.eirgrid.ie/offshore

The 2033 analysis in this forecast statement considers a power system with 4.3 GW of offshore (phase 1) generation, 2.2GW of interconnection and an onshore generation capacity of 25GW. In contrast the peak all island winter demand is forecast to be 8555 MW.

The TYTFS methodology examines the additional generation that could be connected to the system described above while meeting the Transmission System Security and Planning Standards (TSSPS) for a number of high and low demand scenarios. The combination of significant forecast generation required to meet 2030 targets and the methodology selecting the lowest additional capacity that can be accommodated across the scenarios can result in a worst-case value i.e. a node may have a reported capacity opportunity of 0 MW, while there may still be periods of the year where it could export.

The all-island generation opportunities assessment in Chapter 7 provides information for generators wishing to connect to the transmission system.

Regional changes in locational tariff signals are also described in Chapter 7. This information is provided to help network users make informed decisions when exploring potential transmission network connection locations. Regions with generation capacity in excess of local demand in the South West, West and North West of Ireland have lower Transmission Loss Adjustment Factors and higher Generator Transmission Use of System charges than Eastern regions with higher demand levels and less surplus generation.

Demand Growth

The demand forecast used in our analysis is the median all-island transmission peak demand forecast which is taken from the All-Island Generation Capacity Statement 2023-2032 (GCS)[7]. The demand forecast represents an average annual increase in all-island winter peak demand of 2.6% over the period of GCS 2023-2032.

The potential demand growth is primarily associated with population growth, electrification of heat, transport and industry and the connection of large energy users, such as data centres. Often requests to connect to the grid are in proximity of Dublin, which contributes to the increase in connections and connection requests in the area. Further information on the growth of demand can be found in Chapter 3.

7 https://cms.eirgrid.ie/sites/default/files/publications/19035-EirGrid-Generation-Capacity-Statement-Combined-2023-V5-Jan-2024.pdf

Demand Opportunity

Demand connections can progress in short to medium timeline so it is considered appropriate to assess demand opportunities for scenarios in the year 2029.

The all-island demand opportunity results, based on the 2029 transmission system, are presented in Chapter 8. The study identifies substations which have the capability to accommodate demand connections.

Demand increases on the island of Ireland are largely driven by population growth, electrification of heat, transport and industry, as well as increasing connection requests from large customers.

Chapter 8 includes an overview of the CRU's direction on the data centre connections. This has been included as a result of the large volume of connections and enquiries from data centres and other large energy users in the Dublin area. In the context of the CRU's direction on the connection of data centres, EirGrid clarified in December 2021 that the greater Dublin area is considered a constrained region for the purpose of processing of data centre connections.

It is important to note that demand and generation opportunity studies in this TYTFS are based on contracted customer connections and approved transmission reinforcements at the data freeze date of January 2024.

Limitation of analysis

The results of demand and generation opportunity analyses are solely based on high level transmission network assessments. The results do provide some guidance; but the actual connection capacity and possible connection solutions will only be determined following detailed individual connection studies. We will continue to examine innovative solutions and technologies in response to future connection enquiries.

Those who are considering connecting generation or demand to the transmission systems of Ireland or Northern Ireland should contact us. It is advisable to consult us early in the project process. In Ireland customers can contact us at info@eirgrid.com while in Northern Ireland customers can contact us at info@soni.ltd.uk.

1. Introduction

EirGrid is the Transmission System Operator (TSO) in Ireland, and SONI is the TSO in Northern Ireland. The TSOs jointly prepare and publish the All-Island Ten-Year Transmission Forecast Statement (TYTFS) each year.

1.1 Introduction to the Transmission Forecast Statement

The transmission system is a network of 400 kV, 275 kV, 220 kV and 110 kV high-voltage lines and cables. It is the backbone of the power system, efficiently delivering large amounts of power from where it is generated to where it is needed. EirGrid plans and develops the transmission system in Ireland to ensure it meets forecast transmission system operating conditions. SONI is responsible for planning and operating the transmission system in Northern Ireland within defined security standards.

The TYTFS 2024 provides the following information:

- Network models and data for the all-island transmission system;
- Forecast generation capacity and demand growth;
- Maximum and minimum fault levels at transmission system stations;
- Predicted transmission system power flows at different points in time; and
- Demand and generation opportunities on the transmission system.

The TYTFS is designed to assist users and potential users to identify opportunities to connect to, and make use of, the transmission system. The appendices provide further information and transmission system data to enable the reader to perform power flow analysis.

When using data provided in the TYTFS 2024, readers should consider other documents such as:

- All-Island Generation Capacity Statement (GCS)[8];
- Shaping Our Electricity Future Roadmap;
- EirGrid's Transmission Development Plan for Ireland;
- SONI's Transmission Development Plan for Northern Ireland;
- EirGrid's Tomorrow's Energy Scenarios for Ireland;
- SONI's Tomorrow's Energy Scenarios for Northern Ireland[9]; and
- European Network of Transmission System Operators for Electricity's (ENTSO-E's) Ten Year Network Development Plan for Europe.

Each year, EirGrid and SONI jointly prepare the All-Island Generation Capacity Statement. The GCS outlines demand forecasts and assesses the generation adequacy of the island of Ireland over a ten-year period. The TYTFS complements the demand information presented in the GCS. The next iteration of TYTFS will consider the All-Island Resource Adequacy Assessment report[10].

EirGrid and SONI also publish Transmission Development Plans (TDP) for Ireland and Northern Ireland respectively. The TDPs are available on the EirGrid and SONI websites. The TDPs for Ireland and Northern Ireland provide details of the transmission system developments expected to be progressed in Ireland and Northern Ireland in the coming 10 years. These transmission system developments are also included in the data, assumptions and analyses in the TYTFS.

To cater for the increased level of uncertainty over the future usage of the grid, EirGrid and SONI carry out scenario planning for Ireland and Northern Ireland respectively. We call this plan Tomorrow's Energy Scenarios (TES), acknowledging that there is no single pathway to a low carbon future.

The European Network of Transmission System Operators for Electricity (ENTSO-E), of which EirGrid and SONI are members, publishes a Ten-Year Network Development Plan (TYNDP) every two years. The TYNDP outlines projects of European significance.

8 This document has since been renamed to All-Island Resource Adequacy Assessment
9 https://www.soni.ltd.uk/media/documents/TES-2023-Final-Full-Report.pdf
10 This report was published after the data freeze of this TYTFS
https://cms.eirgrid.ie/sites/default/files/publications/AIRAA-2025-2034.pdf

1.2 Governance

1.2.1 Roles and Responsibilities

Northern Ireland

Under the licence in Northern Ireland—held by SONI—we are required to plan and operate the Northern Ireland transmission system. In doing so we must comply with both the SONI Transmission System Security and Planning Standards (TSSPS) and the SONI Grid Code.

Ireland

Under the licence in Ireland—held by EirGrid—we are required to operate, develop and ensure the maintenance of the Irish transmission system. In doing so we must comply with both the EirGrid TSSPS and the EirGrid Grid Code.

1.2.2 Duty to Prepare a Statement

EirGrid and SONI are each required to publish a Transmission Forecast Statement in line with the Statutory Regulations in Table 1-1. Since 2012 we have jointly prepared and produced an all-island document, following an agreement with the Commission for Regulation of Utilities (CRU) in Ireland and the approval of the Utility Regulator (UR) in Northern Ireland. TYTFS 2024 has been prepared in accordance with and in fulfilment of these obligations.

Table 1-1: Statutory Regulations requiring the TSOs to produce a Transmission Forecast Statement

Ireland	Northern Ireland
Section 38 of the Electricity Regulation Act 1999 (as amended)	Condition 33 of the License to participate in the Transmission of Electricity

1.2.3 Single Electricity Market

The Single Electricity Market (SEM) has been operating on the island of Ireland since 2007. The all-island wholesale electricity market allows consumers in both Ireland and Northern Ireland to benefit from increased competition. This in turn allows consumers to benefit from reduced energy costs and improved reliability of supply.

The model of the SEM changed considerably on 1 October 2018 to take account of the requirements of the European Network Codes and the Target Model. The project to develop and realise the new market was called the Integrated - Single Electricity Market (I-SEM). The market remains the Single Electricity Market (SEM).

The transmission systems of Ireland and Northern Ireland are electrically connected by means of a 275 kV tie-line. This tie-line connects Louth station in Co. Louth (Ireland) to Tandragee station, in Co. Armagh (Northern Ireland). There are also two 110 kV connections between Ireland and Northern Ireland:

- Letterkenny station in Co. Donegal (Ireland) and Strabane station in Co. Tyrone (Northern Ireland);
- Corraclassy station in Co. Cavan (Ireland) and Enniskillen station in Co. Fermanagh (Northern Ireland).

Generation on the transmission systems of Ireland and Northern Ireland is dispatched on an all-island basis. The TYTFS transmission network models are also dispatched in this manner, to reflect how the all-island transmission system is operated.

1.3 Data Management

Transmission system development is continuously evolving. A data freeze date of 31st January 2024 applies to the TYTFS 2024. All data for system model files, and sequence data for use with short circuit current level analysis, was collected on this date. A data freeze date enables us to update system models in order to perform analyses and also allows us to update the appendices of the TYTFS.

1.4 Other Information

Potential users of the transmission system should also be aware of the following key documents:

- EirGrid Grid Code and SONI Grid Code
- SONI Transmission System Security and Planning Standards
- The Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012
- EirGrid Transmission System Security and Planning Standards
- EirGrid Operating Security Standards
- SONI Transmission Connection Charging Methodology Statement
- EirGrid Transmission Connection Charging Methodology Statement 2008
- Joint TSO/DSO Group Processing Approach Charging and Rebating Principles 2010 for Ireland
- EirGrid Statement of Charges 2023/2024
- Statement of Charges – For Use of Northern Ireland Electricity Ltd Transmission System
- EirGrid Transmission Loss Adjustment Factors 2023-2024
- SONI Transmission Loss Adjustment Factors 2023-2024[11];
- All-Island Generation Capacity Statement 2023-2032
- EirGrid Transmission Development Plan for Ireland 2023-2032
- SONI Transmission Development Plan for Northern Ireland 2023-2032[12]

1.5 Publication

The TYTFS 2024 is available in pdf format on our websites: www.eirgridgroup.com and www.soni.ltd.uk

For a hard-copy version, please send a request to info@eirgrid.com or info@soni.ltd.uk.

Transmission system model files are also available on both websites.

11 Transmission loss adjustment factors (TLAFs) | SONI
12 Transmission Development Plan Northern Ireland 2023-2032.

2. The Electricity Transmission System

The transmission system in Ireland and Northern Ireland plays a vital role in the supply of electricity. It transports energy from generators to demand centres across the island.

2.1 Overview of the All-Island Elecstricity Transmission System

In Northern Ireland, the transmission system is operated at 275 kV and 110 kV, while the transmission system in Ireland is operated at 400 kV, 220 kV and 110 kV. The two transmission systems are connected by means of a 275 kV double circuit from Louth station in Co. Louth in Ireland to Tandragee station in Co. Armagh in Northern Ireland. There are also two 110 kV connections between Letterkenny (IE) and Strabane (NI) stations, and between Corraclassy (IE) and Enniskillen (NI) stations.

See Section 2.2 below for further information on the existing transmission connections between Ireland and Northern Ireland.

EirGrid and SONI together operate the transmission systems - North and South - on an all-island basis[13]. The 400 kV, 275 kV and 220 kV networks form the backbone of the transmission system. They have higher power carrying capacity and lower losses than the 110 kV network.

In Ireland, the 400 kV network provides a high-capacity link between the Moneypoint generation station on the west coast and Dublin on the east.

In Northern Ireland the 275 kV network comprises:

- A double circuit ring.
- A double circuit spur to Coolkeeragh Power Station; and
- A double-circuit spur southwards up to the border at Co. Louth, in Ireland.

In Ireland the transmission network typically comprises of single circuit lines which are interconnected to cover the wider geographical distances between stations. Typically, large generation stations (greater than 200 MW) are connected to the 220 kV or 400 kV networks.

The 110 kV circuits provide parallel paths to the 220 kV, 275 kV and 400 kV networks and are the most extensive element of the all-island transmission system, reaching into every county on the island of Ireland.

13 As set out in the Synchronous Area Operator Agreement and the Load Frequency Control Block Operator Agreement which were approved by both UR and CRU as required by Regulation 2017/1485: System Operation Network Code.

The all-island transmission system generally consists of overhead lines. There are exceptions to this, such as in the city centres of Belfast, Cork and Dublin, where underground cables are used. Table 2-1 presents the total lengths of overhead lines and cables at the different voltage levels (as of the data freeze date). Revision of individual line lengths may change following completion of network development projects.

Transformers are located at substations that link the different voltage networks together, providing paths for power to flow between voltage levels. The total transformer capacity between the different voltage levels on the all-island system is presented in Table 2-2.

Table 2-1: Total length of installed transmission circuits

Voltage Level (kV)	Total length (km)	Length in Ireland (km)	Length in Northern Ireland (km)
400	439	439	
275	713		713
220	1970	1970	
110	6703	5273	1430

Table 2-2: Total installed transformer capacity

Voltage Level (kV)	Capacity (MVA)	Number	Number in Ireland	Number in Northern Ireland
400/220	4050	8	8	
275/220	1200	3	3	
275/110	4280	19		19
220/110	14066	67	67	
220/33	110	1	1	
110/38	8642	179	179	
110/33	8679	113		113

Reactive compensation devices, such as shunt capacitors, static var compensators (SVCs) and shunt reactors, are used to improve transmission system voltages in local areas.

Capacitors and SVCs help to support local voltages in areas where low voltages may otherwise occur. Shunt reactors suppress voltages in areas where they would otherwise be too high, most likely during periods of low demand and/or high wind. Table 2-3 displays the reactive compensation on the all-island transmission system.

Table 2-3: Installed Reactive Compensation

Voltage Level (kV)	Type	MVArs	No. Devices	Ireland	Northern Ireland
400	Line Shunt Reactor	160	2	2	
	Voltage Source Converter (EWIC)	+/- 175	1	1	
275	Shunt Capacitor	236	4		4
220	Shunt Reactor	250	4	4	
110	Static Var Compensator	90	2	2	
	Static Compensator (STATCOMs)	230	3	3	
	Shunt Capacitor	996	44	44	
38	Shunt Reactor	100	5	5	
33	Shunt Capacitor	29	5	5	
22	Shunt Reactor	210	7		7
	Shunt Capacitor	125	5		5
20	Shunt Capacitor	92	14	14	
	Shunt Reactor	9	1	1	

2.2 Existing Connections between Ireland and Northern Ireland Transmission Systems

The existing cross-border circuits are shown in Figure 2-1, where the transmission systems of Ireland and Northern Ireland are connected via a double circuit 275 kV line. This line connects the Northern Ireland transmission system at Tandragee to the Irish transmission system in Louth. There are three 275/220 kV transformers in Louth station, one 600 MVA transformer and two ganged 300 MVA transformers (sharing a connection).

The design capacity of each of the 275 kV cross-border circuits is 600 MVA. However, the actual capacity of the circuits to accommodate transfers between the two systems at any time depends on the prevailing system conditions on either side of the border. This includes the ability to deal with system separation.

In addition to the main 275kV double circuit, there are two 110 kV connections:

- A phase-shifting transformer (PST) between Letterkenny, Co. Donegal and Strabane, Co. Tyrone; and
- A phase-shifting transformer (PST) between Corraclassy, Co. Cavan and Enniskillen, Co. Fermanagh.

The purpose of these 110 kV PSTs is to provide support to either system under certain system conditions. Phase shifting transformers (PSTs) allow the flow of power to be controlled. Usually the flow is zero but flows of up to about 30MW can be scheduled in either direction during outages if required. They also provide voltage support by tying the two systems together electrically.

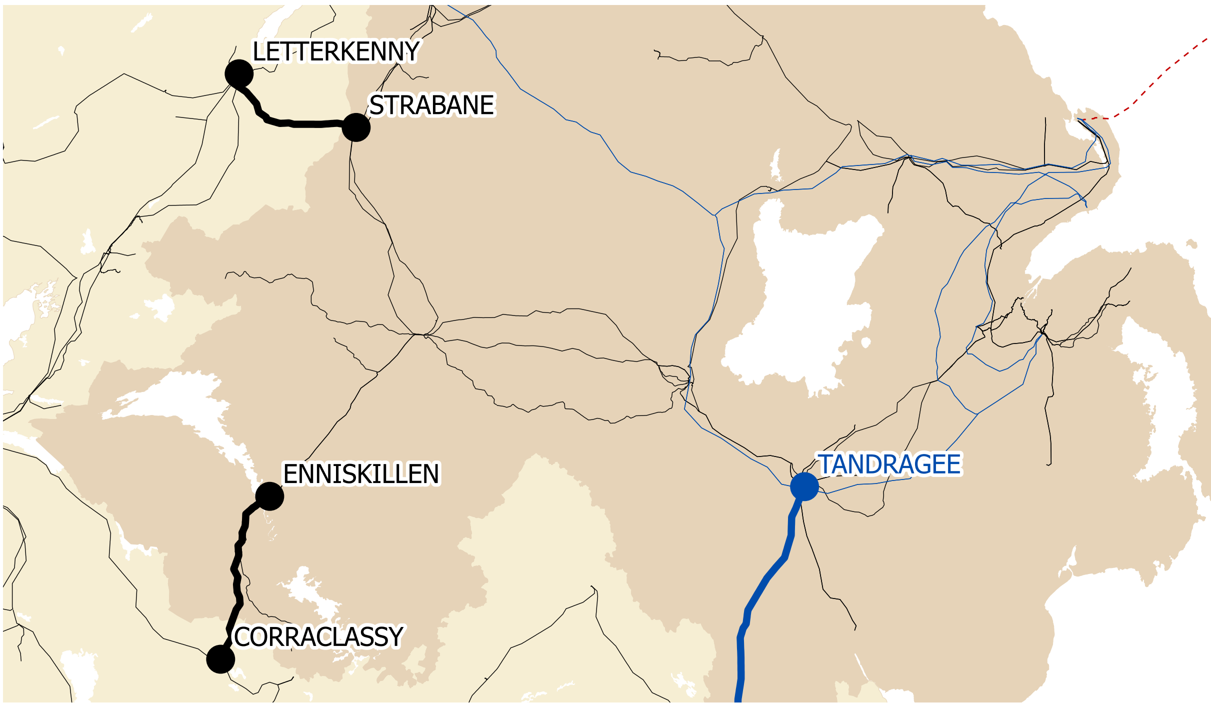


Figure 2-1: Existing Cross-Border Circuits

2.3 Interconnection with Great Britain and Europe

Transmission grids are often interconnected so that energy can flow from one country to another. By linking to other transmission systems, we can:

- Increase the diversity and security of energy supplies;
- Facilitate competition in the European and GB markets; and
- Aid the transition to a low carbon energy sector by integrating renewable sources.

The East West Interconnector and Greenlink Interconnector link the electricity grids of Ireland and Wales, while the Moyle Interconnector links the electricity grids of Northern Ireland and Scotland. For further information on the interconnectors planned, see Section 2.3.3 Future European and GB Interconnection.

Power can be either imported or exported on the interconnectors. Interconnector power flows have system impacts that need to be managed operationally. For example, during times of import, conventional generation may be displaced by non-synchronous power sources, reducing the all-island system inertia. Interconnector flows can also have implications for the system frequency, stability, and operation. Frequency changes are faster in transmission systems with low rotational inertia, making frequency control and system operation more challenging.

The Moyle Interconnector also increases the dynamic reactive support required by the transmission system as the link does not have dynamic reactive power export capability[14].

SONI acts as Interconnector Administrator (IA) for the Moyle interconnector. Interconnector capacity is implicitly allocated through the ex-ante auctions operated by SEMOpx. The capacity is available for implicit allocation to facilitate coupling between the wholesale electricity markets on the islands of Ireland and Great Britain. Figure 2-2 shows the location of the Moyle, East-West and Greenlink interconnectors.

14 Unlike Moyle, the Greenlink and East West Interconnectors have dynamic reactive power export capability.

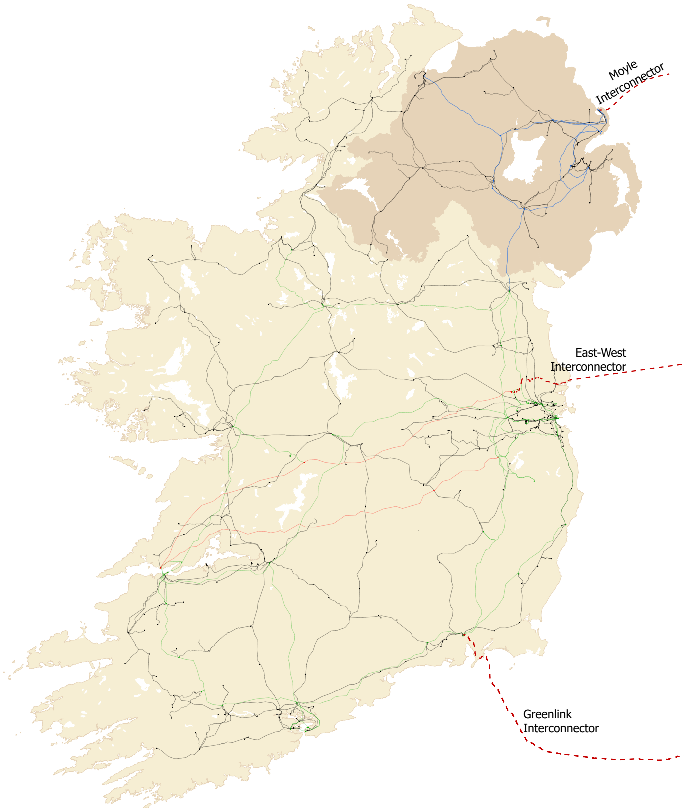


Figure 2-2: Existing Interconnectors

The amount of power that is permitted to be traded between Ireland and Wales across the East-West Interconnector is detailed in Table 2-4.

The available capacity is measured at the BETTA market reference point in Deeside 400 kV station in Wales.

Table 2-4: Contracted Capacity on EWIC Interconnector

Direction	Summer (MW)	Winter (MW)
Wales to Ireland	500	500
Ireland to Wales	500	500

The amount of power that can be traded between Northern Ireland and Scotland across the Moyle Interconnector is detailed in Table 2-5.

Table 2-5: Contracted Capacity on Moyle Interconnector[15]			
Flow	**Dates**	**Firm capacity available (MW)**	**Transmission Constrained Capacity (MW)**
NI to GB	All Year	500	400
GB to NI	1 Apr – 31 Oct	450[16]	N/A
	1 Nov – 31 March	450	N/A

2.3.1 Moyle Interconnector

The Northern Ireland transmission system is currently connected to Scotland via a 500 MW High Voltage Direct Current (HVDC) link called the Moyle Interconnector. It is a Line Commutated Converter (LCC) HVDC link, which commenced full commercial operation in 2002.

It is constructed as a dual monopole HVDC link with two coaxial sub-sea cables from Ballycronan More in Islandmagee, Northern Ireland to Auchencrosh in Ayrshire, Scotland. The link has a physical installed capacity of 500 MW.

The converter station at Ballycronan More is looped into one of the 275 kV Ballylumford to Hannahstown circuits. The Moyle link is self-compensating for reactive power losses. There are four 59 Mvar capacitor banks at the Ballycronan More converter station with three of these capacitor banks acting as filters.

Since there is potential for network overloads and voltage steps if the 275 kV double circuit between the Moyle converter station at Ballycronan More and the nearby Ballylumford substation were to trip, the Moyle Interconnectors full export capacity of 500 MW is not currently in use. There is a project in place to resolve this issue which involves reconfiguration of the connection to Moyle.

15 Electricity - Mutual Energy (mutual-energy.com)
16 May be reduced to 410 under certain system outage conditions

2.3.2 East-West Interconnector

The East-West Interconnector is a 500 MW HVDC link which runs between Woodland County Meath in Ireland and Deeside in North Wales. The link comprises approximately 186 km of sub-sea cable and 76 km of land underground cable.

The East-West Interconnector uses Voltage Source Converter (VSC) technology. VSC technology offers independent and rapid control of active and reactive power. It does not suffer from commutation failure and is capable of offering emergency power control in the event of low or high frequency events.

In addition, due to the VSC technology, the East-West Interconnector provides black start capability. The link can operate in either voltage control or reactive power control mode independently in both converter stations. It can supply or absorb up to 175 Mvar at Portan 400 kV station which is connected directly to Woodland 400 kV station. The East-West Interconnector commenced commercial operation in December 2012.

2.3.3 Greenlink Interconnector

The Greenlink Interconnector is a 500 MW HVDC link which runs between Great Island in County Wexford Ireland and Pembroke in south Wales. The link comprises approximately 160 km of sub-sea cable.

The Greenlink Interconnector uses Voltage Source Converter (VSC) technology. The interconnector can operate in either voltage control or reactive power control mode independently in either converter station, and it can supply or absorb up to 163 MVAr at Great Island[17].

Table 2-6: Contracted Capacity on Greenlink Interconnector

Direction	Summer (MW)	Winter (MW)
Wales to Ireland	530	530
Ireland to Wales	504	504

17 The Greenlink Interconnector is operating since January 2025

2.3.4 Future Interconnection with GB and Europe

Currently, Celtic interconnector is the proposed interconnector that is deemed to be a Project of Common Interest (PCI) by the European Commission. PCIs are intended to help the EU achieve its energy policy and climate objectives: affordable, secure and sustainable energy for all citizens. The connection offer for the proposed Celtic Interconnector between Ireland and France was originally executed in November 2021. At the TYTFS data freeze date, this project is expected to be in place from 2026 onwards. As such, this interconnector has been included within the analyses for this forecast statement.

In Northern Ireland, SONI has received a connection application from Transmission Investment (TI) for a new interconnector (LirIC) to Scotland. Transmission Investment (TI) is the sole developer of LirIC. The project is at an initial assessment stage. It has recently been evaluated through the Initial Project Assessment (IPA). The IPA is the first stage of the cap and floor regime process, and its purpose is to determine whether the interconnector is in the interest of GB consumers and should in principle obtain a cap and floor regime. It has been concluded that LirIC is likely to be in the interests of GB consumers, and therefore it has been decided to grant cap and floor regime in principle, subject to the conditions indicated by the Office of Gas and Electricity Market.[18]

In Ireland, there is a further interconnector project in development (MARES Connect) from Ireland to GB.

Due to the early development status of these projects, they are not included within any studies or tables in this report.

18 Initial Project Assessment of the Window 3 Interconnectors - decision | Ofgem

2.4 Transmission Development Plans

EirGrid's Transmission Development Plan (TDP) and SONI's Transmission Development Plan Northern Ireland (TDPNI) detail the transmission system development projects that have been initiated by EirGrid and SONI respectively. They also discuss further developments that may arise in the period of the plans. The TDP IE and TDPNI describe projects that are required to:

- Facilitate demand growth;
- Provide new generation and demand connections;
- Ensure the transmission system complies with the EirGrid Transmission System Security and Planning Standards (TSSPS) and SONI TSSPS;
- Provide interconnection capacity; and
- Refurbish or replace existing assets.

The planned transmission system developments presented in this statement are based on those projects that have received internal approval by the data freeze date. Appendix B outlines these developments. These projects are currently scheduled to be completed at various stages between now and 2033. It should be noted that the information presented in later chapters on transmission system transfer capabilities and opportunities is dependent on the completion of these development projects in the assumed timeframe.

Information presented in the TDP IE, TDPNI and TYTFS documents represent a snapshot of an evolving transmission system development plan.

While we are considering other reinforcements, these are not at the stage of maturity required for inclusion in this statement.

Each planned development is illustrated in the maps and schematics in Appendix A. New generation connections and new transmission interface stations are described in Sections 2.8 and 2.9 respectively.

2.5 Ireland Transmission System Developments

This section details the transmission system projects that are planned to take place in Ireland over the period covered by this forecast statement. Project completion dates in the TYTFS are forecasts based on the best project information available at the time of the data freeze date (January 2024).

2.5.1 Grid Development Strategy

EirGrid published the updated Grid Development Strategy (GDS) "Your Grid, Your Tomorrow" in 2017. The GDS documents our strategy for the long-term development of the network and includes three strategy statements:

- Inclusive consultation with local communities and stakeholders will be central to our approach;
- We will consider all practical technology options; and
- We will optimise the existing grid to minimise the need for new infrastructure.

The GDS aims to achieve a balance between the costs and impact of new infrastructure, while maximising the capability of the existing network.

2.5.2 Our Public Consultation Process

As part of our approach, we use a consistent, six-step process to explore options and make decisions. This means we follow the same steps for every project. The decision-making tools we use, and the amount of engagement we carry out at each step, depends on the scale and complexity of each project. Engagement with the public, local communities and landowners typically takes place during steps 3 and 4, and again at steps 5 and 6 on our Community Benefit funds. Engagement with our customers, the wider energy industry and statutory and other stakeholders can take place at every step. Similarly, engagement with relevant consenting authorities, and other Statutory and non-Statutory stakeholders takes place at every step, either specific to a project, or at a more strategic level.

Step 1 How do we identify needs of the electricity grid?

Step 2 What technologies can meet these needs?

Step 3 What's the best option and what area may be affected?

Step 4 Where exactly should we build?

Step 5 Appy for planning permission.

Step 6 Construct, energise (make live) and share benefits.

Figure 2-3 General structure of the six-step process for our grid projects

For each key project or initiative, we also use a bespoke engagement plan which identifies the channels we will use to provide information to our stakeholders. A general structure of the process is set out in Figure 2-3.

2.5.3 Tomorrow's Energy Scenarios

In 2017, to cater for the increased level of uncertainty over the future usage of the grid, we introduced scenario planning into our grid development process. We call this study Tomorrow's Energy Scenarios (TES).

Our scenarios detail credible futures for the electricity sector in Ireland, with specific focus on what this means for the electricity transmission system over the next twenty years and beyond. The underlying assumptions in the scenarios are validated using feedback received from policy makers, industry and the general public as part of an open consultation.

When the scenarios are finalised, we use them to test the performance of the electricity transmission grid and publish the results in the TES System Needs Assessment (SNA). The TES process occurs every two years.

The needs identified in the TES SNA process are brought through our six-step process for developing the grid. As needs and projects progress through the six-step process, they are included in the TDP IE and TYTFS.

In May 2024 EirGrid and SONI published the latest iteration of the Tomorrow's Energy Scenarios[19], which reflected the feedback received during the consultation held towards the end of 2023.

2.5.4 Descriptions of Ireland Transmission Development Projects

The TDP IE reports the planned transmission infrastructure projects that need to be built or upgraded over the ten years from 2024 to 2033. The timeline of the TDP IE aligns with the strategic planning horizons adopted by EirGrid. These are the medium-term planning, long-term scenario planning and strategic visions for the future. The medium-term planning looks at demand and generation forecasts and opportunities as well as accompanying network reinforcements to meet these forecasts within the next ten years. This medium-term planning includes the Generation Capacity Statement (GCS) which contains ten-year demand forecasts and generation portfolio for generation adequacy and the Six Step Grid Delivery process. Furthermore, in the medium-term, this TYTFS 2024 sets out the state of the transmission system and a ten-year assessment of the opportunities for new demand and generation connections.

Further detailed information is published in the Transmission Development Plan 2024.

19 Tomorrow's Energy Scenarios 2023 Final Report (eirgrid.ie)

Table 2-7: Summary of projects under development as per data freeze date January 2024

Project category	Border, Midlands, West	Southeast, Mideast, Dublin	Southwest, Midwest	Projects at multiple locations	Total
New Build	31	49	15		95
Uprate/ Modify	28	20	9	3	60
Refurbish/ Replace	9	27	16	8	60
Other		4		4	8
Total	**68**	**100**	**40**	**15**	**223**

2.6 Northern Ireland Transmission System Developments

This section details the transmission system projects that are planned to take place in Northern Ireland over the period covered by this forecast statement. Projects have been included using completion dates assessed to be appropriate at the time of the data freeze (January 2024).

2.6.1 Grid Development Process

In Northern Ireland SONI follows the Grid Development Process. This is a three-part process which includes stakeholder and public participation (as appropriate) in the development of projects, see Figure 2-4.

The approach taken to developing the grid is described by the following:

- The projects listed here have all progressed through either the SONI approval and governance process or have been identified to SONI by NIE Networks (asset replacement projects are identified by NIE Networks). In cases where the project is at an early stage, i.e. Part 1, this approval may be limited to the investigation of feasibility of several options prior to shortlisting and selection of preferred option and identification of study areas. Therefore, the outline design that progresses to the consents stage may vary from that assumed in the forecast statement study files.
- Developments are based on assumptions relating to the forecast change in demand and generation.
- Studies have concluded that the following projects are required to address forecast non-compliance with standards, subject to the forecast change in demand and generation. However, further cost benefit analysis may result, in some cases, in the identification of alternative solutions or operational interventions.

Part 1 Identifying the optimum solution and what area may be affected

Part 2 Identifying where the project will be built

Part 3 Planning Application to Project Handover to NIE Networks

Figure 2-4 SONI's Grid Development Process

Further projects for which a need has been identified but approval has not yet been granted have not been included in the TYTFS analysis. These are discussed in more detail in Transmission Development Plan for Northern Ireland TDPNI 2023-2032.

SONI published its first 'Tomorrow's Energy Scenarios Northern Ireland' (TESNI) which outlines three possible energy futures. These acknowledge that there is no single pathway to a low carbon future. We also analysed how the existing and planned transmission grid performs under each of the scenarios over a range of timeframes.

EirGrid and SONI published the TES 2023 consultation[20] last autumn (Nov – Dec 2023). Following the consultation, EirGrid and SONI have reflected on the feedback received and published the latest iteration of the Tomorrow's Energy Scenarios in May 2024.

In this respect, SONI also has a crucial role to play in the implementation of Northern Ireland's Energy Strategy and Climate change legislation which sets a target of an average of at least 80% of our electricity coming from renewable sources by 2030[21]

2.6.2 Descriptions of Northern Ireland Development Projects

Additional Shunt Reactors

With an increase in small scale generation and increasing energy efficiency, the minimum load seen on the NI transmission system has dropped, leading to an increased need to reduce system voltages during these periods. Shunt reactors suppress system voltages. This project involves installation of two new shunt reactors at Tamnamore, and one at each of Castlereagh and Tandragee, connected to tertiary windings of interbus transformers. At the TYTFS data freeze date this project is expected to be completed in phases by summer 2028.Banbridge Transformer Replacement

The 30 MVA 110/33 kV transformers T1 – T4 at Banbridge are to be replaced by two new 90 MVA units. At the TYTFS data freeze date this project is expected to be completed by winter 2026.

Enniskillen Transformer Replacement

The 45 MVA 110/33 kV transformers T1 and T2 at Enniskillen are to be replaced by new 90 MVA units. At the TYTFS data freeze date this project is expected to be completed by winter 2024.

20 Tomorrow's Energy Scenarios 2023 Consultation Report (eirgrid.ie)
21 https://www.legislation.gov.uk/nia/2022/31/contents/enacted

Donegall Main (North) Transformer Replacement

The 60 MVA 110/33 kV transformer TX B at Donegall North is to be replaced by a new 90 MVA unit. At the TYTFS data freeze date this project is expected to be completed by summer 2027.

Airport Road Main

It is planned to construct a new 110/33 kV substation including 2 x 60 MVA transformers and a 33 kV switchboard in the Belfast Harbour Estate, close to Airport Road. The substation will be connected as a teed transformer feeder arrangement from Rosebank Main 110 kV. The substation will supply both Airport Road and Queens Road 33 kV substations which are to be transferred from Cregagh Main. At the TYTFS data freeze date this project is expected to be completed by winter 2026.

Ballylumford Switchgear

The existing 110 kV switchgear at Ballylumford is to be replaced with a new 110 kV GIS double busbar and the 110 kV circuits diverted accordingly. At the TYTFS data freeze date this project is expected to be completed by winter 2029. Currently one 275/110 kV interbus transformer at Ballylumford is operated out of service to ensure the fault level is kept within existing switchgear fault rating. After this work is completed, this restriction can be removed.

Castlereagh IBTx 3

The interbus transformer IBTX 3 at Castlereagh is to be replaced. The replacement transformer will have a 240 MVA primary winding and a 60 MVA tertiary winding. At the TYTFS data freeze date this project is expected to be completed by 2025.

Mid Antrim Upgrade (formerly Kells-Rasharkin New 110 kV Circuit)

As a result of increasing growth in renewable generation there will be a need to construct a second 110 kV circuit between Kells and Rasharkin 110/33 kV cluster substations. This circuit will be required to have a minimum rating of approximately 250 MVA. At the TYTFS data freeze date this project is expected to be completed by 2029.

Larne Transformer Replacement

As a result of an increase in connections at 33 kV, the 45 MVA 110/33 kV at transformers at Larne are to be replaced with 90 MVA units. This is expected to be completed in 2026.

Cregagh Refurbishment

Cregagh substation is being refurbished. As part of this the existing 75 MVA 110/33/6.6 kV transformers are being replaced with new 90 MVA 110/33 kV units. This is expected to be completed in 2026.

Drumnakelly – Tamnamore Uprate

These circuits may be subject to overload under high wind generation conditions and are consequently switched out during high wind periods. This project is to upgrade the capacity on these circuits, allowing these circuits to fully return to service. The conductors on the existing tower line and single circuit sections will be replaced and uprated. A section of underground cable will be installed on the 'A' circuit. At the TYTFS data freeze date this project is expected to be completed in 2029.

Moyle Reinforcement

The drivers for this project are market integration, security of supply and RES integration. At present, full utilisation of the 500 MW export capability of the Moyle Interconnector is prevented by the potential for network overloads and voltage steps in the event of the loss of the 275 kV double circuit between the Moyle converter station at Ballycronan More and the nearby Ballylumford substation. This project involves works to allow reconfiguration of the connection to Moyle to address this contingency.

The estimated completion date of this project is 2028.

Windfarm Clusters Development

(i) *Kells 110/33 kV Cluster*

It is planned to establish a 110/33 kV cluster substation near Kells, connected to the existing Kells station via an overhead line. At the TYTFS data freeze date this project is expected to be completed by 2025.

(ii) *Gort Main Second Transformer*

It is planned to install a 2nd 110/33 kV transformer at Gort Main cluster substation, allowing the transfer of a nearby wind farm from the Omagh distribution system to a more direct connection to the transmission system. At the TYTFS data freeze date this project is expected to be completed by winter 2024.

(iii) *Cam Cluster*

It is planned to establish a 110/33 kV cluster substation between Limavady and Coleraine in the Cam area, connected to the existing 110 kV circuit between Coolkeeragh and Limavady. To enable future transmission development in this area SONI is progressing a Cam Substation Extension which will additionally turn in the nearby 110 kV circuit between Coleraine and Limavady. At the TYTFS freeze date this project is expected to be completed by 2029.

Energising Belfast – Belfast city centre reinforcement

The first phase of this project comprises the installation of a fourth transformer at Castlereagh and diverting the Carnmoney to Castlereagh circuit into the Finaghy substation. For the purposes of TYTFS 2024 analysis, this phase of the project is expected to be completed in 2025.

The second phase of this project includes the establishment of new 110 kV double busbar stations near Belfast North Main and Belfast Central Main and installation of new double circuit cables. For the purposes of TYTFS 2024 analysis, this phase of the project is expected to be completed in 2028.

The redundant section between Finaghy and Carnmoney will subsequently be removed.

Energising Belfast: Asset Removal

Once the necessary assets have been installed and the network reconfigured, the Carnmoney to Castlereagh circuit will be removed. The section between Finaghy and Carnmoney will be removed after Phase 1 and the Finaghy to Castlereagh section after Phase 2.

Carnmoney – Eden Reinforcement

The 110 kV double circuit between Eden and Carnmoney substation is being replaced with underground cable in Carnmoney and Carrickfergus and overhead line refurbished in the rural area in between. This will increase the Winter/Autumn/Summer rating of the circuits to 147/136/117 MVA. This is expected to be completed in 2029.

As part of this project, a 2nd 110/33 kV 90 MVA transformer is also being installed at Glengormley substation. This is expected to be completed in 2025.

Coolkeeragh 110 kV Extension

This project will facilitate the future connection of a third interbus transformer, the restoration of the second busbar coupler and section switches and other improvements at Coolkeeragh 110 kV. Following an assessment of options based on a range of criteria the preliminary preferred option selected is the extension of the existing outdoor Coolkeeragh 110 kV substation into the old bund area through treating and redistributing bund material onsite.

The estimated completion date is 2029.

2.6.3 Projects Not Included in the 2024 TYTFS Analysis

Several projects are planned but have not been included in the TYTFS analysis due to uncertainty at this time over scope, and/or timescales.

NI projects advancing in Part 1

The following projects are advancing through Part 1 with significant analysis undertaken and options identified for each. Once determined, these projects will be submitted to the Utility Regulator NI for approval and advance into Part 2.

Connect West (formerly Mid Tyrone Upgrade)

The Connect West Project will increase the capacity of the transmission network in the Mid Tyrone area through the construction of a new 275 kV circuit between Dromore and either Turleenan or Tamnamore 275 kV substations.

Armagh upgrade (formerly Armagh and Drumnakelly Reinforcement)

NIE Networks and SONI are jointly assessing the level of security of supply on the distribution system supplying Armagh and the 110/33 kV substation at Drumnakelly. This project will involve:

- Reinforcement of the distribution system in the area between Drumnakelly, Tullygoonigan and Armagh; and
- Reinforcement of the transmission system in the area between Tandragee and Armagh.

East Tyrone Reinforcement

NIE Networks and SONI are jointly assessing the level of security of supply on the distribution system supplied from the 110/33 kV substation at Dungannon. This project will involve the construction of a second 110/33 kV substation at Dungannon.

North West of NI 110 kV reinforcement

Following the completion of the 'Mid Antrim Upgrade' project, there will be a need to reinforce the 110 kV transmission system near Rasharkin, Coleraine, Limavady and Garvagh cluster (and at the proposed Cam cluster). As well as likely uprating the circuits between these substations, other options to be investigated as part of this project will include:

- A new 110 kV circuit from Cam cluster – Rasharkin; and
- A second 110 kV circuit from Coleraine – Rasharkin.

Tamnamore land purchase for substation extension

Tamnamore is a strategic 275/110 kV substation in Co. Tyrone. Several connection projects are in development nearby, and the substation will need to be extended in future to include a 3rd interbus transformer, 2nd bus coupling circuit breaker and enable further connections. To prevent the substation becoming landlocked by nearby developments, this project will procure the land to the north of the substation, enabling its future extension.

Coolkeeragh – Strabane

As a result of increasing growth in renewable generation there will be a need to provide additional transmission capacity between Coolkeeragh and Strabane 110 kV substations. Options being investigated as part of this project include:

- Uprating all circuits between Coolkeeragh, Killymallaght and Strabane; and
- Providing an additional circuit along the corridor by establishing two 110 kV circuits along the existing Coolkeeragh to Strabane double circuit towerline.

275 kV Substation Rebuilds

Castlereagh, Coolkeeragh, Kells, Magherafelt and Tandragee 275 kV substations require redevelopment due to the age and condition of the concrete A-frames used to support the flexible conductor. At this time, the preferred option for each is not yet known as optioneering is underway. Key considerations in these projects include ensuring long-term security of supply, allowing potential extension of the substations in future and managing a complex programme of outages for each rebuild, potentially through the use of the installation of additional interbus transformers.

Newry BSP

As a result of increasing demand growth in the Newry area, there will be a need to provide additional transmission capacity into Newry. Options being investigated as part of this project include:

- Uprating the existing 110 kV circuits between Newry and Tandragee; and
- Establishing a second Bulk Supply Point at Newry, supplied from Tandragee 110 kV substation.

Coleraine transformer replacement

The 60 MVA 110/33 kV transformers at Coleraine are to be replaced with new 90 MVA units to increase capacity for distribution connections. The transformers will be installed on a new alignment to enable a 110 kV mesh extension in future. As part of this work, Gruig wind farm will be transferred to Rasharkin Main to reduce distribution system loading at Coleraine.

Limavady transformer replacement

The 45 MVA 110/33 kV transformers at Limavady are to be replaced with new 90 MVA units to increase the capacity for distribution connections.

North Sperrin – renewable generation capacity

There is a significant amount of planned new renewable generation in the North Sperrin area. This project will develop a new substation in this area to enable these connections. This is a Transmission Cluster project, meaning that the connecting generators will pay for the cost of developing the substation in proportion to the amount of its capacity they use. SONI are currently developing the Transmission Cluster policy and once this is formally adopted SONI will be in a position to bring this project forward.

Offshore

To deliver the Department's Energy Strategy and associated Action Plan's initial target of at least 1GW of offshore wind from 2030. In February 2025, the Department published its updated Offshore Renewables Action Plan for Northern Ireland.[22]In one of the actions listed in that plan (D2), the Department committed to publishing a Statement of Intent with The Crown Estate. In that statement, the link between the connection of offshore windfarms to the grid and realising the offshore potential was identified as a "common priority".

The NI Executive's Energy Strategy Action Plan for 202523 commits the DfE to confirming arrangements for connection of Offshore Renewable Energy to the electricity grid (Action 2). To address part of this question, the UR has asked SONI to consider the network project(s) that would be necessary to facilitate the objectives set out in the DfE's "Enabling Frameworks" and "Electricity Networks" overarching strategic priorities that underpin that plan. [page 4 of the OREAP 2025].

Subsequent to the data freeze for this TYTFS, SONI has undertaken a high level feasibility assessment of the options available for the potential connections that would facilitate delivery of "the Energy Strategy Action Plan's initial target of at least 1GW of offshore wind from 2030".

SONI further refined the conclusions of this work in the light of the draft SEA that the DfE published in February 2025. To deliver the Northern Ireland Executive's Energy Strategy, offshore connections would need to be made to either existing substation bays or those that are already within the planning phase of the grid development process. We have therefore identified the following projects for inclusion in this TYTFS.

Ballylumford Offshore Connection Bays

Two of the existing bays at the Ballylumford 275kV substation are required to be available to connect the parties that are successful in The Crown Estate's leasing auction for the North Channel (and potentially the Irish Sea) areas. This project relates to the use of existing assets to facilitate the delivery of the NI Executive's strategy.

Coolkeeragh 275 kV Redevelopment

A number of concrete structures at Coolkeeragh are not compliant with modern standards and are need of replacement. Additionally, there is a need to install a 2nd bus coupling circuit breaker. This project will address this issue through redevelopment of the existing substation or replacement. As part of this project, two bays will be included to facilitate connection of the parties that are successful in The Crown Estate's leasing auction for the Atlantic area. The scope of this project includes assets required to facilitate the delivery of the NI executive's strategy.

22 https://www.economy-ni.gov.uk/sites/default/files/2025-02/Offshore%20Renewable%20Energy%20Action%20Plan%20for%20NI.pdf

2.7 Joint Ireland and Northern Ireland Approved Transmission System Developments

This section includes transmission system developments which both EirGrid and SONI have identified the need for.

We are proposing a new 400 kV circuit which will connect Woodland 400/220 kV station in County Meath (Ireland) and Turleenan 400/275 kV station in County Tyrone (Northern Ireland). A new 400 kV station at Turleenan is required.

At present, the transmission transfer capacity between Ireland and Northern Ireland is not sufficient. Due to the risk of a forced outage, we must limit power flows across the border to prevent stress on the grid and risk to security of supply. The North South Interconnector will deliver a more secure and reliable electricity supply throughout the island of Ireland. It will bring about major cost savings and address significant issues around the security of electricity supply.

A key benefit is that it will remove bottlenecks between the two systems. This will enable the two systems to work together as a single network. This will benefit residents and businesses on both sides of the border. Other benefits will include cost savings for consumers, as larger electricity systems operate more efficiently than smaller ones.

The North South Interconnector will also allow for greater connection of renewable generation. This will help Ireland and Northern Ireland achieve future renewable energy targets. At the TYTFS data freeze date this project is expected to be completed by the end of 2027. Once this connection is established, the constraints on the existing Tandragee-Louth 275 kV double circuit will be significantly reduced.

2.8 Connection of New Generation Stations

New generators will connect over the period covered by this statement. Table 2-6 lists the transmission system developments associated with future generation. New generators are included in the appropriate network models according to their expected connection date. Details of these generators and their expected connected dates are given in Appendix D.

Table 2-8: Transmission System Station Development to Facilitate the Connection of Future Generation

Generator	Planned Connection Method	Location
Derrymeen Battery Storage	New Derrymeen battery energy storage station, connecting into Tamnamore 110 kV station	Northern Ireland
Colinglen Battery Storage	New Colinglen battery energy storage station, connected into Hannahstown 110 kV station	Northern Ireland
Tureagh Battery Storage	New Tureagh battery energy storage station, connected into Hannahstown 110 kV station	Northern Ireland
Statkraft Coleraine Synchronous Condenser	New Coleraine HISC station, connected into Coleraine 110 kV station	Northern Ireland
Statkraft Coolkeeragh Synchronous Condenser	New Coolkeeragh HISC station, connected into Coleraine 275 kV station	Northern Ireland
Kilroot GT6	275 kV connection into Kilroot substation	Northern Ireland
Kilroot GT7	275 kV connection into Kilroot substation	Northern Ireland
Pigeon Top Wind Farm	New Pigeon Top 110 kV station, connected into Drumquin 110 kV station	Northern Ireland
Dooish Wind Farm	New Dooish 110 kV station, connected into Drumquin 110 kV station	Northern Ireland
Cam Cluster	Future Cam 110/33 kV substation is planned to be connected into the existing Coolkeeragh – Coleraine and Coleraine – Limavady 110 kV circuits	Northern Ireland
Aghada BESS 02	New Aghada Battery energy storage station, connected into Aghada 220kV station	Ireland
Ballinknockane Solar Park	New Ballinknockane 110 kV station, connected into the existing Aughinish-Kilpaddoge 110 kV circuit	Ireland
Ballinrea Solar Park	New Castletreasure 110 kV station, connected into existing Raffeen 110 kV station	Ireland
Ballymoneen Solar Park	New Gortaleva 110 kV station, connected into existing Cashla 110 kV station	Ireland

Table 2-8: Transmission System Station Development to Facilitate the Connection of Future Generation

Generator	Planned Connection Method	Location
Ballyroe Solar	New Ballynadrideen 110 kV station, connected into existing Charleville 110 kV station	Ireland
Ballyvatta Solar Farm	New Ballynabrannagh 110 kV station, connected into existing Knockraha 110 kV station	Ireland
Banemore Solar Farm	New Banemore solar farm, connected into the existing Clahane 110kV station	Ireland
Blackwater Bog Solar 1	New Blackwater Bog Solar farm, connected into Shannonbridge 220/110kV station	Ireland
Castlelost FlexGen	New 4 bay 220 kV station, connected into existing Maynooth – Shannonbridge 220 kV circuit	Ireland
Croaghonagh Wind Farm	New Croaghonagh 110 kV station, connected into Clogher 110 kV station	Ireland
Carrigdangan Wind Farm (formerly Barnadivane)	New Carrigdangan 110 kV station, connected into Dunmanway 110 kV station	Ireland
Cloghan Wind Farm	New Cloghan windfarm, connected into the existing Derrycarne 110kV substation east of Cloghan	Ireland
Clondardis Solar Farm	New Shanonagh 110 kV station, connected into existing Mullingar – Lanesboro 110 kV circuit	Ireland
Clonfad Solar Farm	New Clonfad 110 kV station, connected into existing Kinnegad – Mullingar 110 kV circuit	Ireland
Clonin North Solar Farm	New Laurencetown 110 kV station, connected into existing Derryiron 110 kV station	Ireland
Coole Wind Farm	New Lickny 110 kV station, connected into the existing Mullingar 110 kV station	Ireland
Cuilleen Power	New Cuilleen 110 kV station, connected into existing Athlone 110 kV station	Ireland
Cushaling Wind Farm	New Philipstown 110 kV station, connected into existing Cushaling – Portlaoise 110 kV circuit	Ireland
Garr Solar and Storage	New Corbetstown 110 kV station, connected into existing Derryiron 110 kV station	Ireland
Gaskinstown Solar Farm	New Deenes 110 kV station, connected into existing Baltrasna – Drybridge 110 kV circuit	Ireland
Derrinlough Wind Farm	New Stonestown 110 kV station, connected into existing Derrycarney – Dallow T / Shannonbridge 110 kV circuit	Ireland

Table 2-8: Transmission System Station Development to Facilitate the Connection of Future Generation

Generator	Planned Connection Method	Location
Drombeg Solar Park	New Drombeg 110 kV station, connected into the existing Kilpaddoge-Tralee 110 kV circuit	Ireland
Erkina Solar Farm	New Timoney 110 kV station, connected into Shannonbridge – Ikerrin Tee – Thurles 110 kV circuit	Ireland
Fieldstown Solar Farm	New Newbarn 110 kV station, connected into existing Finglas 110 kV station	Ireland
Firlough Wind Farm	New Firlough 110 kV station, connected into the existing Glenree – Moy 110 kV circuit	Ireland
Gallanstown Solar Park	New Gallanstown 110 kV station, connected into the existing Corduff-Platin 110 kV circuit	Ireland
Garreenleen Solar Farm	New Bendinstown 110 kV station, connected into existing Kellis 110 kV station	Ireland
Glen Solar Farm	New Aghaleague 110 kV station, connected into existing Garvagh 110 kV station	Ireland
Greener Ideas Profile Park	New Baldonnell 110 kV station, connected into existing Barnakyle 110 kV station	Ireland
Harristown Solar Park	New Harristown 110 kV station, connected into the existing Kinnegad-Dunfirth/Rinawade 110 kV circuit	Ireland
Huntstown MIC increase	New Mooretown 220 kV station, connected into existing Finglas–Huntstown B 220 kV Circuit and Corduff–Huntstown A 220 kV Circuit, while also forming two new 220 kV circuits Huntstown A – Mooretown and Huntstown B – Mooretown	Ireland
Kilmannock Battery Storage	New Dunbrody 110 kV station, connected into existing Great Island 110 kV station	Ireland
Kilshane Power Station	New Cruiserath 220 kV station, connected into new Cruiserath 220 kV station	Ireland
Knocknamork Wind and Solar Park	New Coomnaclohy 110 kV station, connected into existing Ballyvouskill 110 kV station	Ireland
Knockranny Wind Farm	New Ferry View 110 kV station, connected into existing Knockranny 110 kV station	Ireland
Loughteague Solar Farm	Direct connection into a designated bay of the proposed Coolnabacky 440/110 kV	Ireland

Table 2-8: Transmission System Station Development to Facilitate the Connection of Future Generation

Generator	Planned Connection Method	Location
Lumcloon Energy Storage	New Derrycarney 110 kV station, connected into the existing Portlaoise-Dallow/Shannonbridge 110 kV circuit	Ireland
Manusmore Solar Park	New Coolshamroge 110 kV station, connected into existing Drumline – Ennis 110 kV circuit	Ireland
Monatooreen Solar Park	New Monatooreen 110 kV station, connected into Knockraha 220/110 kV station	Ireland
Monvallet Hybrid Solar and Battery Farm	New Drumcamill 110 kV station, connected into existing Louth 110 kV station	Ireland
Rathnaskilloge Solar Farm	New Rathnaskilloge 110 kV station, connected into the existing Cullenagh – Dungarvan 110 kV circuit	Ireland
Oriel Wind Farm	New Oriel 220 kV station, connected into the existing Louth-Woodland 220 kV circuit	Ireland
Oweninny wind farm 3	New Oweninny windfarm 3, connected into existing Bellacorick 110kV substation	Ireland
Pinewoods Wind Farm	New Garrintaggart 110 kV station, connected into future Ballyragget – Coolnabacky 110 kV circuit	Ireland
Rosspile Solar Park	New Rosspile 110 kV station, connected into the existing Great Island-Wexford 110 kV circuit	Ireland
Shantallow Solar Park	New Shantallow 110 kV station, connected into the existing Cashla-Shannonbridge/Somerset 110 kV circuit	Ireland
Timahoe North Solar Park	New Timahoe North 110 kV station, connected into the existing Derryiron-Maynooth 110 kV circuit	Ireland
Tomsallagh Solar Farm	New Effernoge 110 kV station, connected into existing Crane – Lodgewood 110 kV circuit	Ireland
Tracystown Solar Farm	New Dennistown 110 kV station, connected into existing Wexford 110 kV station	Ireland
Yellow River Wind Farm	New Knockdrin 110 kV station, connected into existing Derryiron 110 kV station	Ireland

2.9 Connection of New Interface Stations

Transmission interface stations are the points of connection between the transmission system and the distribution system or large energy users connecting directly to the transmission system.

The planned new interface stations, for the period covered by this statement, are listed in Table 2-7. These stations are included in the network models according to their expected connection date. Details of the connections and dates are given in Section B.2, Appendix B.

Table 2-9: Planned Extension and New Transmission Interface Station

Station	Nearest Main Town or Load Centre	County
Airport Road 110 kV station	Belfast	Down
Armagh 110 kV station	Armagh	Armagh
Ballyragget 110 kV station	Ballyragget	Kilkenny
Baroda 110 kV station	Newbridge	Kildare
Bracklone 110 kV station	Portarlington	Laois
Batter Lane 110 kV station	Finglas	Dublin
New 110 kV station near Kilbarry	Cork	Cork
Walterstown 110 kV station	Meath	Meath

2.10 Detailed Transmission Network Information

Appendix A includes maps and schematic diagrams showing snapshots of the all-island transmission system as of January 2024 and the planned transmission system expected by the end of 2033. The diagrams indicate stations, circuits, transformers, generation, reactive devices and phase shifting transformers.

The electrical characteristics and capacity ratings of the existing and planned transmission system are included in Appendix B. Characteristics of existing and planned overhead lines, underground cables, transformers and reactive compensation devices are provided.

3. Demand

This chapter provides information on the all-island, Ireland, and Northern Ireland demand forecasts.

3.1 Introduction to Demand Forecast Data

The forecasts are taken from the All-Island Generation Capacity Statement 2023-2032 (GCS) which was published by EirGrid and SONI in January 2024. The GCS 2023 contains forecasts of future energy consumption and demand levels between 2023 and 2032. This chapter also describes the anticipated large demand increase in the Dublin area. This potential demand increase is associated primarily with the connection of new large energy users such as data centres. The impact of these data centres on the future all-island demand forecast is also discussed.

3.2 Transmission Demand Forecast

Table 3-1 presents the median all-island, Ireland and Northern Ireland, Winter Peak demand forecast over the period 2023-2032, as published in the GCS. It is difficult to accurately predict a peak demand figure for a particular year in the future. This is due to several factors that can cause fluctuations in the forecast, such as weather conditions, economic activity, electricity usage patterns, and government policy.

The annual peak demand figures listed in Table 3-1 are expected to occur during winter of each year. In Ireland and Northern Ireland, the Winter Peak demand usually occurs between 17:00 and 18:00 on a weekday evening in the months of January or December.

The median demand forecast represents an average annual increase in all-island Winter Peak demand of 2.6% over the period of 2023-2032[23]. This represents an increase in demand forecast relative to GCS 2022-2031, when the forecast average annual increase in all-island Winter Peak demand was 2.06%[24].

Table 3-1: All-island, Ireland and Northern Ireland Median Peak Demand Forecast

Connection	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Northern Ireland (GW)	1.62	1.56	1.60	1.64	1.68	1.75	1.78	1.80	1.83	1.85	1.90
Ireland (GW)	5.47	5.74	5.90	6.07	6.25	6.38	6.49	6.59	6.72	6.88	7.04
All-island (GW)	6.86	7.21	7.43	7.64	7.87	8.06	8.19	8.31	8.47	8.65	8.87

23 The cumulative forecast in demand over the period of GCS 2023-2032 is 29.3%
24 The cumulative forecast increase in demand over the period of GCS 2022-2031 was 22.7%

As well as Winter Peak forecasts, we also develop Summer Peak and Summer Valley forecasts for Ireland and Northern Ireland, and Autumn Peak forecasts for Northern Ireland.

The Summer Peak demand refers to the average peak demand levels that are forecast to occur during the summer period of each year. The Ireland and Northern Ireland Summer Peaks are combined to produce an all-island Summer Peak.

The overall transmission system power flows are usually lower in summer than in winter. However, this may not be the case for flows on all circuits. The capacity of overhead lines is lower during the summer period because of higher ambient temperatures. Network maintenance is also usually carried out during the summer/autumn period. Both factors can restrict the network, reducing its capability to transport power.

The annual minimum expected demand is referred to as the Summer Valley. It represents the lowest annual demand that is forecasted and is expected to occur during the summer of each year. The Ireland and Northern Ireland SummerValley demands are combined to produce an all-island Summer Valley demand. The Summer Valley cases examine the impact of the combination of low demand and low levels of conventional generation on the transmission system.

This minimum condition is of particular interest when assessing the capability of the transmission system to connect new generation. This is because with local demand at a minimum, the connecting generator will export more of its power across the transmission system. The Summer Peak and Summer Valley demands occur between March and August. The Autumn Peak demand refers to the peak demand value expected in September and October.

Summer Peak, Summer Valley and Autumn Peak demand forecasts can be expressed in terms of percentage of Winter Peak demand. These are shown in Table 3-2.

Table 3-2: Ireland and Northern Ireland Seasonal Demand Forecast as a Percentage of Winter Peak Demand

Season	Ireland Seasonal Demand Forecast as a Percentage of Winter Peak (%)	Northern Ireland Seasonal Demand Forecast as a Percentage of Winter Peak (%)
Winter Peak	100	100
Autumn Peak	N/A	87
Summer Peak	80	79
Summer Valley	35	29

These figures are consistent with historical demand data.

3.2.1 Dublin Area Demand

Background

Over the past few years, the number of connections and requests to connect to the transmission network in the Dublin area has increased. This document includes information on both current demand connections and future demand opportunities at the freeze date of January 2024. Our assessment of demand opportunities is presented in Chapter 8 and includes sections focused on the Dublin area and data centres.

The level of enquiries in the Dublin area is principally driven by the need for Information, Communications and Technology (ICT) industries, electrification of heat and transport and high-tech manufacturing companies to connect to a high-quality power supply in the Dublin area.

New interface points that connect the Transmission System and Distribution System, also called Bulk Supply Points (BSP) are being planned. The justification for the new BSPs in Dublin is to supply the projected electricity demand growth in this area, including increasing demand related to residential, commercial and electrification of the heat and transport sectors.

A summary of the Bulk Supply Points that are being planned is as follows:

- New Fingal East Meath Bulk Supply Point Station and associated new grid connection[25];
- New Dublin Central Bulk Supply Point Station and associated new grid connection; and
- New South Dublin Reinforcement Bulk Supply Point Station and associated new grid connection.

25 Approved after data freeze date.

Data Centres

As of 1st January 2024, there are thirteen large scale data centres connected to the Transmission System and five connected to the 110 kV Dublin distribution system. The total annual energy consumption at these sites for 2023 was 5.82 TWh. The maximum combined power demand of these data centres was 706 MVA.

Contracts are in place for a total of 1912.6 MVA of large-scale data centre connections to the transmission system or the 110 kV Dublin distribution system[26].

What is a data centre?

A data centre is a facility used to house computer systems and associated components, such as telecommunications and storage systems. They underpin the operations of companies in the broad ICT sector, particularly those in social media and cloud computing. The size of the individual electricity demand connections depends on the scale of the business operation. These have varied from 20 MW with some possibly extending to 250 MW in the final stages of development. Their use of electricity tends to be constant throughout the year. The modern world increasingly requires the retention and use of vast volumes of data, so this trend is likely to continue for the foreseeable future.

Impact on the System Demand Forecast

The potential connection of data centre demand on the scale discussed represents significant demand growth. This is having an impact on the all-island system demand forecast and generation capacity adequacy. Generation adequacy is assessed and discussed in the GCS.

SONI has issued a connection offer for a data centre in the North West which is expected to connect at Coolkeeragh 110kV. If this offer is accepted, this might have an impact on the generation and demand opportunities in the North West.

3.3 Demand Data

Electricity usage follows some generally accepted patterns. For example, annual peak demand occurs between 17:00 - 19:00 hrs on winter weekday evenings. Minimum usage usually occurs during summer weekend night-time hours.

26 As of 1st January 2024.

3.3.1 Generated Peak Demand Profiles

Figure 3-1 shows the generated peak demand profiles of Ireland and Northern Ireland in 2023, on the day of the all-island winter peak on 05 December. The individual peaks in 2023 for Ireland and Northern Ireland did not occur on the same day. Peak demand for Ireland occurred on 04 December 2023, while peak demand occurred in Northern Ireland on 16 January 2023[27].

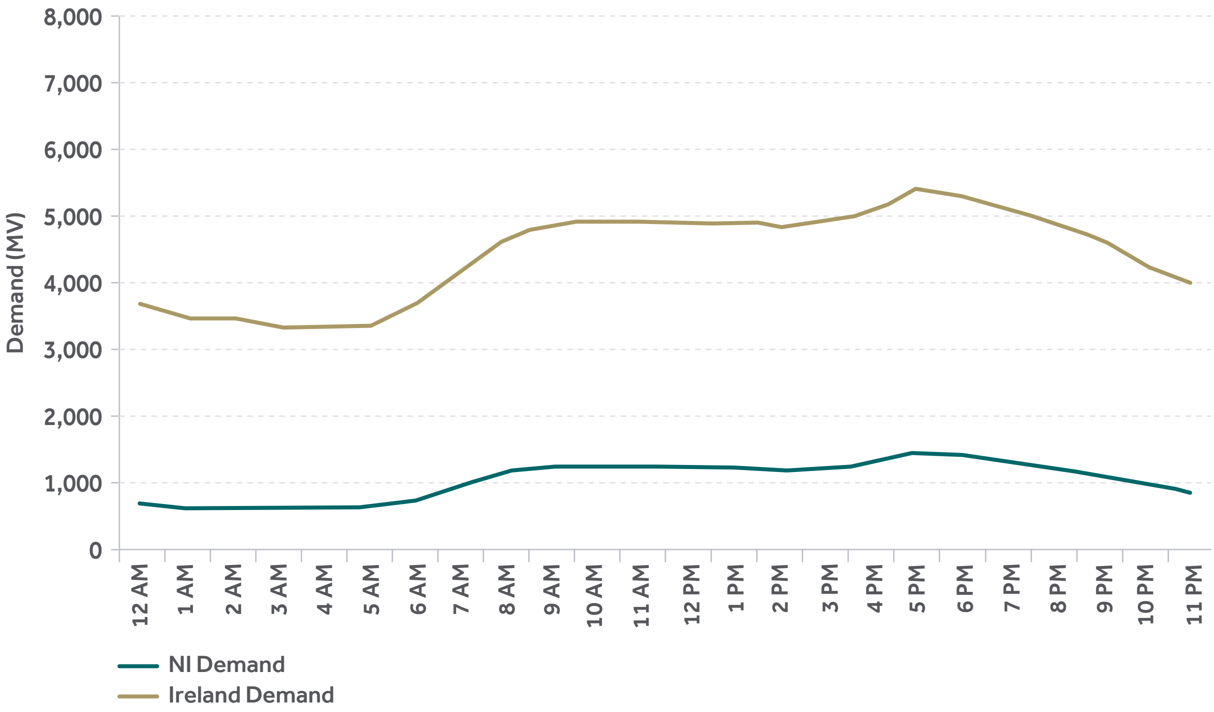


Figure 3-1: Generated Peak Demand Profiles for 2023

3.3.2 All-Island Demand Profiles

Figure 3-2 shows the profiles of the 2023 all-island Winter Peak, Summer Peak and Summer Valley. The percentage demand attributable to each jurisdiction during the peak and valley scenarios is also shown.

The day of minimum demand, occurring within each calendar year, is usually observed during summertime. The levels of minimum demand that are scrutinised by this report pertain to measurements taken at Bulk Supply Points (BSPs) on the transmission network. The contributions of small-scale generation, such as rooftop solar, are not disaggregated from the coincident gross demand requirement, and thus potentially serve to mask underlying trends in end-user demand patterns.

27 After data freeze date, a new all-island winter peak has been set since, on 08 January 2025, when demand reached 7.5 GW. This winter peak demand will be considered in coming versions of this Statement

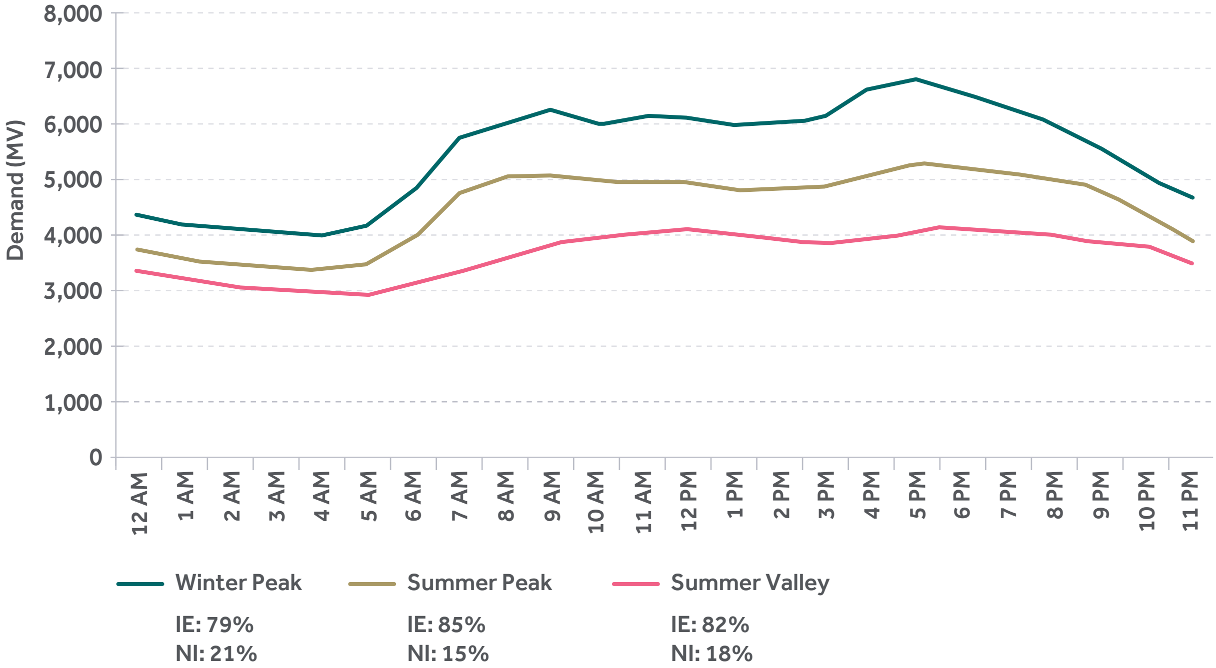


Figure 3-2: 2023 All-island Winter Peak, Summer Peak, and Summer Valley demand profiles

Table 3-3: Ireland and Northern Ireland Peak and Minimum Demand, 2023

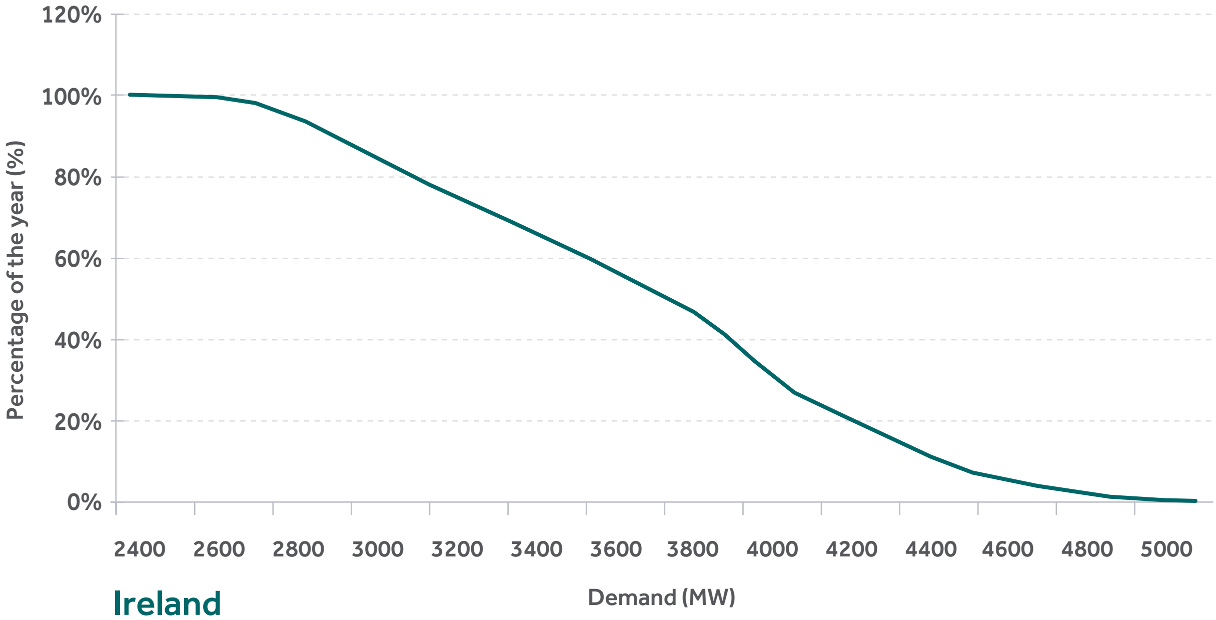
2023	Ireland		Northern Ireland	
	Date and Time	Demand (MW)	Date and Time	Demand (MW)
Winter Peak	04/12/2023 17:30	5442	16/01/2023 17:15	1470
Summer Peak	04/05/2023 17:15	4336	24/05/2023 17:15	1059
Minimum Demand	02/08/2023 05:30	2495	16/07/2023 05:15	393

3.3.3 All-Island Weekly Demand Peaks

Figure 3-3 shows the profile for the Ireland, Northern Ireland and All-Island weekly peaks during 2023.

3.3.4 Load Duration Curves

Figure 3-4 show the Ireland and Northern Ireland 2023 load duration curves, respectively. The curves show the percentage of time in the year that a particular demand value was exceeded. For example, demand exceeded 3750 MW in Ireland for 50% of the time. Demand in Northern Ireland exceeded 850 MW for 50% of the year.



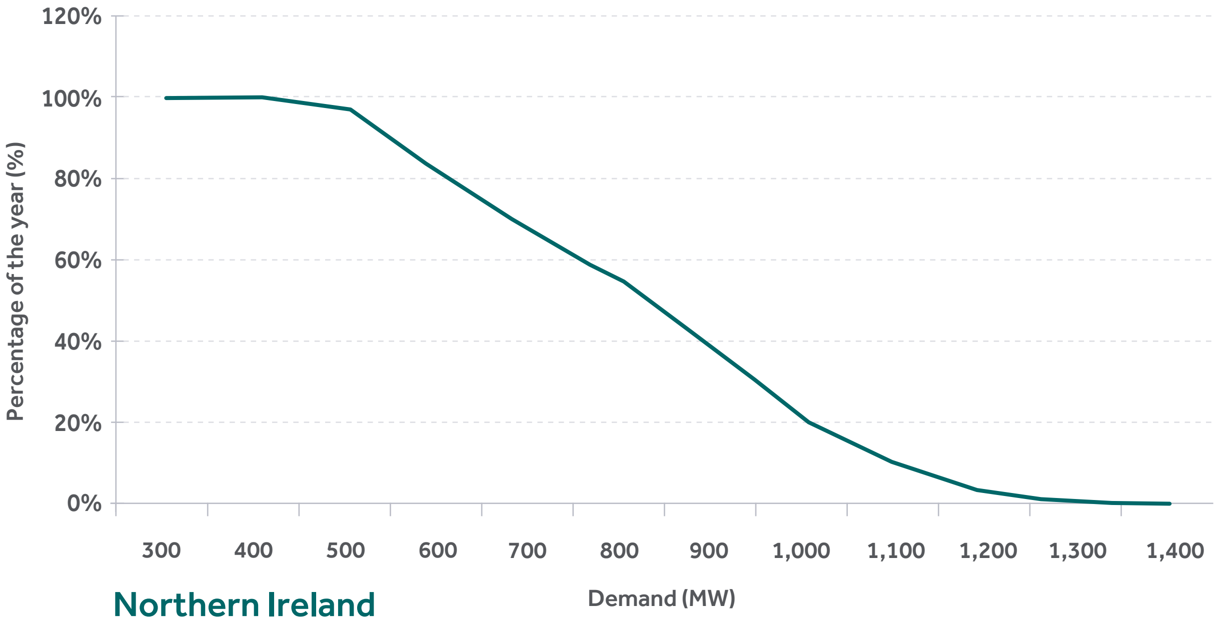


Figure 3-3: Load duration curves for Ireland and Northern Ireland

3.4 Forecast of Electrical Demand at Transmission Interface Stations in Ireland

Transmission interface stations are the points of connection to the transmission system. These interfaces include:

- Connections between the transmission and the distribution systems; and
- Customers connected directly to the transmission system at 220 kV or 110 kV.

The interfaces are mostly 110 kV stations. In Dublin city, where the Distribution System Operator (DSO) operates the 110 kV network, the interface is usually at 220 kV stations. The Transmission System Operator (TSO) and the DSO work collaboratively to ensure that the needs of transmission and distribution connected customers are met through planning the development of these transmission interface stations.

Appendix C lists forecast demands at each transmission interface station. The forecast demands are given for Winter Peak, Summer Peak and Summer Valley for all years from 2024-2033. Demand projections at individual transmission stations are developed from the system demand forecasts on a top-down basis. This approach takes the overall demand forecast and breaks it down using transmission system information, including historical data, to gain better knowledge of the sub-components of the demand forecast.

The forecasting process includes regular monitoring and review of consumption trends in all parts of the country. The allocation of the system demand forecast to each station is pro-rata. This is based on an up-to-date measurement of actual peak demand at each station. Account is taken of planned transfers of demand between stations, as agreed with the DSO (ESB Networks). In this way, changes in the location of electricity consumption are captured. This process provides a station demand forecast and by extension a regional demand forecast for the short to medium term.

The system-wide demand forecasts, presented in Table 3-1, include transmission losses whereas the individual station demand forecasts do not. Transmission losses therefore account for the difference between system-wide demand and the sum of the demand at each interface station. The demand at each interface is given in Appendix C.

Demand forecasts in Appendix C include the small number of directly connected customers. The values in Appendix C were the best estimates of requirements at the data freeze date and do not reflect contractual status or the level of firm capacity that may be available in the network. In some cases, the estimates may be less than contracted maximum import capacity (MIC) values. These values are chosen to give a better projection of expected demand on a system-wide basis. When analysing the capacity for new demand in a particular area, the MIC values of local directly connected and contracted customers are used. It is important to note that some contracted MIC is non-firm and subject to flexible demand arrangements.

A demand-side unit (DSU) consists of one or more demand sites that can be instructed by EirGrid and SONI to reduce electricity demand. DSUs are usually medium to large industrial premises. A DSU uses a combination of on-site generation or plant shutdown to deliver a demand reduction. Providing this dispatch availability means that the DSU is eligible for capacity payments in the Single Electricity Market (SEM).

It is noted that DSUs may reduce some customers' demands from time-to-time over Winter Peak hours. However, normal demand levels are included in the Winter Peak demand forecasts shown in Table C-1 in Appendix C. Normal demand levels are also used in the power flow tables in Appendix H. These normal demand levels are used since they are more indicative of general power flows.

It is identified that there are emerging needs for additional transformer capacity at transmission interface stations in the Dublin area to accommodate forecasted growth of electricity demand due to large energy users, electrification of heat and transport and growth in commercial connections in the distribution network.

3.5 Forecast Demand at Northern Ireland Bulk Supply Points (BSP)

The 110/33 kV BSP demand forecasts are provided by NIE Networks, the DSO in Northern Ireland. These forecasts are based on demand trends at an individual nodal level and adjusted to align with system average cold spell (ACS) forecasts. ACS analysis produces a peak demand which would have occurred had conditions been averagely cold for the time of year. This ACS adjustment to each Winter Peak seeks to remove any sudden changes caused by extremely cold or unusually mild weather conditions. Consideration is also given to future block load transfers from one BSP to another. Tables and information relating to demand forecasts are contained in Appendix C.

4. Generation

This chapter provides information about existing generation capacity and defines future projections for the next ten years from 2024 to 2033.

All generation capacity and dispatch figures given in this statement are expressed in exported or net terms. This is the generation unit output less the unit's own auxiliary load.

In December 2023 the Irish Government published the next iteration of its Climate Action Plan (CAP) 2024. The 2024 plan reflects increased ambitions for the decarbonisation of Ireland's economy, including measures to meet the revised targets of renewable sources (RES-E) introduced in the 2023 update. The 2023 CAP increased the proportion of renewable electricity required to 80% by 2030 and a target of 9 GW from onshore wind, at least 5 GW of offshore wind energy plus 2 GW for green hydrogen production, 8 GW from solar including 2.5 GW of new non-utility solar, and finally green hydrogen production from renewable electricity surplus generation. In order to meet this target, and the requirements introduced under the 2024 CAP, investment will be needed in new renewable generation capacity, system service infrastructure and electricity networks.

In Northern Ireland, the United Kingdom's Committee on Climate Change advised that it is necessary, feasible and cost-effective for the UK to set a target of net zero Green House Gas (GHG) emissions by 2050. The new Climate Change Act (Northern Ireland) 2022 (legislation.gov.uk) came into effect on 08 June 2022. The revised legally binding target towards net zero emissions covers all sectors of the economy. This update to the Order demonstrates the UK's commitment to targeting a challenging ambition in line with the requirements of the Paris Agreement on climate change.

Energy Policy is a devolved matter for Northern Ireland, and the DfE has worked with stakeholders, including SONI, and developed the Energy Strategy for Northern Ireland. It sets out a pathway for energy to 2030 that will mobilise the skills, technologies and behaviours needed to take us towards our vision of net zero carbon and affordable energy by 2050. Subsequent Energy Strategy Action Plans were published in 2022, 2023 and 2024.

The Climate Change Act (Northern Ireland) 2022 sets a new target of 80% of electricity consumption to come from renewable energy sources by 2030. The Department for Agriculture, Environment and Rural Affairs (DAERA) on behalf of the Northern Ireland Executive has published a draft Green Growth Strategy[28]. The Green Growth Strategy is the Northern Ireland Executive's multi-decade strategy, balancing climate, environment and the economy in Northern Ireland.

28 https://www.daera-ni.gov.uk/articles/green-growth-strategy

The Department for the Economy has consulted on a Draft Offshore Renewable Energy Action Plan, which contains the ambition to deliver 1GW of offshore wind from 2030[29]. The Department has also consulted on the design considerations for a Renewable Electricity Support Scheme for Northern Ireland[30].

A freeze date of January 2024 was applied when compiling this TYTFS.

4.1 Generation in Ireland

At the data freeze date 13,291 MW of generation capacity was installed in Ireland, as detailed in Table 4-1.

4.1.1 Existing and Planned Transmission Connected Generation

Table 4-2 lists planned generators that have signed transmission connection agreements in place not yet connected, along with their expected energisation dates if available, at the data freeze date. It should be noted that this position might have changed somewhat since the data freeze date.

Table 4-1: Installed Generation Capacity in Ireland

Transmission System Connected (MW)	Distribution System Connected (MW)	Total Generation Capacity (MW)
10,590	2,701	13,291

29 https://www.economy-ni.gov.uk/consultations/draft-offshore-renewable-energy-action-plan
30 https://www.economy-ni.gov.uk/consultations/design-considerations-renewable-electricity-support-scheme-northern-ireland

Table 4-2: Contracted Transmission Generation at data freeze date

Generator	Generation Type	Generation Capacity (MW)	Expected Energisation Date
Aghada BESS 02	Battery	159	2024
Arklow Banks 2	Offshore	800	2027
Ballinknockane	Solar	50	2025
Banemore Solar farm	Solar	34	2024
Bellewstown	OCGT	3 x 57[31]	2026 & beyond
Blackwater Bog Solar 1	Solar	65	2025
Carrownagowan Wind Farm	Wind	91.2	2026 & beyond
Castlebanny	Wind	138.8	2026 & beyond
Clonfad Solar	Solar	100	2025
Codling 1	Offshore	483	2027
Codling 2	Offshore	483	2027
Codling 3	Offshore	483	2027
Cushaling Windfarm	Wind	50	Data unavailable
Derrygreenagh	CCGT	100	2026 & beyond
Drehid	Wind	60	2026 & beyond
Drombeg	Solar	50	2025
Dublin Array	Offshore	824	2027
Erkina	Solar	66.6	2025
Firlough	Wind	48.30	2027
Gallanstown	Solar	119	2024
Gaskinstown	Solar	85	2024
Glen Solar	Solar	40	2024
Golagh	Wind	60	2026 & beyond
Harristown	Solar	42.3	2025

31 Three different units of 57 MW connected to Navan 110 kV substation

Table 4-2: Contracted Transmission Generation at data freeze date

Huntstown BES	Battery	10	2026 & beyond
Kish Battery (Crag)	Battery	114	2026 & beyond
Laghtanvack Bellacorick	OCGT	2 x 57[32]	2026 & beyond
Loughteague Solar Park	Solar	55	2026
Milltown Solar	Solar	115	2026 & beyond
Moanvane Windfarm	Wind	60	2024
Monatoreen	Solar	25.7	2025
Mully Graffy Windfarm (Kilgorman)	Wind	29.9	2026
NISA Belcamp	Offshore	500	2027
Oriel (1)	Offshore	210	2027
Oriel (2)	Offshore	160	2027
Oweninny 3	Wind	50	2027
Pinewoods Windfarm	Wind	49.5	2025
Poolbeg Energy Storage	Battery	75	2027
Porterstown Battery storage facility	Battery	30	2025
Rathnaskilloge	Solar	95	2024
Shannonbridge B	Battery	63.2	2025
Skerd Rocks	Offshore	450	2027
Southbank	OCGT	315	2026 & beyond
Tarbert G5	OCGT	315	2026 & beyond
Timahoe North	Solar	70	2024
Tullabeg Phase 2	Solar	105	2026 & beyond
Yellow River Windfarm	Wind	110.2	2025

32 Two different units of 57 MW connected to Bellacorick 110 kV substation

4.1.2 Planned Closure of Generation Plant

The closure of a generation plant could have a significant impact on the ability of the transmission system to comply with standards. The EirGrid Grid Code specifies the minimum length of notice a generator must give the TSO before retirement or divestiture. The closure of a generator with capacity less than or equal to 50 MW requires at least 24 months' notice. Generators with larger capacity than this must give at least 36 months' notice.

Some older generators will come to the end of their lifetimes over the next ten years. Some generators are also assumed to close as they don't comply with the carbon limits imposed by the Clean Energy Package. These generators are noted in the All-Island Generation Capacity Statement 2023-2032 (GCS) and are listed in Table 4-3. In line with this, On 29 September 2021, the CRU published a Programme of Actions to increase generation capacity to provide additional stability and resilience to the Irish energy system for the next four or five years. Under the published Programme of Work, the CRU, in conjunction with EirGrid and the DECC, developed several Key Actions to be delivered by this group. Potential capacity shortfalls will continue to be assessed, and action plans will be further developed and updated as necessary to maintain the security of the electricity supply.

Table 4-3: Closure of Conventional Generation[33]

Generator	Generation Capacity (MW)	Expected to close by end of year
Moneypoint 1,2,3	750	2025 [34]
Edenderry 1	118	2030

33 As per data freeze date January 2024
34 EirGrid notes that these units may be retained beyond this date for security of supply purposes. Information stated on last GCS and new All-Island Resource Adequacy Assessment

4.1.3 Wind and Solar Generation

Over the past two decades, wind power generation in Ireland has increased significantly. The level of wind generation in Ireland is expected to continue to grow over the period of this TYTFS.

Although grid scale solar generation connected to the network is currently not significant, solar connections are expected to increase significantly over the course of this TYTFS. The information presented in Figure 4-1 is a combination of connected and contracted wind and solar generation as of data freeze date[35].

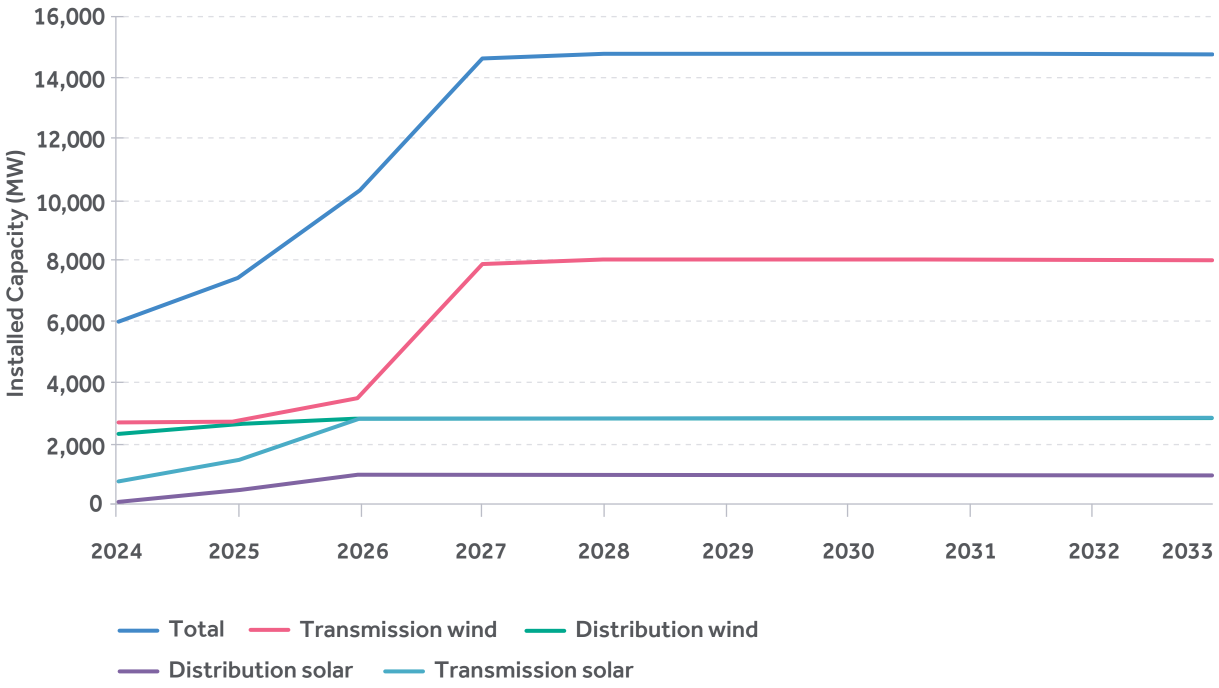


Figure 4-1: Connected and Contracted Wind and Solar Capacity, 2024 to 2033

Table 4-4 shows the existing and committed wind and solar generation capacity totals expected to be connected by the end of each year[36]. These generators have signed connection agreements and are committed to connecting to either the transmission or distribution system over the next few years. Generators with no estimated connection dates were assumed to connect at a steady rate from 2024 onwards.

35 Detailed information on these figures is presented in Tables D-2 and D-3 in Appendix D.
36 The individual wind farm details are included in Tables D-2 and D-3 of Appendix D.

Table 4-4: Existing and Committed Wind and Solar Capacity Totals (MW)

Connection	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Wind (Transmission)	2683	2791	3583	7891	7891	8051	8051	8051	8051	8051
Wind (Distribution)	2369	2624	2844	2844	2844	2844	2844	2844	2844	2844
Solar (Transmission)	790	1486	2866	2866	2866	2866	2866	2866	2866	2866
Solar (Distribution)	141	517	999	999	999	999	999	999	999	999
Total	5893	7418	10292	14600	14760	14760	14760	14760	14760	14760

4.1.4 Offshore Generation

In December 2023, the Irish Government launched the Climate Action Plan 2024 which includes an action to develop Designated Maritime Area Plans (DMAPs) for Offshore Renewable Energy (ORE) following the Offshore Renewable Energy Development Plan II (OREDP II)

The Climate Action Plan 2024 re-iterates the targets for renewable electricity of 80% by 2030 and a target of 9 GW from onshore wind, 8 GW from solar, and at least 5 GW of offshore wind energy by 2030.

In order to meet the Climate Action Plan targets, investment will be needed in new renewable generation capacity. Offshore wind will be a significant part of the renewable generation mix in the future. Currently there is one 25 MW offshore wind farm in Ireland. The Climate Action Plan outlines that at least 5 GW of offshore wind will be connected to the grid by 2030.

Regarding Offshore Phase 1, in May 2023, EirGrid completed the first offshore renewable energy auction (ORESS-1) on behalf of Department of the Environment, Climate and Communications (DECC). EirGrid is currently supporting over 4 GW of Phase 1 offshore projects through the design process.

4.1.5 Demand Side Units

In 2024, demand side units (DSUs) in Ireland had a combined dispatchable capacity of 589 MW.

4.1.6 Distribution-Connected Generation

Table 4-5 details the existing distribution-connected generation capacity by generation type. This generation plant comprises of small conventional and renewable units. Conventional units include CHP schemes and small industrial thermal units. Renewable generation consists of:

- Wind;
- Small Hydro;
- Land-fill gas (LFG);
- Biogas; and
- Biomass.

Table 4-5: Existing Distribution-Connected Generation in Ireland at Data Freeze date

	Wind[37]	Small Hydro	Biomass/ LFG	CHP	Diesel	Solar	Total
Net Capacity (MW)	2369	8.3	106	95	0	141	2719
Total	5893	7418	10292	14600	14760	14760	14760

Distribution-connected generators reduce the demand supplied through Transmission Interface Stations. Forecasts of demand levels at individual Transmission Interface Stations are presented in Appendix C. These forecasts take account of the contribution of the existing non-wind distribution-connected generators[38].

4.2 Generation in Northern Ireland

At the data freeze date 4,063MW of generation capacity was installed in Northern Ireland, as detailed in Table 4-6.

Table 4-6: Northern Ireland Installed Generation Capacity

Transmission System Connected (MW)	Distribution System Connected (MW)	Total Generation Capacity (MW)
2,261[39]	1802	4063

The 2,261MW connected to the transmission system consists of:

- Conventional generation,
- Battery Storage; and
- Transmission connected windfarms.

4.2.1 Existing and Planned Transmission Connected Generation

Planned Conventional Generation

New capacities at Kilroot KGT6 and KGT7 that were successful in the 2023/24 & 2024/25 T-4 capacity auctions and became available in the first half of 2024.

37 Table D-3 in Appendix D provides details of the existing distribution-connected wind farms and their capacities.
38 Because of the variability of wind, a fixed contribution from distribution-connected wind farms is not considered in the calculation of the peak transmission flow forecasts. Rather a number of wind scenarios are considered in the TYTFS analyses.
39 Please note this figure does not include the Moyle Interconnector capacity.

4.2.2 Closure of Generation Plant

Kilroot ST1 and ST2 did not qualify for inclusion in the T-4 2023/24 auction in April 2020 and the owner subsequently issued a Closure Notice for ST1 and ST2. Both units closed on 30th September 2023.

4.2.3 Northern Ireland Renewable Generation

Existing/Approved Renewable Generation

Existing and approved renewable generation in NI is shown geographically in Figure 4-2.

The totals are derived from locational and capacity information[40] on:

- Large scale renewable generation schemes that are connected to the Northern Ireland network;
- Small scale renewable generation schemes with installed capacity at each Bulk Supply Point (BSP) greater than 0.5 MW;
- Large scale schemes that are currently in construction; and
- Schemes approved by the planning service.

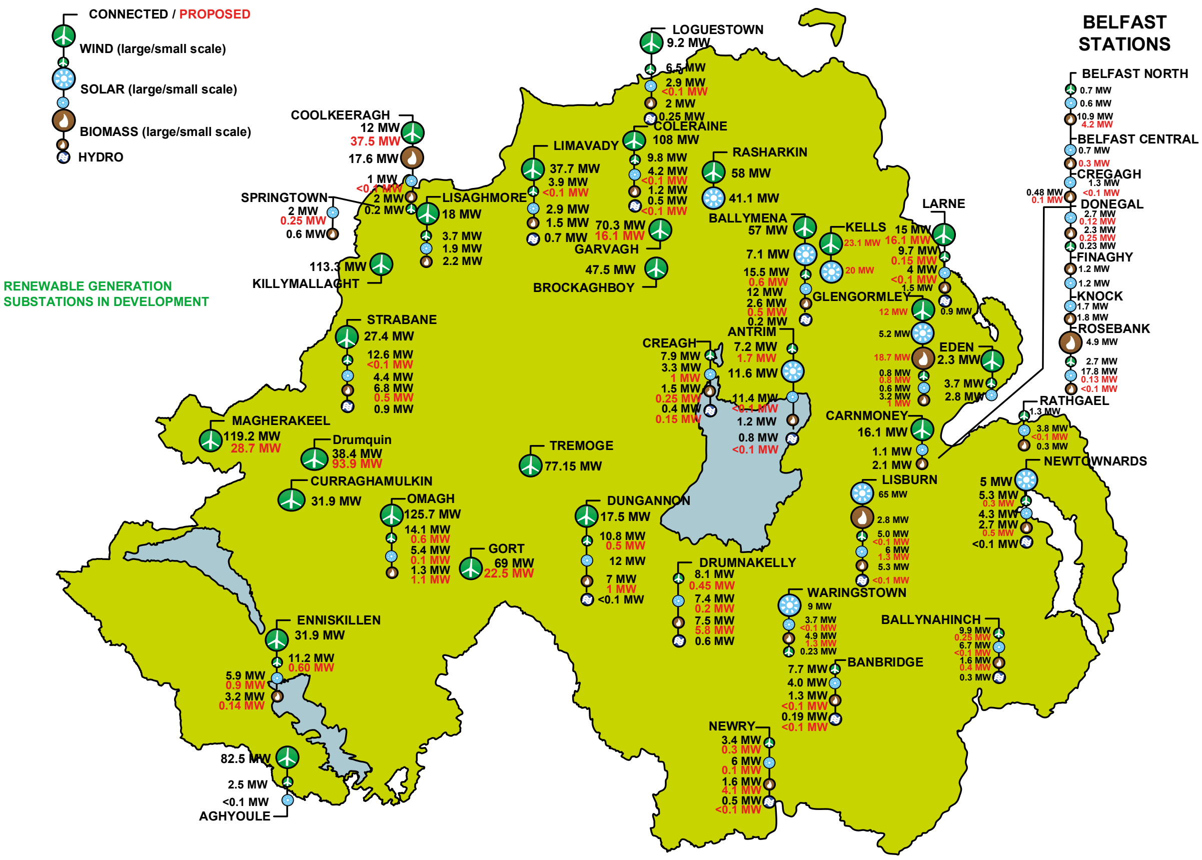


Figure 4-2: Existing and Approved Northern Ireland Renewable Generation

40 As at data freeze date – January 2024.

The map indicates points at which renewable generation is connected to or is assumed to connect to. These points include 110/33 kV Bulk Supply Points and 110/33 kV Cluster substations[41].

Figure 4-3 shows the expected change in wind and solar generation in Northern Ireland. Only committed generators are included.

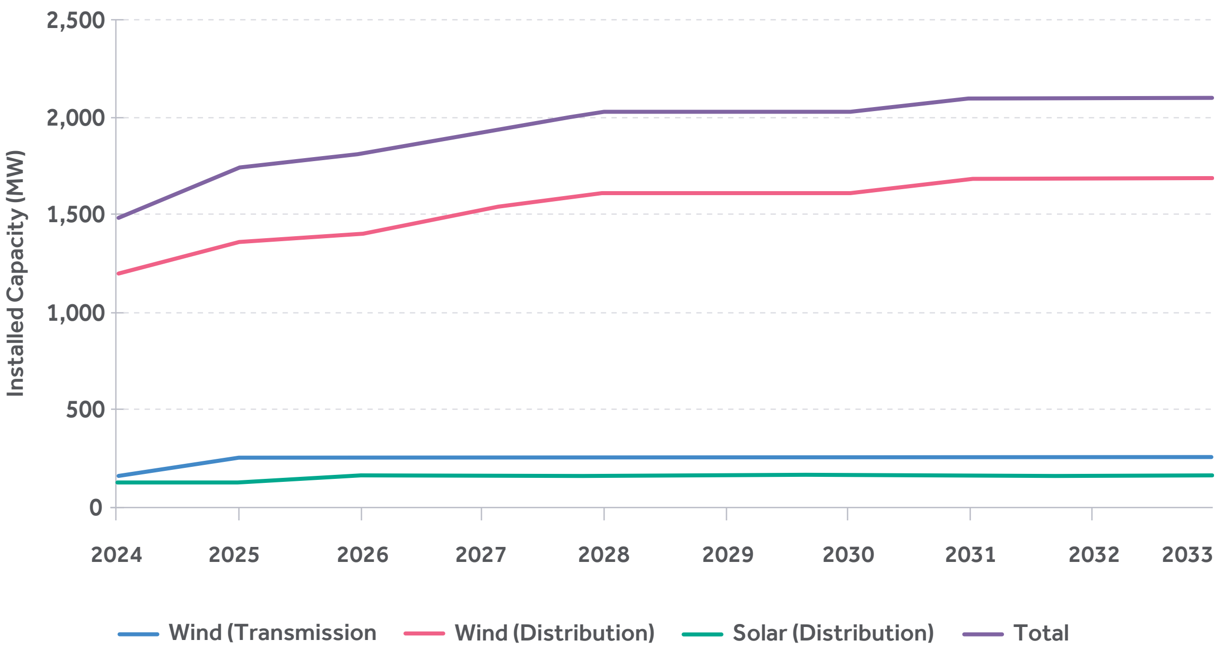


Figure 4-3: Connected and Contracted Wind and Solar Capacity in Northern Ireland, 2024 to 2033

Table 4-7 shows the existing and committed wind and solar generation capacity totals expected to be connected by the end of each year[42]. These wind and solar farms have signed connection agreements and are committed to connecting to either the transmission or distribution system over the coming years.

41 A Cluster substation is a 110/33 kV substation in the vicinity of a number of wind farms. It acts as a local hub to group or "cluster" the wind farms. The wind farms are connected by short individual 33 kV lines to the Cluster substation. Cluster substations already exist at Magherakeel, Tremoge, Gort, Rasharkin and Curraghmulkin, with a further two planned at Agivey and Kells (see Chapter 2). SONI is responsible for the delivery of the transmission elements of the Cluster substation, in line with the criteria set out in 'Statement of Charges for Connection to the Northern Ireland Electricity Networks' Distribution System': https://www.nienetworks.co.uk/statementofcharges

42 The individual wind farm details are included in Tables D-2 and D-3 of Appendix D.

Table 4-7: Existing and Committed Wind and Solar Capacity Totals (MW)

Connection	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Wind (Transmission)	163	252	252	252	252	252	252	252	252	252
Wind (Distribution)	1195	1360	1407	1524	1609	1609	1609	1690	1690	1690.3
Solar (Distribution)	126	126	159	154	161	161	161	161	161	161
Total	1484	1738	1818	1930	2022	2022	2022	2103	2103	2103

Offshore Renewable Generation

Our assumptions regarding the level and location of offshore renewable generation connected to the NI transmission system are based on best information available at the data freeze date.

For the purpose of this TYTFS analyses we assumed that there will not be any offshore renewable generation connected as at present there are no connection agreements in place. We will continue to monitor the progress with a view to incorporating offshore renewable generation if available in future TYTFS analyses.

4.2.4 Demand Side Units

In 2024, demand side units (DSUs) in Northern Ireland had a combined dispatchable capacity of 165MW.

4.2.5 Distribution-Connected Generation

Existing Distribution-Connected Generation

Table 4-8 shows a breakdown of the existing Northern Ireland distribution-connected generation. In Northern Ireland there is more small-scale Generation compared to Ireland.

Table 4-8: Northern Ireland Distribution-Connected Generation

Generation	Net Capacity (MW)
Large Scale Wind	1195
Small Scale Wind	163
Large Scale Biomass	17
Small Scale Biomass, CHP, and Landfill Gas	81
Large Scale Solar	134
Small Scale Solar	126
Small Scale Hydro	6
AGU	80
Total	1802

There is a total of 80 MW of Aggregated Generating Units (AGUs) in Northern Ireland registered in the SEM by three parties. Two of these AGUs, iPower and EmPower, consist of mostly distribution connected diesel generator sets located around Northern Ireland. The third, ContourGlobal, consists of CHP gas generation. These units currently participate in the SEM.

There is currently 6 MW of small-scale hydro generation installed on the waterways of Northern Ireland. This is a mature technology. Due to the lack of suitable new locations, limited increase in the small-scale hydro is expected in the foreseeable future.

5. Transmission System Performance

This chapter describes the future performance of the transmission system in terms of compliance with planning standards in the respective jurisdictions. System performance levels are assessed using forecast power flows and short circuit levels.

The power flow and short circuit analyses results presented in this document are based on updated information such as changes to transmission infrastructure, new demand projections and new generation connections, with a data freeze date of January 2024.

5.1 Forecast Power Flows

The power flows on the all-island transmission system, at any given time, depend on a number of factors, such as:

- The transmission system configuration;
- The level of demand;
- Interconnector flows; and
- The power output from each generator.

There are many possible combinations of generator dispatches that can meet the demand requirements. There are also many demand scenarios that may occur on the transmission system.

When examining transmission system performance a range of economic generation dispatches are considered. The generation dispatches used in our power flow analysis are prepared on an all-island basis. Power flows across the existing 275 kV and planned 400 kV internal[43] interconnectors are modelled to operate within transfer limits. The dispatch scenarios also consider imports and exports of power across the existing and planned interconnectors which are considered for this year's TYTFS analyses.

Transmission system power flows are described in Appendix H. The power flow tables show the flow of real power on the transmission system under normal conditions.

The level of renewable generation increases over the ten-year period under study. As renewable generation increases, power flows from the West of the island to the East can be seen to increase. This is because renewable power generated in the Western regions is supplying the larger demand levels in the East (Belfast and Dublin). These increased power flows are more significant at times of minimum demand and high renewable generation output.

Another effect that can be seen in Appendix H is the effect of increased renewable generation levels on reactive power requirements on the transmission system. At high levels of renewable generation, reactive power support is needed to keep voltages within planning standard limits.

43 Internal to the all-island transmission system. These are the interconnectors between Ireland and Northern Ireland. This type of interconnector is also known as a tie line.

5.2 Compliance with Planning Standards

The transmission system is planned and operated to technical requirements and standards in Ireland and Northern Ireland. These requirements are laid out in the Transmission System Security and Planning Standards (TSSPS) documents. These standards are in line with best international practice.

The standards are deterministic, meaning they set out an objective standard which delivers an acceptable compromise between the cost of development and service delivered. Rather than conducting subjective benefit analysis in each case, it is preferable to plan to meet an objective standard and carry out analysis of the options available to meet the standard.

The need for transmission system development is identified when the simulation of future conditions indicates that the TSSPS would be breached.

5.2.1 Ireland

EirGrid's view of future transmission needs and our plan to develop the Irish network through specific projects to meet these needs over the next ten years is presented in our Transmission Development Plan (TDP IE). The TDP IE presents the projects which are currently being advanced to solve the needs of the transmission network. In addition, future needs that drive potential projects are also discussed in the TDP IE.

It is possible that changes will occur in the need for, scope, and timing of the developments in the TDP IE. Similarly, it is likely, given the continuously changing nature of electricity requirements, that new developments will emerge that could impact the plan as presented. The long-term development of the network is under review on an on-going basis.

TYTFS 2024 includes transmission system development projects that have progressed through step 4 of the six-step Framework for Grid Development and are under development.

5.2.2 Northern Ireland

The Northern Ireland transmission projects included in TYTFS 2024 are based on the Transmission Development Plan Northern Ireland (TDPNI). Capital projects are mainly driven by increases in Northern Ireland demand levels and renewable generation connections. Planned developments also include load related and asset replacement projects. These projects mainly impact on the rating of switchgear and circuits.

It is possible that changes will occur to the developments outlined in the TDPNI. Similarly, it is likely, given the continuously changing nature of electricity requirements, that new developments will emerge that could impact the plan as presented. The long-term development of the network is under review on an on-going basis.

TYTFS 2024 includes transmission system development projects that have received approval to be built as per data freeze date.

5.3 Short Circuit Current Levels

Short circuit currents occur during a fault condition on the transmission system. Depending on the type of fault, these short circuit currents can be very high. All transmission system equipment must be capable of carrying these very high currents.

Protection devices, in particular circuit breakers, must be capable of closing onto high currents created by a fault on the transmission system. They must also be capable of interrupting high currents to isolate a fault. Correct operation is essential for minimising risk to personnel and preventing damage to transmission equipment. Correct operation of protection devices is also necessary for maintaining system stability, security and quality of supply.

Short circuit current levels must be considered as the transmission system is developed and as new generation or demand is connected. In Ireland the EirGrid Grid Code specifies the allowable short circuit current levels at the different voltages; these values are shown in Table 5-1. Users connecting to the transmission system are required to design their plant and apparatus to these specified levels. Equipment at lower voltage levels must also be designed to withstand short circuit current levels.

Table 5-1: Short Circuit Current Levels

<table>
<tr><th rowspan="2">Voltage Level (kV)</th><th colspan="3">Short Circuit Current Levels (kA)</th></tr>
<tr><th colspan="2">Ireland</th><th>Northern Ireland</th></tr>
<tr><td>400</td><td colspan="2">50</td><td>50</td></tr>
<tr><td>275</td><td colspan="2">n/a</td><td>40</td></tr>
<tr><td>220</td><td colspan="2">40</td><td>n/a</td></tr>
<tr><td rowspan="2">110</td><td>Countrywide</td><td>25</td><td rowspan="2">40</td></tr>
<tr><td>Designated sites</td><td>31.5</td></tr>
</table>

Table 5-1 also includes short circuit requirements for new users connecting to the Northern Ireland transmission system. Northern Ireland system users are recommended to design their plant and apparatus to withstand short circuit current levels set out in Table 5-1, as a minimum. The design of a user's plant is also subject to detailed short circuit current level assessment. Changes to the transmission system or the addition of generation can increase the short circuit current levels at nearby[44] stations.

Forecast increases in short circuit current levels can indicate transmission system equipment at risk of having its rating exceeded. Should this be the case, it may be necessary to replace this equipment with higher rated plant. Risk mitigation measures may also be implemented to reduce short circuit current levels. Short circuit current levels are calculated for all transmission system nodes in accordance with engineering recommendation G74. Engineering recommendation G74 is based on international standards.

The analysis was carried out for single and three phase faults in both winter peak and summer valley studies. Short circuit current levels were assessed for the years 2024, 2027 and 2030, and the results are presented in Section 5.3.1.

A description of the calculation methods used is given in Appendix E. Appendix E also provides the results of the short circuit analysis alongside an explanation of the terms used in short circuit discussions in this document.

Winter peak analysis is carried out to represent the most onerous transmission system conditions, where maximum short circuit currents on the transmission system are most likely to occur. During winter peak analysis, generators that are not providing real or reactive power are switched on in the study and dispatched at zero MW. This measure allows short circuit current contributions from all generator sources to be considered in the studies and ensures the most onerous, but credible conditions are used for the calculation of short circuit current levels at each bus.

Analysis of summer valley is carried out to indicate minimum short circuit currents on the transmission system based on intact network conditions. The minimum short circuit current at each bus is dependent on generation dispatch and transmission system conditions.

During summer valley analysis, generators that were not dispatched were not connected to the system, except all the storage capacity units switched on in the study and dispatched at zero MW.

44 This means stations that are electrically nearby, which does not necessarily mean those geographically closest.

Both the maximum and minimum short circuit current level studies assume that the transmission system is in the normal intact condition. The generation dispatches for the winter peak and summer valley studies are presented in Appendix D.

The results presented in Section 5.3.1 are the total busbar short circuit current levels. Short circuit current that could flow through each individual circuit breaker may be less than the total busbar short circuit current. This is dependent on network configuration and conditions.

Customers requiring the expected minimum short circuit current level at a particular bus are advised to contact the TSO directly, as planned and forced outages may reduce the short circuit level further.

5.3.1 Assessment of Short Circuit Current Levels in Ireland

The transmission system in Ireland is designed and operated to maintain short circuit current levels below the levels in Table 5-1.

The TSSPS includes standards for, amongst others, voltage range and deviations, maximum thermal loading of grid equipment, system security, dynamic stability, and short circuit current levels (also known as fault current levels). The TSSPS is used in the planning timeframe (i.e. five to ten years ahead) and the short circuit standard is set out in such a way that potential breaches are detected in a timeframe so a mitigation can be implemented.

EirGrid plans the system so that the short circuit levels (both make and break short-circuit currents) shall not be greater than 90% of equipment ratings. In most cases, this corresponds to saying that, for three-phase or single-phase-to-earth faults, planned maximum break short-circuit fault levels shall not be greater than: 400 kV: 45 kA, 220 kV: 36 kA, 110 kV: 23.4 kA (or 28.35 kA at designated 110 kV locations). By this we mean that breaches of the 90% equipment rating should trigger EirGrid to develop solutions, new circuits, or uprate equipment to either reduce. As Table 5-1 indicates, while most 110 kV stations in Ireland are designated as 25 kA, the EirGrid Grid Code stipulates that certain 110 kV stations may be designated as 31.5 kA. A new station could be designated as 31.5 kA from the start, or an existing 25 kA station may be changed to 31.5 kA. When a station changes from 25 kA to 31.5 kA, the equipment at that station may need to be modified. Station equipment at lower voltages may also need to be replaced in order to comply with this design rating.

Short circuit current results are presented in Appendix E. The results for Ireland include X/R ratios, transient AC (Ik') and subtransient AC (Ik'') currents. These results provide an indication of the strength of the transmission system.

5.3.2 Assessment of Short Circuit Current Levels in Northern Ireland

The Northern Ireland transmission system is designed and operated to maintain short circuit current levels below equipment ratings. These ratings are listed in the tables in Appendix E, Section E.6.3. The individual substation ratings are based on the lowest rated equipment at each substation.
The Northern Ireland results in Appendix E include transmission substation ratings for:

- AC & DC X/R Ratios;
- Initial Short Circuit Current (I'');
- Peak Make Current (ip); and
- RMS Break Current (IB).

The I'' and ip values are used to assess the necessary rating of electrical equipment required to close onto short circuit currents. The IB values are used to assess the capability of electrical equipment required to open and break short circuit current.

5.3.3 Maximum Short Circuit Current Results

Short circuit current results show that a number of Ireland and Northern Ireland transmission nodes have short circuit current levels with the potential to be close to or exceed acceptable levels. Careful management of these issues is needed to ensure short circuit currents remain within acceptable levels.

The system is always operated to keep short-circuit currents within the standards. Our study methodology assumes all units are online in order to give the most conservative results. In real operation, this would be very unusual and short circuit currents can be monitored in the real-time Energy Management System. In addition, there are options such as sectionalizing the network that can be used to reduce short-circuit values.

Figure 5-1 indicates the locations where short circuit current levels are high in 2028. In Ireland the short circuit current level results are represented as a percentage of the levels specified in the Grid Code which are outlined in Table 5-1.

In Northern Ireland the short circuit level results are represented as a percentage of actual equipment ratings.

Three short circuit level ranges are represented in Figure 5-1:

- Yellow dots represent substations where short circuit current results are between 80% and 90% of the ratings;
- Orange dots represent substations where short circuit current results are between 90% and 100% of the ratings; and
- Red dots indicate substations where the short circuit current results exceed ratings.

There are a number of stations where short circuit current levels are anticipated to be above 80% of standard levels and these are indicated in Figure 5-1. We continue to monitor short circuit current levels at all stations and if required we will put mitigation plans and measures in place to ensure that they remain within safety standards. Mitigations include operational measures such as sectionalising parts of the network and investing in new equipment.

The short circuit ratings of Castlereagh, Kells, Magherafelt, Tandragee and Coolkeeragh 275 kV substations in Northern Ireland have been reduced to 10 kA. NIE Networks has undertaken a review of the design of concrete structures at these substations and compared the design with standards that have been issued since these structures were built.

Strictly applying these modern standards, the mechanical force exerted on the structures during fault conditions would limit these to a rating of 10 kA. SONI is bringing forward projects to modernise all of these substations. These projects are currently in the optioneering phase, and SONI are not currently in a position to offer any further connections into these substations until a better understanding of the preferred redevelopment option is reached, which is expected to be before 2026.

SONI and NIE Networks are also bringing forward redevelopment projects at all five substations to address this issue.

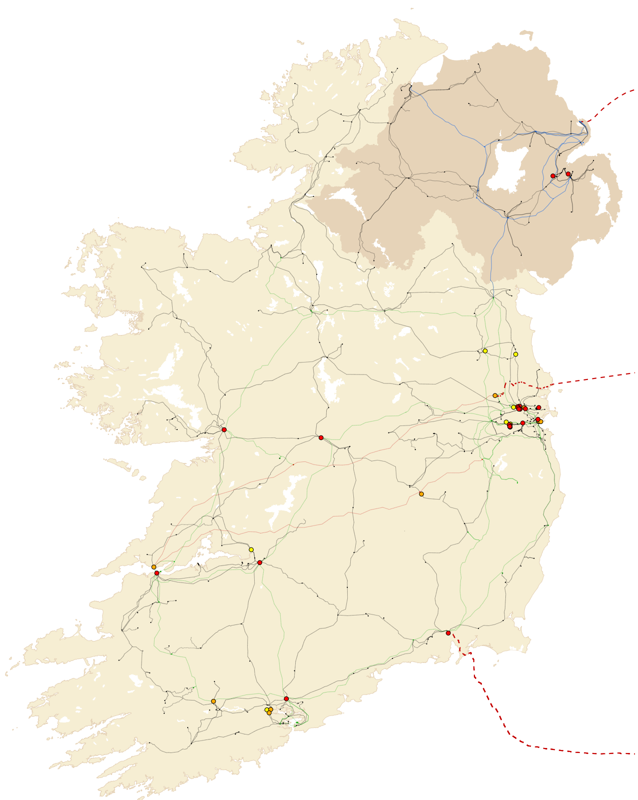


Figure 5-1: Short Circuit Current Levels for Winter Peak 2028

Table 5-2 below provides information on the transmission nodes for 2024; 2027; and 2030 where the short circuit current level is above 90% of the relevant level[45].

Table 5-2: Nodes Exceeding Short Circuit Current Levels (Rating ≥ 100)

Substation	[kV]	Jurisdiction
	2024	
Barnakyle	110	Ireland
Cloghran	110	Ireland
College Park	110	Ireland
Corduff	110	Ireland
Corkagh	110	Ireland
Kilmahud	110	Ireland
Kilpaddoge	110	Ireland
	2027	
Aungierstown	110	Ireland
Baldonnell	110	Ireland
Barnakyle	110	Ireland
Barnageeragh	110	Ireland
Cashla	110	Ireland
Castlebagot	110	Ireland
Cloghran	110	Ireland
Clutterland	110	Ireland
College Park	110	Ireland
Coolnanoonagh	110	Ireland
Corkagh	110	Ireland
Kilcarbery	110	Ireland
Killonan	110	Ireland

45 In Ireland these results are presented as a percentage of the short circuit current levels specified in the Grid Code which are outlined in Table 5-1, with the exception of KLN/Killonan 110 kV which is presented as a percentage of actual equipment ratings. In Northern Ireland they are a percentage of actual equipment ratings.

Table 5-2: Nodes Exceeding Short Circuit Current Levels (Rating ≥ 100)		
Kilmahud	110	Ireland
Kilpaddoge	110	Ireland
Kishoge	110	Ireland
Knockraha	110	Ireland
Shannonbridge	110	Ireland
Snughborough	110	Ireland
Cruiserath	220	Ireland
Finglas	220	Ireland
Inchicore	220	Ireland
Mooretown	220	Ireland
	2030	
Cregagh	110	Northern Ireland
Hannastown	220	Northern Ireland
Aungierstown	110	Ireland
Baldonnell	110	Ireland
Ballymoneen	110	Ireland
Barnageeragh	110	Ireland
Barnakyle	110	Ireland
Belcamp	220	Ireland
Cashla	110	Ireland
Castlebagot	110	Ireland
Cloghran	110	Ireland
Clutterland	110	Ireland
College Park	110	Ireland
Coolnanoonagh	110	Ireland

Table 5-2: Nodes Exceeding Short Circuit Current Levels (Rating ≥ 100)		
Corduff	110	Ireland
Corduff	220	Ireland
Corkagh	110	Ireland
Cruiserath	220	Ireland
Finglas	220	Ireland
Great Island	110	Ireland
Inchicore	220	Ireland
Kilcarbery	110	Ireland
Killonan	110	Ireland
Kilmahud	110	Ireland
Kilpaddoge	110	Ireland
Kishoge	110	Ireland
Knockraha	110	Ireland
Mooretown	220	Ireland
North Wall	220	Ireland
Poolbeg	220	Ireland
Shannonbridge	110	Ireland
Snughborough	110	Ireland

Table 5-3: Nodes approaching Short Circuit Current Levels (90≤ Rating <100)		
Substation	**[kV]**	**Jurisdiction**
	2024	
Ballylumford	110	Ireland
BAFD	110	Ireland
STRA	110	Ireland
Coolnabacky	110	Ireland
Cashla	110	Ireland
Clashavoon	110	Ireland
Inchicore	110	Ireland
Kilbarry	110	Ireland
Knockraha	110	Ireland
Shannonbridge	110	Ireland
Snughborough	110	Ireland
Corduff	220	Ireland
Cruiserath	220	Ireland
Finglas	220	Ireland
Inchicore	220	Ireland
	2027	
Culmore	110	Ireland
Ballylumford	110	Ireland
Clashavoon	110	Ireland
Inchicore	110	Ireland
Marina	110	Ireland
Monatooreen	110	Ireland

Table 5-3: Nodes approaching Short Circuit Current Levels (90≤ Rating <100)		
Trabeg	110	Ireland
Belcamp	220	Ireland
Castlebagot	220	Ireland
Huntstown	220	Ireland
Poolbeg	220	Ireland
2030		
Donegall	110	Northern Ireland
Castlereagh	110	Ireland
Clashavoon	110	Ireland
Coolnabacky	110	Ireland
Inchicore	110	Ireland
Marina	110	Ireland
Monatooreen	110	Ireland
Trabeg	110	Ireland
Castlebagot	220	Ireland
Huntstown	220	Ireland
Irishtown	220	Ireland
Kilpaddoge	220	Ireland
Moneypoint	220	Ireland
Shannonbridge	220	Ireland
Southbank	220	Ireland
Woodland	220	Ireland

5.3.4 Rating Breaches

Transmission Stations in Ireland
Where the Rating Has Been breached

The short circuits shown in the tables were identified in the worst-case winter peak scenario.

Studies indicate that the short circuit current levels at a number of substations in the Dublin area have the potential to exceed 100% of the existing substation ratings. The increase in short-circuit current levels at Dublin stations is due to high levels of generation in the area combined with the network topology.

Outside Dublin area, Cashla, Shannonbridge, Killonan, Kilpaddoge and Knockraha substations have also the potential to exceed 100% of the existing substation ratings.

EirGrid, as TSO, manages these levels in real-time through operational switching and generator dispatch. We will be putting mitigation plans and measures in place to ensure that the short circuit current levels at these stations remain within safety standards.

Northern Ireland Stations
Where the Rating Has Been Exceeded

(i) Castlereagh, Coolkeeragh, Kells, Magherafelt and Tandragee 275 kV
The short circuit rating of these stations has been reduced to 10 kA following a review by NIE Networks of the design of concrete structures at these substations when applying design standards that have been issued since these structures were built. Under these modern standards, the mechanical force exerted on the structures during fault conditions limits these to a rating of 10 kA. Investigation works have found the structures to be in an acceptable state.

(i) SONI and NIE Networks are bringing forward redevelopment projects at all five substations to address this issue. It is not currently possible to offer connections into these substations until a better understanding of the preferred development option has been reached, which SONI expects will be before 2026.

(i) Cregagh and Hannahstown 110 kV
The completion of the energising Belfast project will increase fault levels in Belfast. Energising Belfast is a project to build 2 new switching substations in Belfast, Corporation Street and York Street, and establish 110 kV linkup between Hannahstown, Donegal, York St, Crop St, Central, Cregagh and Castlereagh. NIE Networks are planning to refurbish Cregagh substation during the RP7 price control period, which will include higher rated switchgear. The switchgear at Hannahstown will also be replaced with higher capacity equipment to enable the Energising Belfast project.


EirGrid

5.3.5 Minimum Short Circuit Current Results

The minimum short circuit current results are presented in Appendix E. These results indicate minimum short circuit currents on the transmission system based on intact network conditions. These results are representative of the assumed generation dispatch and transmission system conditions.

The Moyle interconnector requires a minimum system strength of 1500 MVA to prevent commutation failure while for EWIC a system strength of greater than 1000 MVA is specified for normal operation. As shown in Appendix E, these levels are met in the period covered by this TYTFS.

The ENTSO-E HVDC code (applicable to Greenlink and Celtic interconnectors) requires that HVDC units shall be capable of operating within the range of short circuit power and network characteristics specified by the Transmission System Operator.

Any parties requiring the expected minimum short circuit current level at a particular bus are advised to contact us directly.

6. Transmission System Capability

This chapter describes the analysis conducted to determine the capability of the transmission system to accommodate additional demand and generation.

6.1 Introduction

The results of these studies provide the basis for the statements of opportunity discussed in Chapter 7 and Chapter 8. The ability of the system to accommodate new generation and new demand varies throughout the year. As system planners, Eirgrid and SONI must ensure that the Transmission System Planning Standards are not breached under reasonable contingencies when the system is most stressed

6.2 All-Island Demand Opportunity Analysis

The all-island demand opportunity analysis is conducted for a single year, 2029. This year gives developers a useful indication as to the demand opportunities that exist in the medium-term on the transmission system. Studies are conducted for the summer period and the winter period of 2029/2030.

In Northern Ireland the demand opportunity analysis provides an indication of capability of the backbone[46] transmission network to accommodate additional demand. In Ireland, the locations analysed for new demand have been carefully chosen based on feedback from industry sources to align with areas that are of interest to customers seeking connection to the transmission system.

The results of these studies are dependent on generation and demand assumptions, and completion dates of transmission system development projects. Factors that may influence the results are discussed in Section 6.4.

6.2.1 Approach to Calculation of Demand Opportunities

The transmission system is planned to meet forecast demand levels at all stations in Ireland and Northern Ireland. The demand forecast for each 110 kV station is a proportion of the overall system demand forecast. This forecast is based on historical demand distributions. Future demand customers that have signed connection agreements are also included in station demand forecasts as presented in Chapter 3.

Additional demand connections above the forecast levels are not explicitly catered to in transmission system development plans. However, capacity for additional demand on the transmission system may exist in certain locations. For example, the addition of transmission system infrastructure generally provides a step increase in transmission system capacity. This addition may permit demand connections higher than forecast levels, as illustrated in Figure 6-1.

46 The backbone transmission system connects local area networks together, enabling the efficient bulk transfer of electricity around the country and beyond.

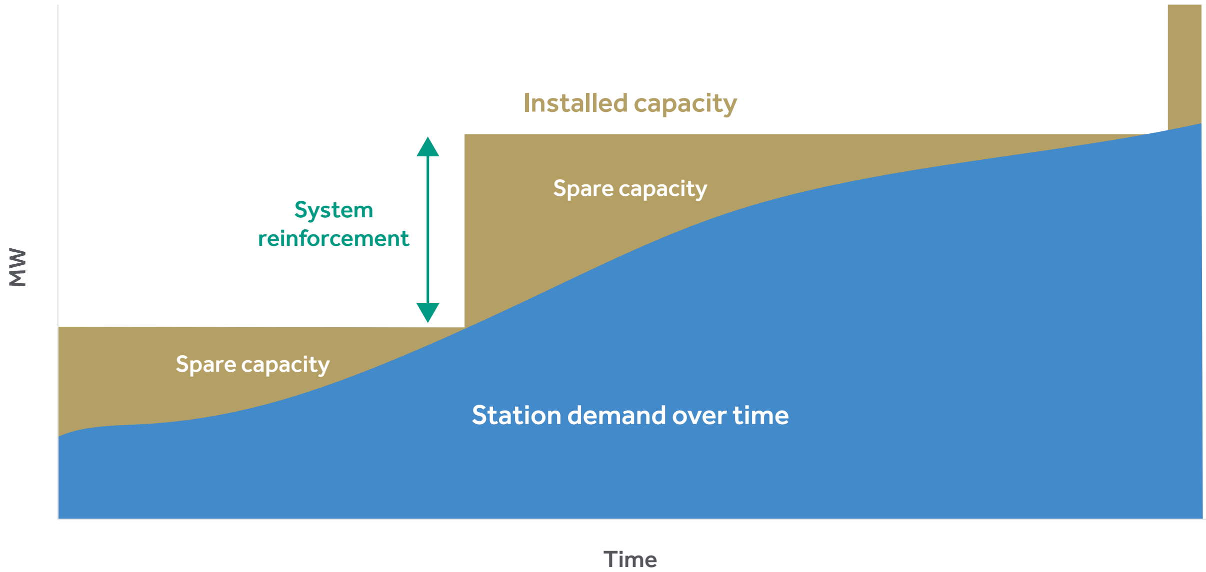


Figure 6-1: Illustration of Typical Step Change in System Capacity Due to the Addition of Transmission System Infrastructure

In Figure 6-1 the blue line represents the required MW capacity at a particular location on the transmission system. The red line represents the installed transmission system capacity. As Figure 6-1 shows, changes in installed capacity generally appear as a step increase following completion of a network reinforcement project.

In general, demand for electricity increases over time. Figure 6-2 below displays the typical demand growth profile of a typical station. The blue line represents the demand forecast at the station. The green arrows represent potential new step increases in demand that could potentially be accommodated at this typical station.

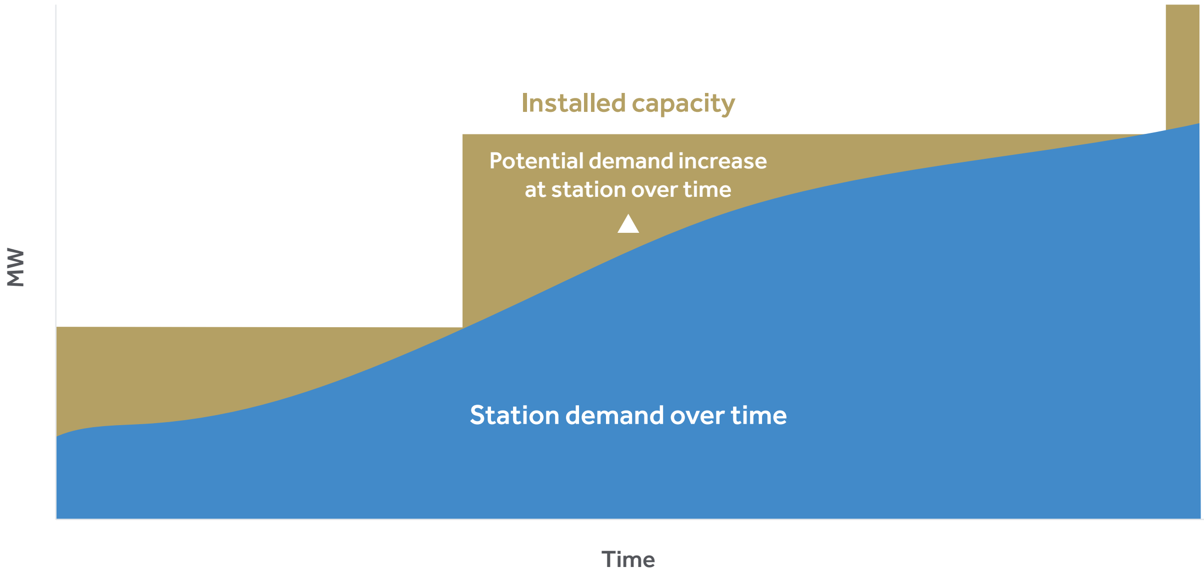


Figure 6-2: Forecast Demand Profile of a Typical Station and Station Potential to Accommodate Additional Step Increase in Demand

The analysis examines the transmission system's capability to accept such increased demand above forecast levels. Capability to accept additional demand is examined at particular 110 kV, 220 kV and 275 kV stations. The stations analysed are distributed throughout Ireland and Northern Ireland, as shown in section 8. The results of this analysis are useful in identifying opportunities for the connection of new or increased demand.

The opportunity value calculated is a measure of the transfer capability remaining in the physical transmission system. It provides an indication of the flexibility of the transmission system to accommodate future demand increases before additional reinforcements are required.

The transfer analysis is intended as a pre-feasibility indication of opportunity for increased demands. The method for determining capacity closely aligns with pre-feasibility study techniques.

In Ireland, the Ireland Transmission System Security and Planning Standards (TSSPS) are applied in the analyses of demand opportunities. The transmission system is assessed for the loss of any single item of plant (N-1). Unlike generators, demand stations are typically not dispatchable. It is therefore necessary to assess the transmission system performance against standards for maintenance-trip contingencies (N-1-1) in the analysis of increased demand in Ireland.

In Northern Ireland, the Northern Ireland Transmission System Security and Planning Standards (TSSPS) have been applied for analyses of demand opportunities. The transmission system is assessed for loss of any single item of transmission plant (N-1) and loss of a double circuit (N-DCT) all year round. During the summer season the Northern Ireland transmission system is also assessed for maintenance-trip (N-1-1) contingencies for specific cases.

Voltage analysis is performed as part of the demand capacity studies in both Ireland and Northern Ireland. This is because the addition of demand can act to depress system voltages.

6.2.2 Method for Calculating Limits for Increased Demand Connections

Specialised power system software is used to screen critical contingencies for thermal overloads or voltage limitations.

What is a load flow?

A load flow is a numerical analysis of the flow of electricity in a power system based on fundamental physics and electrical characteristics of the system. Load flow analysis is used to calculate values such as voltage, current, and power flowing around the transmission system, given a defined generation dispatch and system demand level.

Power transfers are considered using dispatch scenarios typically experienced on the transmission system. While these dispatches are typical, we choose them for our analysis to stress the network in terms of power transfers.

By analysing different scenarios that stress the transmission system, we can reasonably try to ensure that the demand opportunities reported in our analysis will not breach our Transmission System Security and Planning Standards. The conventional units selected for each dispatch scenario align with market projections for the study year 2027.

Modelling Details: Single N-1 and Double Circuit (N-DC) Contingency Studies

- Generators are modelled with their maximum output equivalent to their Maximum Export Capacity (MEC); and
- Local wind generation is switched out in the vicinity of the test station.

Modelling Details: Maintenance Trip Studies (N-1-1)

- Generators are modelled with their maximum output equivalent to their Maximum Export Capacity (MEC); and
- Some centrally-dispatchable generation local to the test station is maximised to its MEC value.

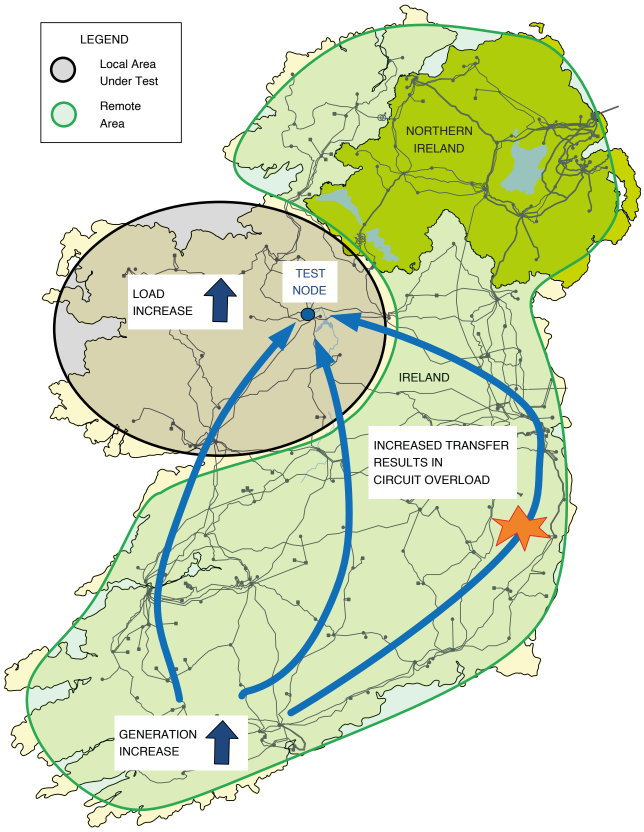


Figure 6-3: Illustration of incremental transfer capability study method for assessing demand opportunities

To calculate the opportunity, demand at 0.95 power factor is added to a test station in increasing amounts. This is balanced by an increase in generation[47] outside the local test area. This is illustrated in Figure 6-3 above.

The limit for increased transfers to the test station is then established. This is achieved by checking the post-contingency performance of the transmission system against thermal and voltage standards. This process is carried out for each dispatch scenario studied. Issues on the transmission system are not considered limiting unless they are sensitive to the incremental transfers under examination.

Calculation of Results

As noted above we undertake a range of contingency studies (N-1, N-1-1, N-DCT) to calculate the capability for increased demand at each station studied. For the maintenance-trip studies (N-1-1) in Ireland, less onerous generation dispatches can be scheduled to accommodate maintenance outages.

The results of this analysis are reported in Chapter 8. The demand opportunity reported is the lowest demand increase achieved from the range of studies undertaken. It is important to note that results of the demand opportunity analysis are indicative only.

47 Generation increased as per merit order.

Demand opportunity is tested at each station on an individual basis. As such, the opportunities presented are not cumulative. If new demand connects in an area that is currently shown to have capacity, this will then use up some or all of the available capacity in that area.

Potential demand customers should not be discouraged by choosing a site in which there appears to be a lack of transmission system capacity. The actual transmission capacity can only be determined during the connection offer process. Early consultation is encouraged so that options can be explored relating to any potential proposals and enable timely decision making.

Customers considering connecting demand to the transmission system are advised to contact us as early in the project as possible.

6.2.3 Calculation of Dublin Demand Capability

The Dublin region is the largest demand centre on the all-island transmission system. Dublin has been and remains the focus of continued interest for the connection of new large demand. There has been a significant increase in the number of enquiries and applications for new demand connections in the Dublin region and its environs in recent years. Many of these requests are for data centres. Data centres present relatively flat load profiles that impact on both the minimum and maximum demand requirements in the region.

The Dublin 220 kV transmission network is operated by EirGrid, the transmission system operator (TSO). The meshed Dublin 110 kV network is operated by ESB Networks, the distribution system operator (DSO). System development and operation in the area requires both system operators to work closely together. This is to ensure power flows are optimised and to facilitate new connections. Due to the volume of demand enquiries and applications received for the Dublin area, and their potential impact, Section 8.3 of this document focuses on the demand opportunities in the Dublin region.

The methodology used to assess demand opportunities in the Dublin region is based on the existing transmission system. It also includes criteria, such as how each zone is expected to develop, and the associated lead times for project delivery.

6.2.4 Calculation of Demand Capability in Northern Ireland and Ireland outside Dublin

This section provides a general example of the analysis of the capability of any station studied in Chapter 8 to accept additional new demand. The assessment is carried out by simulating the transmission system for summer peak and winter peak 2029. The station is tested to accommodate increased demand. The relevant demand forecasts and generator dispatches are used.

Due to its intermittency, wind or solar generation cannot be relied on to be available to meet demand. Therefore, all wind and solar generation in the vicinity of the test station is turned off. Studies are carried out according to the dispatch scenario assumed. The extra demand in each study is met by increasing generation according to the merit order. For each study in turn, a test demand (for example 100 MW) is added to the station under study. The power system is then simulated with the extra demand in place.

The analysis tests an exhaustive range of contingencies to identify any resultant TSSPS violations, thus identifying a capacity limit. Some contingencies cause violations of thermal overload or voltage standards when the full test demand is added. In these cases, the test demand is reduced to zero MW and the simulation is re-run with the demand increasing in 10 MW steps. The simulation runs until a violation of thermal overload or voltage standards occurs. The preceding step value is then the calculated capacity value.

In assessing opportunities for new demand, the TYTFS considers the capability of the transmission system only. The capability of the distribution system is not addressed in Ireland or Northern Ireland. The implications for generation adequacy of demand growth above the median forecast levels are dealt with separately in the All-Island Generation Capacity Statement 2022-2031 (GCS) which is available on the EirGrid and SONI websites.

6.3 All-Island Generation Opportunity Analysis

This section describes the generation opportunity analysis performed on the Ireland and Northern Ireland power systems. This analysis is used to determine the capability of the transmission system to accommodate additional generation connections at the defined areas. The statements of opportunity presented in Chapter 7 are a result of this generation opportunity analysis. The final year of this forecast statement, 2030, is used in the analysis. The analysis is performed using specialised load flow software, the same approach used in the demand opportunity analysis.

In Chapter 7 we also include information on the harmonised all-island Generation Transmission Use of System (TUoS) tariffs and Transmission Loss Adjustment Factor (TLAF) arrangements in the SEM. The all-island TUoS and TLAF arrangements have an objective to provide locational signals to generators that reflect the costs they impose on the transmission system. This information is provided to help generators make informed decisions when exploring potential transmission network connection locations.

All information relating to generation opportunity presented in Chapter 7 is indicative only. The actual transmission system capacity can only be determined during the connection offer process.

6.3.1 Calculation of Generation Opportunities

Generation opportunity at a node is assessed based on the premise that new generation at a particular point on the network will displace generation at a different point on the network.

All existing generation, and all generation planned to connect in Ireland and Northern Ireland during the period covered by the TYTFS, is considered for dispatch before assessing any further generation opportunity on the all-island transmission network.

We compiled a list of 110 kV, 220 kV, 275 kV and 400 kV nodes for generation opportunity analysis. These nodes are distributed across the all-island network so that potential users can understand how opportunities vary across the network.

When testing a node, existing generation in the area around the node is maximised. This group of generators is referred to as the source region. The remaining generation required to meet the demand is dispatched based on a merit order. Finally, the test generator is then dispatched.

As the output of the test generator increases, the output from other generation in a separate area of the network - the sink area - is reduced. This forces power flows along specific corridors of the transmission network.

For each incremental increase in new generation capacity at the test node, an AC load flow linear algorithm is used to test the network for compliance with the TSSPS. The generation opportunity is determined once overloads are detected on the network. For the generation opportunity analysis, single (N-1) and double circuit (N-DC) contingency studies only are considered. For each node assessed, three different analyses are performed. Figure 6-4 demonstrates an example of this approach.

For each scenario in the illustration, the purple area represents the source region where generation is maximised. The test generator is then increased, and generation in the orange area - the sink region - is reduced. The blue arrows represent the resulting power flows. These three scenarios are then repeated for the following network demand scenarios:

- Winter peak;
- Autumn peak (Northern Ireland only);
- Summer peak; and
- Summer valley.

The lowest result from all of the scenarios analysed is used to determine the capacity of the node under test. By analysing several scenarios across different demand scenarios that stress the transmission system, we can reasonably ensure that the generation opportunities reported in our analysis will not breach our Transmission System Security and Planning Standards.

It is important to note that results of the generation opportunity analysis are indicative only. The results of the analysis are not cumulative, as the capability of a node to accept new generation capacity is tested individually.

The transmission system is planned to meet forecast generation levels at all stations in Ireland and Northern Ireland. Additional generation connections above the forecast levels are not explicitly catered for in transmission system development plans. However, capacity for additional generation on the transmission system may exist at certain locations.

Because of the relative size of individual generators, changes in generation installations, whether new additions or closures, can have a more significant impact on power flows than demand. New generation capacity will inevitably alter the power flows across the network, which has the potential to create overload problems deep into the network. Problems deep into the network are resolved by network reinforcements known as deep reinforcements.

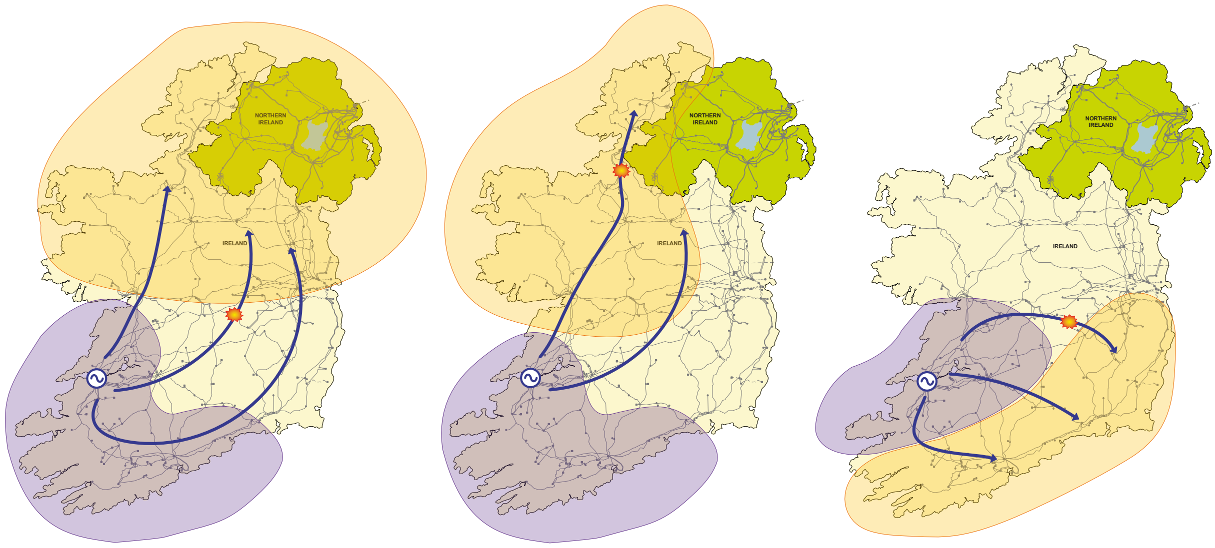


Figure 6-4: Illustration of Incremental Transfer Capability Study Method for Generation

The generation opportunity analysis presents the level of generation that can be accommodated on the planned transmission system without the need for deep reinforcements to allow full network access.

6.4 Interpreting the Results

The results of the analyses[48] described in this chapter are based on a set of assumptions. These assumptions are associated with:

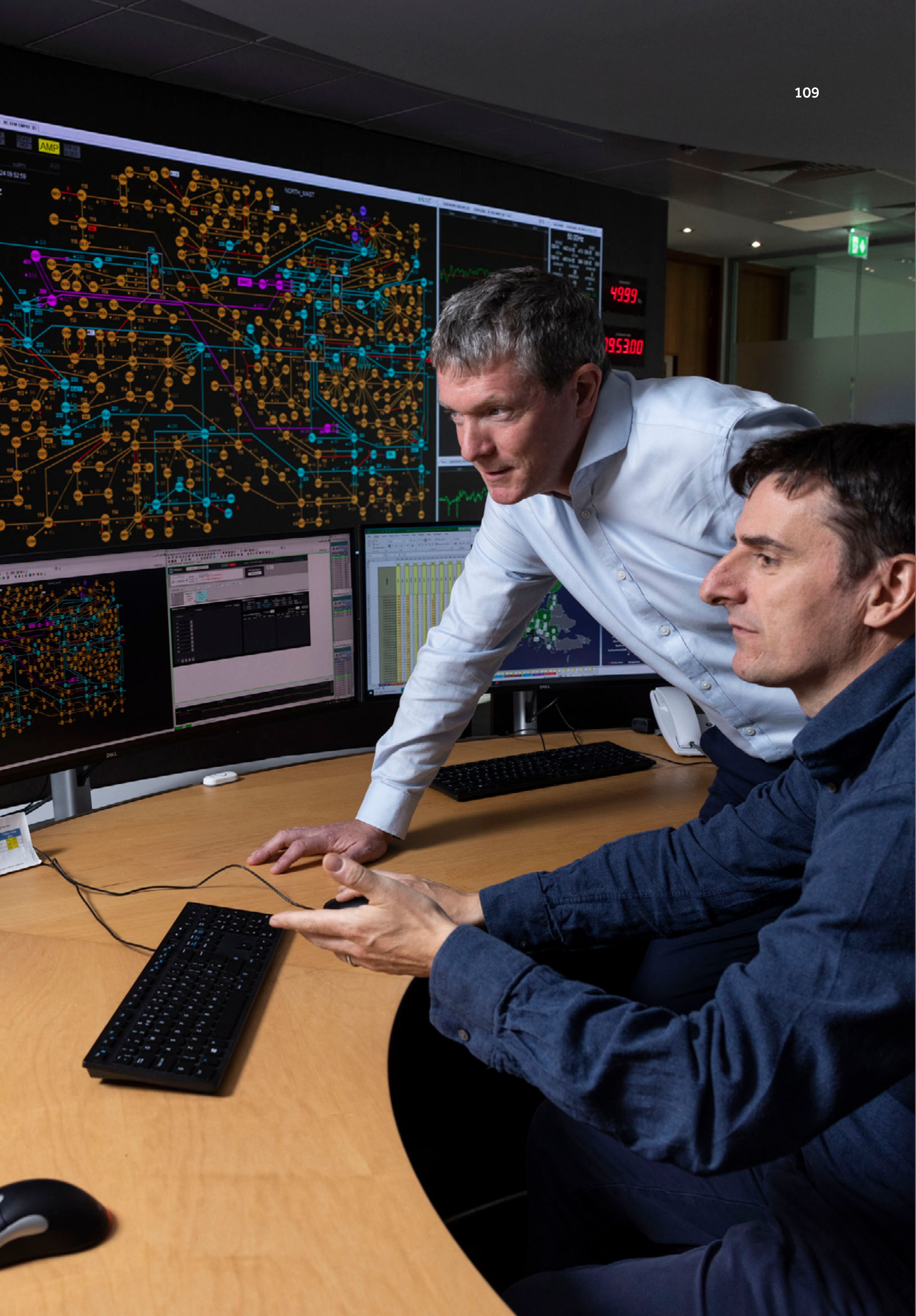
- Future demand growth;
- Generation connections; and
- Transmission system developments.

The key forecast factors on which the results depend are dynamic. Therefore, the reality that emerges will not exactly match the forecasts. Consequently, the results, while reasonably indicative, should not be interpreted as definitive projections.

The factors likely to have an impact on the outcomes include:

- The signing of a connection agreement by a new generator;
- Delays in connection of committed new generation stations;
- Closure of existing generation stations;
- Changes in the economy which give rise to changes in the overall demand for electricity;
- Changes in demand in a particular region or area, arising from new industry developments or closures;
- Delays in the provision of transmission system reinforcements; and
- Selection and construction of new transmission system reinforcement developments which may significantly increase transmission system capacity.

48 The results are presented in Chapter 7 and Chapter 8.



7. Transmission System Capability for New Generation

In order to meet the Climate Action Plan 2030 renewables targets significant increases in generation sources will be required as examined in the Shaping Our Electricity Future studies. Since the targets stated by the Climate Action Plan were put in place, there has been a large increase in renewable developments that have taken advantage of generation opportunities.

7.1 Summary of analysis

The analysis in this forecast statement considers a power system with 4.3 GW of offshore (phase 1) generation, 2.2GW of interconnection and an onshore generation capacity of 25GW. In contrast the peak all island winter demand is forecast to be 8555 MW.

This level of forecasted generation capacity vs peak demand, coupled with the TYTFS methodology where winter peak, summer peak, summer valley and autumn peak (SONI) are examined and the lowest resulting capacity is reported, can result in a worst-case value i.e. a node may have a reported capacity of 0 MW but there may be periods of there year where it could export.

In addition to the Ten-Year Transmission Forecast Statement EirGrid and SONI publish additional reports which will be of interest to parties looking to connect to the system. Documents such as the Enduring Connection Policy Constraint Forecast reports[49] and SONIs Northern Ireland Constraints reports[50], report on dispatch down, constraint, curtailment, and surplus energy for a wide range of transmission nodes, for renewable technology types. This approach can indicate nodes where connecting generators may see higher or lower constraint levels as an indicator of transmission system capacity.

The results of the generation opportunity analysis show that there are limited opportunities for new generation in many parts of the system. Further generation opportunities would require network reinforcement beyond that identified in in 'Shaping Our Electricity Future 1.1' analysis.

Power system studies for Dublin region shows that, due to high short circuit levels, further capacity cannot be accommodated on the 110 kV or 220 kV networks but connections at 400 kV may be investigated through the Connection Offer Process. While an area may have capacity for new generation connections, it should be noted that development of substantial levels of generation in a concentrated area of the network could create a range of complex issues, in particular breaches of short circuit levels.

49 EirGrid ECP Constraint Forecast Reports
50 SONI ECP Constraint Forecast Reports

7.2 Background

In this chapter we provide the results of the detailed generation capacity opportunity analysis, of which the calculation methodology is described in Chapter 6.

The analysis considers the year 2033 and details the opportunity for connecting further generation beyond the assumed installed generation portfolio. The results provide potential network users with an indication of the capacity of the all-island transmission system to accept new generation. It must be emphasised that this analysis is purely indicative. The actual transmission network capacity can only be determined during the connection offer process. This process requires detailed network assessments in order to determine the optimal connection arrangement that complies with the Transmission System Security and Planning Standards (TSSPS) in Ireland and Northern Ireland.

Changes to generation dispatch patterns and the geographical location of generation can have an impact on all-island transmission network power flows. As a result, Generator Transmission Use of System (GTUoS) tariffs and Transmission Loss Adjustment Factors (TLAFs) can change, resulting in an impact on the economics of power generation. Resulting regional changes in GTUoS and TLAFs are described to help participants make informed decisions when exploring potential transmission network connection locations.

It is important to note that generation opportunity studies in this TYTFS are based on contracted customer connections and approved transmission reinforcements at the data freeze date.

7.3 New Generation Capacity

The level of generation expected to connect to the all-island transmission system is described in detail in Chapter 4 of this statement.

This TYTFS includes the Offshore Phase 1 windfarms connecting in the West, South-East and East coasts in 2027 as per the information available at the data freeze, any updates to these connection dates as projects progress will be reflected in future TYTFS.

There is an increase in renewable generation, mainly connected in remote locations in the South-West, West and North-West of the island of Ireland. At times of high wind generation, this can result in very high power flows on transmission circuits supplying power to the large demand centres on the East coast of Ireland and Northern Ireland.

There are several large conventional power stations due to retire, or to have restricted output, due to the EU Industrial Emissions Directive. These are detailed in All-Island Generation Capacity Statement 2023-2032 and are noted in Chapter 4 of this document. For the purpose of the TYTFS 2024 analysis, it is assumed that sufficient generation capacity will be delivered in appropriate locations to ensure that generation adequacy and security of supply are maintained.

7.4 Generation Opportunity

7.4.1 Assessment of Selected 220 kV, 275 kV and 400 kV Stations

This section provides the opportunities for additional generation on the 220 kV, 275 kV and 400 kV networks in 2033. For these high voltage stations, new generation of up to 600 MW in size was considered for assessment.

Figure 7-1 illustrates the stations selected across the all-island network, as well as their associated generation opportunity. It is important to note that the results are not cumulative, as the opportunity at each station is assessed individually. The capacities shown are relevant to the station tested but also provide an indication of the opportunities available at neighbouring stations.

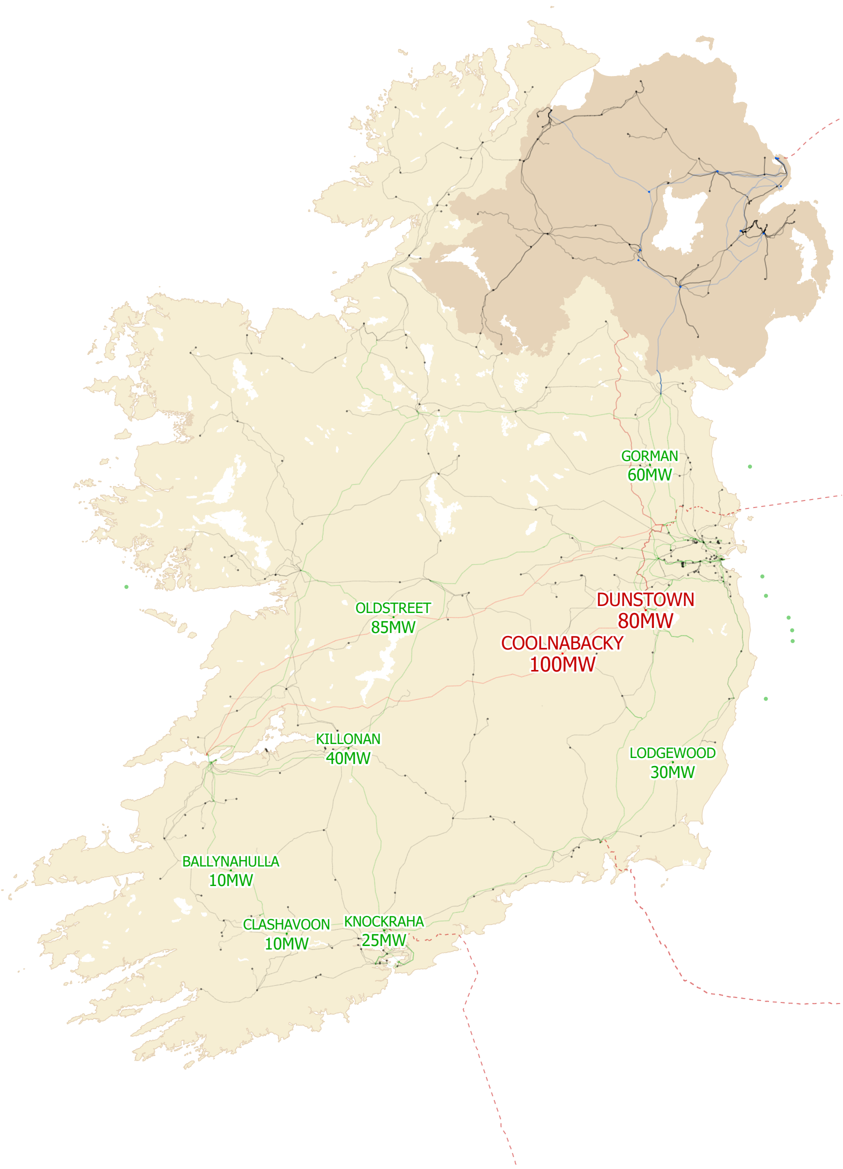


Figure 7-1: Generation opportunity at 220 kV, 275 kV and 400 kV stations in 2033

In general, there is very little opportunity for new generation in the North, West and South of Ireland, as well as the Dublin region. The transmission network in these areas has significant levels of connected and planned renewable generation. Moreover, the southern region contains conventional gas generators and interconnection. In the East, and to a lesser extent South-Eastern and South-Western regions, there are opportunities for new generation connections near the large demand centres on the East Coast, and near the 400 kV corridors on the West Coast. Large Offshore Phase 1 windfarms are expected to connect at Moneypoint, Arklow, North and South Dublin and Louth.

Short circuit studies in the greater Dublin area have indicated that, due to high fault levels, further capacity cannot be accommodated on the 110kV or 220kV networks. Connections at 400 kV networks could be investigated through the Connection Offer Process[51].

In Northern Ireland, there is currently very little opportunity for new generation in the North-West region, although this may change in future. This area has significant levels of renewable generation, both connected and planned, and the transmission network consists almost entirely of 110 kV circuits. There is no capacity for new generation to be directly connected at some 275 kV stations.

A number of 275 kV substations are identified as having 0 MW of opportunity for new generation capacity. These 275 kV stations are restricted by the ability of the structures and busbars to withstand mechanical forces arising from potential faults. SONI and NIE Networks are bringing forward projects to address this issue, however, these are at an early stage and no additional capacity can as yet be identified with sufficient certainty. The fault contribution from non-synchronous connections such as wind farms and data centres tend to be significantly smaller, particularly those likely to connect at 110 kV. Any potential connection at these nodes would therefore be assessed based on its fault current contribution.

7.4.2 Assessment of Selected 110 kV Stations

Numerous 110 kV stations were analysed to complement the higher voltage stations analysed in Section 7.4.1. For these stations, new generation of up to 200 MW in size was considered in the assessment for all 110 kV nodes. Selected stations are displayed in Figure 7-2, and the associated generation opportunity for each of the stations is displayed in Figure 7-3.

As in the previous section, the results are not cumulative, as the opportunity at each station is assessed individually. The capacities shown are relevant to the station tested but also provide an indication of the opportunities available at neighbouring stations.

The results show that there is little opportunity for generation connections at 110 kV. By 2033, there is a high level of renewable generation to be connected to both the transmission and distribution systems in Ireland. The renewable connections are concentrated in the North-West, West and South-West. The installed capacities will exceed the demand in these areas, resulting in limited opportunities for new connections without additional reinforcements.

51 https://www.eirgridgroup.com/customer-and-industry/becoming-a-customer/generator-connections/

Figure 7-2: Selected 110 kV stations for the generation opportunity studies

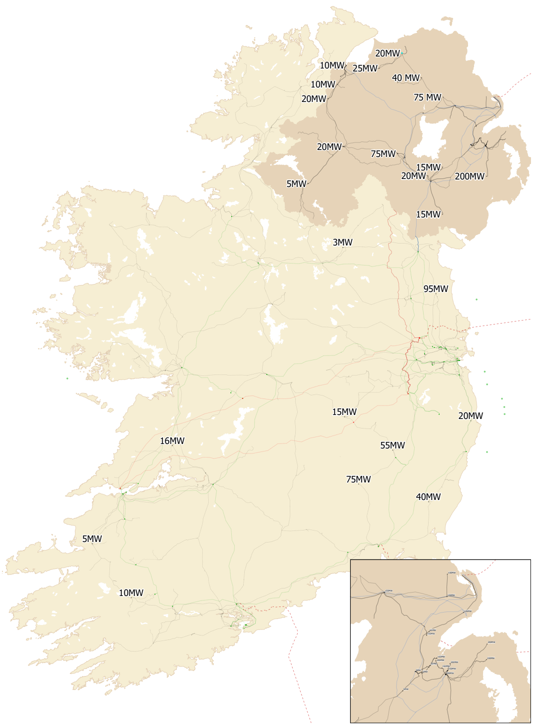


Figure 7-3: Generation opportunity at the selected 110 kV stations in 2033

Some capacity for additional generation is available within the 110 kV network at some nodes in the South-East and South-West of Ireland. This is due to the presence of large demand centres, lower penetration of renewable generation, as well as the strength of the transmission network in these regions. Detailed connection studies are required to determine more accurate quantities of available capacity and connection arrangements.

High levels of additional renewable generation are expected to connect to the distribution and transmission systems in Northern Ireland by 2033. Much of this renewable generation is in the North and West regions of Northern Ireland, and the total capacity of it is significantly greater than local demand, causing congestion on the transmission network. Consequently, these regions have less potential for additional connections than the East of Northern Ireland.

Greater opportunities for generation connections are possible in the East of Northern Ireland. This is due to lower congestion within the transmission network, and higher demand density. Similarly, with the assessment of the generator opportunities for the high voltage network, these results are only indicative of the potential for connection in the network. These figures are, furthermore, not cumulative as the nodes are assessed in isolation.

7.5 Generation Locational Tariff Signals and Their Impact on Transmission Network Capacity

Harmonised transmission arrangements provide locational signals to users reflecting the costs they impose on the transmission system. TLAFs and GTUoS tariffs, as part of harmonised transmission arrangements, can provide generators with locational signals informing their decision on where to connect to the grid and incentivise efficient generation dispatch.

Electrical losses, which occur as electricity is transported along transmission circuits, are accounted for in the settlement process with the application of TLAFs. Some units are responsible for proportionally more transmission losses than others, depending on their point of connection to the grid and use of transmission network capacity.

The methodology used by the transmission system operators (TSOs) to calculate the TLAFs has been approved by the regulatory authorities[52].

The most efficient way to transfer power in terms of losses is to minimise the distance between generation and demand, and not to heavily load lines. Due to the location and amount of demand and generation, power can be transmitted over sizeable distances. If the power generated in a region is in excess of the demand in that region, the excess generation will be utilised some distance away from the source.

52 http://www.eirgridgroup.com/site-files/library/EirGrid/TLAF-Methodology-Explanatory-Paper-v1.0.pdf

The transmission network consists of high voltage overhead lines and cables ranging from 110 kV to 400 kV. When current flows across these circuits, some energy is lost as heat. The higher the power transmitted on a line, the higher the current. Current has a squared relationship to power losses, therefore if the power on a line is doubled, the losses will increase by a factor of four.

In general, transmitting power on a higher voltage level will lower the associated current. The associated losses will be dependent on how congested the line is; increasing power on an already congested line will result in greater losses than increasing power on a similar less congested line.

The Transmission Use of System (TUoS) tariff is the main tariff for transporting power in bulk, across the power system. Generator Transmission Use of System (GTUoS) tariffs contain a locational component, which provides a signal of the costs associated with a generator's use of the transmission network.

Such signals provide a commercial incentive for generators to make informed decisions (both siting/entry and exit decisions) concerning their use of the transmission system. This is intended to improve efficiency in respect of both the use of, and investment in, the transmission system.

7.5.1 TLAFs

Generator TLAFs are reflective of their contribution to transmission losses. The principle is that market participants that contribute more to transmission losses, due to their location, should have a lower TLAF, than those generators who contribute less to transmission losses. The regional average 2024/25 TLAF values are shown in Figure 7-4 and are based on the published approved 2024/25 TLAF values[53].

53 2024/25 Approved TLAFs PDF Version v1.1 (eirgrid.ie)
2024/25 Approved TLAFs PDF Version v1.0 (soni.ltd.uk)

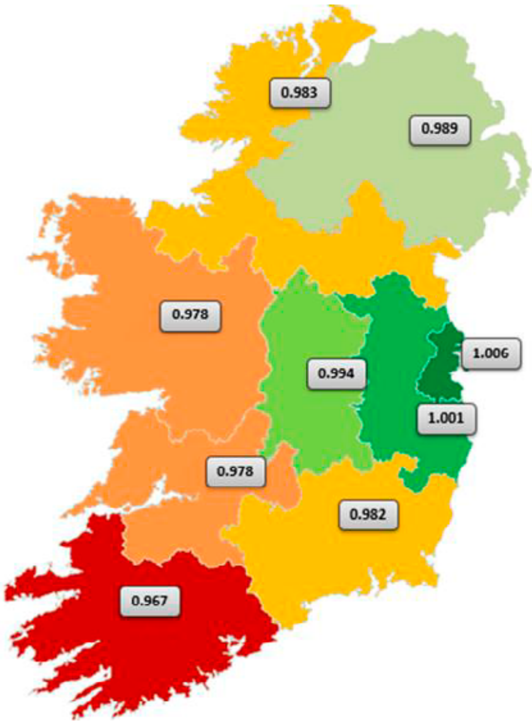


Figure 7-4: All-island 2024/25 regional average TLAF values

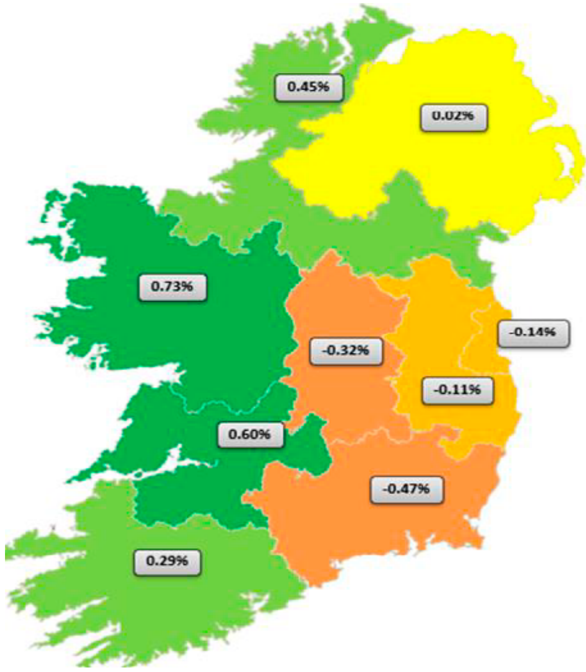


Figure 7-5: % TLAF Change between 2023/24 & 2024/25

Figure 7-5 shows the change in TLAFs between 2023/24 and 2024/25. These changes are influenced by yearly dispatch, demand and topology changes.

The information presented in Figures 7-4 and 7-5 should be used as regional indicators. For the 2024/25 tariff year, the average all-island TLAF has increased by 0.31%. TLAFs for the Dublin region are relatively high as there tends to be local use of generation, with an increasing demand. Local use of generation also typically supports the relatively high Northern Ireland TLAFs. Further information on the 2024/25 TLAFs can be found on the EirGrid and SONI websites[54].

7.6 GTUoS

The regional average 2024/25 GTUoS tariffs are shown in Figure 7-6 and are based on the approved 2024/25 GTUoS tariffs. Higher GTUoS tariffs are reflective of transmission investment costs linked to a generator's use of the system. This promotes efficient use of the transmission system by generators, which should, in turn, facilitate efficient investment in the transmission system.

Figure 7-7 shows the change in GTUoS tariffs between 2023/24 and 2024/25.

54 https://www.eirgridgroup.com/site-files/library/EirGrid/2022-23-Approved-Transmission-Loss-Adjustment-Factors-(TLAFs)-Accompanying-Note-v1.0.pdf
https://www.soni.ltd.uk/media/documents/2022-23-Approved-Transmission-Loss-Adjustment-Factors-(TLAFs)-Accompanying-Note-v1.0.pdf

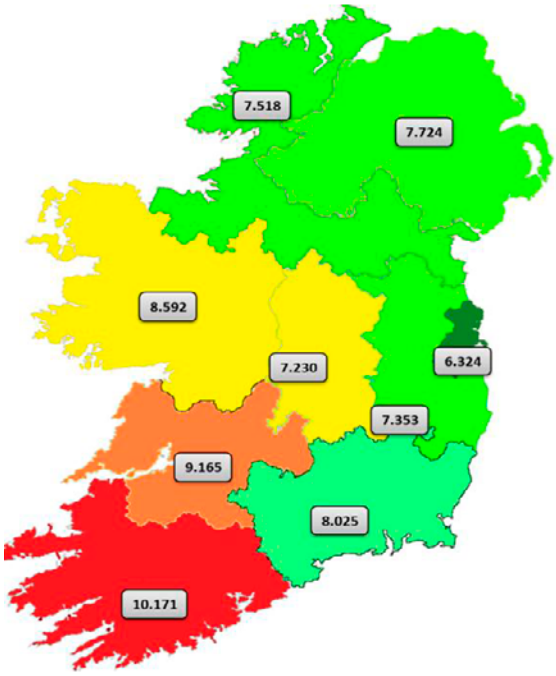


Figure 7-6: All-Island 2024/25 regional average GTUoS values

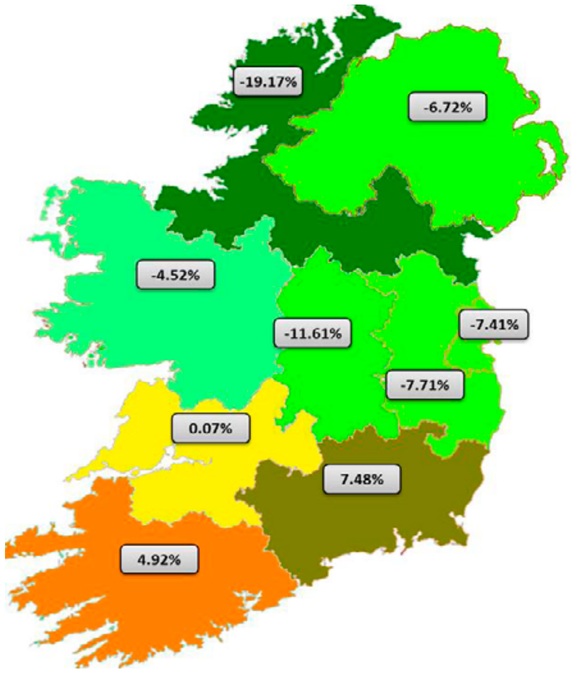


Figure 7-7: % GTUoS change between 2023/24 & 2024/25

For 2024/25, there is an overall decrease in tariffs due to an 8.4% increase in the overall Maximum Export capacity, couple with only a small increase in all-island revenue (0.7%). Regional changes are attributed to changes in network flows and local reinforcements. The annual revenue is the amount allowed to build, operate and maintain the transmission network, and this has increased in Ireland and decreased in Northern Ireland for 2024/25.

GTUoS tariffs for 2024/25 have decreased, on average, by 5.9% from those for 2023/24, which is lower than the revenue change. This is driven by the 8.4% increase in MWs (MEC) in the model and offset by the 0.7% increase in revenue to be recovered by GTUoS. The difference in the exchange rate has also had an effect.

Significant changes were observed in some areas due to reinforcements joining or leaving the 12 year cost window. Most significantly average tariffs in the Borders area are almost 20% lower than in 2023/24, due several reinforcements in Donegal leaving the cost window. As shown in Figure 7-6, median GTUoS tariffs for Northern Ireland in 2022/23 are 5.8% lower than those of 2023/24 and are also around 6% lower than the average Ireland GTUoS tariff for 2023/24. The base flows in 2024/25 are otherwise relatively similar to those of 2023/24 and as a result there are similar trends to those of 2023/24. Further information on the 2024/25 GTUoS can be found on the EirGrid and SONI websites[55].

55 https://cms.eirgrid.ie/sites/default/files/publications/2425_Approved_GTUoS_Tariffs_IE_R0.pdf
https://cms.eirgrid.ie/sites/default/files/publications/Approved-2024-25-GTUoS-Accompanying-Note.pdf
https://cms.soni.ltd.uk/sites/default/files/media/documents/2425-Approved-GTUoS-Tariffs-NI-R0.pdf
https://cms.soni.ltd.uk/sites/default/files/media/documents/2425-Approved-GTUoS-Tariffs-Accompanying-Note-SONI-R0.pdf

7.7 Assumptions behind the TLAF and GTUoS models

7.7.1 TLAFs

The assumptions used to determine TLAFs come from the Imperfections Forecast model, and essentially are a snapshot of a particular study year, comprised of complex and detailed data. This data is collected up to a data freeze point just before the calculation process. This ensures they are as reflective as reasonably practicable for the study year.

For the level of detail involved specifically for calculating TLAFs, the assumptions are only valid for the study year.

Due to the complexity and variability of these assumptions, their collective impact on TLAFs is neither predictable nor forecastable. Looking beyond the study year, assumption data becomes increasingly speculative and could not be considered as reasonable data for the TLAF model.

7.7.2 GTUoS

The GTUoS model includes an element of 'looking to the future' by adopting the principle of incorporating the future network. Looking at the future network involves including the next five years of network files in the model. The network files are consistent with the information published in the latest version of this document available at the time of calculation. Indicative asset costs for a 12 year window are also included in the GTUoS model (looking five years forward and seven years back). Under normal circumstances this starts when the asset first appears in the 'Year+5' network file, until seven years post-commissioning. GTUoS tariffs are calculated on an all-island basis, but assumptions or network changes from one jurisdiction can have an impact on the other. For example, if the revenue to be recovered in Ireland significantly increased, but the revenue to be recovered in Northern Ireland remained the same as the previous year, the average all-island tariff would increase as there is a greater all-island pot to recover. Local variations would then be related to changes in network flows. Another example could be when looking at interconnector flows, where an assumption for Moyle impacts flows in Ireland, and an assumption for EWIC impacts flows in Northern Ireland. Although there is an element of forecasting in the GTUoS model by looking at the future network and associated costs, alongside this are many assumptions and variables that only apply for the study year.

7.8 How to Use the Information for Generation

Generation developers wishing to use the information contained within this section when considering where to connect should follow these steps:

- Consult the maps in Appendix A to find the nearest transmission station to the proposed development. Also, consider the regions and nodes identified in Section 7.4 which are indicating opportunity for generation connections.
- Consult the forecast increase and retirement of generation within a region. Consider the impact of changes to the transmission system since the analysis was carried out. Consider short circuit current levels at the nearest transmission station.
- Discuss your project with EirGrid or SONI as early as possible.
- If seeking to apply for a connection, refer to the EirGrid connection application process[56] or the SONI connection application process[57].

56 http://www.eirgridgroup.com/customer-and-industry/becoming-a-customer/
57 https://www.soni.ltd.uk/Customers/howconnected/

8. Transmission System Capability for New Demand

This chapter presents the demand opportunity analysis which assesses the capability of the existing and planned transmission system to accommodate increased demand, based on information available at the data freeze date of January 2024. Opportunities for further demand connections in Ireland and Northern Ireland are also discussed.

8.1 Generation Adequacy

A significant amount of conventional generation in Ireland and Northern Ireland is expected to close down over the period covered by this statement. However, for the purpose of the TYTFS 2024 analysis, it is assumed that sufficient generation capacity will be delivered in appropriate locations to ensure generation adequacy and security of supply are maintained.

Note that in Ireland, significant security of supply concerns over the next ten years have been highlighted by EirGrid in the Generation Capacity Statement (GCS) 2023 – 2032. EirGrid is working with CRU and the Department of the Environment, Climate and Communications (DECC) to address the short to medium term generation adequacy concerns in Ireland. In September 2021, the CRU first published a Programme of Actions to increase generation capacity to provide additional stability and resilience to the Irish energy system for the coming years. This includes retention of existing units that are scheduled to close and the availability of temporary emergency generation.

Capacity shortfalls will continue to be regularly assessed, and action plans will be further developed and updated as necessary to maintain security of supply.

The GCS 2023-2032 capacity adequacy analysis for Northern Ireland indicates a deficit in the median scenario from 2023 until the end of 2026, from 2027, all the core scenarios are in surplus for the remainder of the study horizon. It is expected that the generation that was successful in the T-4 2025/2026 capacity auction will become available from the start of 2027. The adequacy position for NI is being monitored on an on-going basis and SONI is working with the Department for the Economy and the Utility Regulator in addressing these issues.

8.2 Data Centres

In 2023, data centres consumed 21% of the electricity used in Ireland and with the existing data centre contracts in place, this will increase to more than 30% in a few years based on existing contracts and the potential ramp up contained within them. This level of penetration is currently far higher than for most other countries. At the time of writing, the peak data centre demand utilisation has gone beyond 810 MW. Figure 8-1 shows the estimated share of total electricity being used by data centres in Ireland. This demonstrated that Ireland is an outlier in terms of the volume of data centre load that has already been accommodated within the power system.

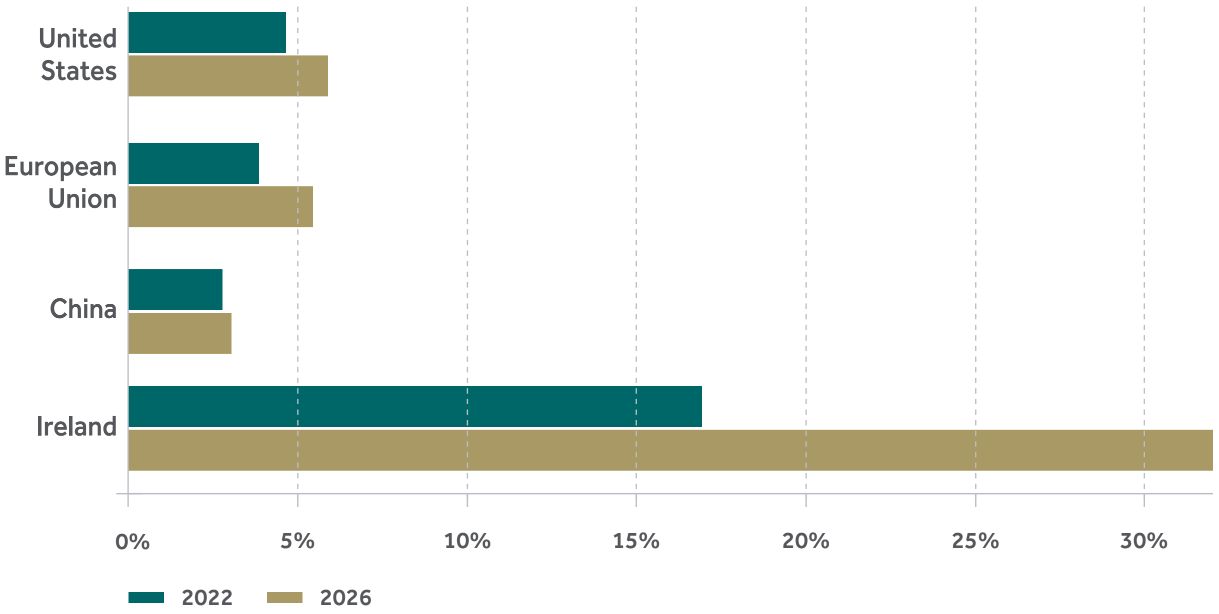


Figure 8-1: Projections from IEA of percentage Electricity Use by Data Centres by Country.

In order to address the unprecedented issues created by the volume of data centre applications, in November 2021, the CRU published direction CRU21124[58] to the System Operators relating to data centre grid connection processing. Since that direction there have been a number of further developments including the Government Policy Statement on Security of Electricity Supply (November 2021), the Government Strategy on the Role of Data Centres in Ireland's Enterprise Strategy (July 2022), Ireland's Sectoral Emissions Ceilings under the Climate Action and Low Carbon Development (Amendment) Act 2021 and the Climate Action Plan 2023 (December 2022). EirGrid is continuing to work with the CRU, and all other relevant parties, on these matters.

In the operational context, data centres are large power electronic-interfaced loads with a relatively static load profile. Data centre demand can be very sensitive to dips in the system voltage experienced at the data centre point of connection to the transmission grid. These voltage dips can originate from relatively far away from the data centre demand itself. The protection functions implemented to safeguard power electronic components of data centres are set to trigger automatic shifting of load onto alternative, back-up electricity supply whenever they sense a disturbance. These protection functions are not defined in the Grid Code or under the control of the TSOs.

58 https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/CRU21124-CRU-Direction-to-the-System-Operators-related-to-Data-Centre-grid-connection-.pdf

In combination with large transmission contingencies (such as the loss of a HVDC interconnector), the consequential disconnection of large amounts of one specific load type (e.g., data centre loads) could result in difficult-to-contain system disturbances. At the time of publishing this TYTFS, new performance requirements for loads are under development by the TSOs. Implementation of Fault Ride-Through (FRT) capabilities for loads are key to the TSOs being able to deliver the operational policy roadmap[59].

8.3 Electrification of Heat, Transport and Industry and New Housing

In line with European legislation and national ambitions, Ireland has major plans for electrification of heat, transport and industry. This means that network capacity must be managed to allow these developments to take place.

Ireland also has serious ambitions to build tens of thousands of new houses every year as outlined in the recent Programme for Government (2024). These new houses will drive large demand increases across the network. There will be concentrations of demand increase where very large housing developments will be delivered.

In recent years, all these developments have started to appear as requests for large demand increases both on the distribution network and on the transmission network. Provision needs to be made on the transmission network to allow for future growth of this type.

The Northern Ireland Executive's new Energy Strategy – The Path to Net Zero Energy was published in December 2021. It outlines a roadmap to 2030 aiming to deliver a 56% reduction in energy-related emissions, on the pathway to deliver the 2050 vision of net zero carbon.

The Climate Change Act (Northern Ireland) 2022 was enacted in June 2022. Key aspects of this legislation include a target of at least 100% reduction in net zero greenhouse gas (GHG) emissions by 2050, setting of carbon budgets, sectoral plans for emissions reduction targets and policies and procedures to drive targets and carbon budgets.

With the transition from fossil fuel sources, an increasing proportion of energy demand will be met from electricity. The demand forecast reflects higher electrification in the heat and transport sectors.

59 https://cms.eirgrid.ie/sites/default/files/publications/EirGrid-SONI-Operational-Policy-Roadmap-2025-2035.pdf

8.4 Reinforcement Delivery

EirGrid and ESB work together to deliver the necessary transmission reinforcements that are needed to reinforce the network to allow new demand to be supplied. The successful delivery of transmission reinforcements in a timely manner depends on lots of factors including public acceptance, local and national support and the allocation and efficient use of transmission outages.

It is essential that the relevant transmission reinforcements receive the local and national support that they need so that Ireland's ambitions for housing, for decarbonization, for economic growth and for supporting local industry can be met.

General Disclaimer

It should be noted that results relating to demand opportunities in this forecast statement are indicative only and are based on information available at the data freeze date of January 2024. It is advised that any potential new demand consumers contact EirGrid in the first instance so that the available connection options can be considered. In particular, data centres need to consider the status of Dublin as a constrained area in the context of the CRU's direction to System Operators relating to data centre grid connection processing.

8.5 Transmission System Demand Capability Obligations

This chapter of the TYTFS is published in order to meet the requirements on providing high-level indication of transmission network capacity under EirGrid's Section 38 of the 1999 Electricity Act and Condition 33 of SONI's TSO licence. Results from demand capability studies are based on a specific set of assumptions (see Chapter 6).

Developers wishing to connect to the transmission system will require further detailed studies. The TYTFS is not intended to have any legal effect on the negotiation of contractual terms for transmission system connections. Before making any commercial decisions, developers should contact the appropriate TSO and engage in a formal application/offer process for their proposed developments.

8.6 All-Island Transmission System Capability for New Demand

As detailed in Chapter 6, the transmission system's capacity to accommodate new demand is assessed using demand opportunity analysis. The study was performed for 2029 winter and summer peaks.

Data used for the demand opportunity analysis is based on the best available information at the January 2024 data freeze date. The results of the demand opportunity analysis presented in this chapter are based on the following assumptions:

- Year 2029 demand forecast was used (see Appendix C);
- Only transmission reinforcements with capital approval which were planned to be completed by 2029 at the data freeze date were included in the analysis;
- Planned generation up until 2029 at the data freeze date was included in the analysis;
- Variable generation cannot continuously serve demand i.e. demand must be met at times where wind and solar resources are not available. As such, variable generation local to the test station was switched out; and
- The 2029 transmission system was assessed for the following contingencies: the loss of a single transmission asset (N-1); a maintenance-trip (N-1-1); and loss of a double transmission circuit (N-DC, Northern Ireland).
- The final results were considered in line with published EirGrid analysis such as Shaping Our Electricity Future.

We analysed a number of transmission stations throughout Ireland (excluding Dublin) and Northern Ireland for Demand Opportunities. These consisted of 110 kV, 220 kV and 275 kV stations. These stations were analysed to help identify locations that are potentially suitable for major demand with large power requirements. The stations examined and their accompanying results are shown in Figure 8-2. The stations with the capacity to accommodate 75MW additional demand are reported for Ireland. There may be some limited opportunities for demand increase at other nodes, but these should be discussed with EirGrid on a case by case basis. Northern Ireland also presents limited opportunities for demand increase for specific nodes. The availability for connection should be discussed with SONI on a case by case basis.

It should be noted that demand opportunity is tested at each reported station on an individual basis. As such, the opportunities presented are not cumulative. If new demand connects in an area that is currently shown to have capacity, it will consume some, or all of, the available capacity in that area.

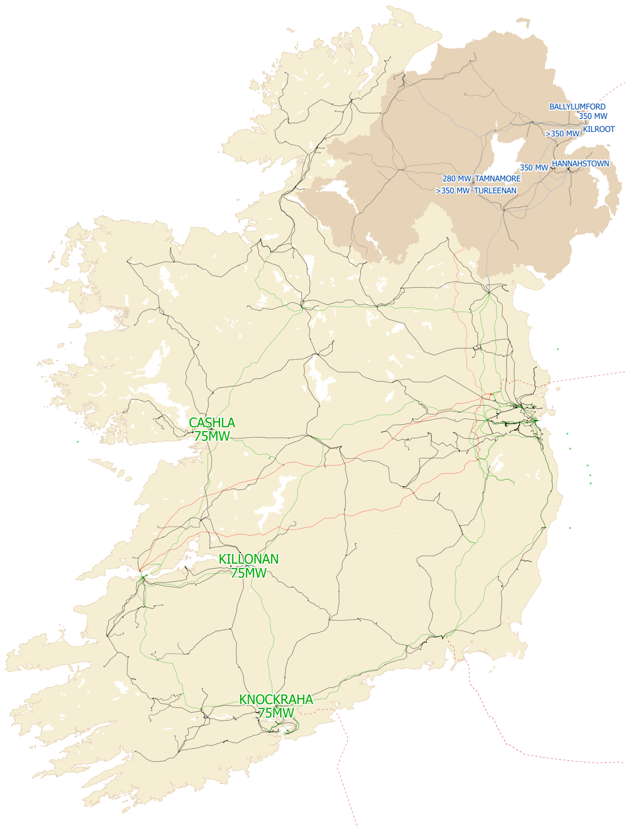


Figure 8-2: Capability for Additional Demand at 275 kV and 220 kV Stations in 2029

As a general rule, demand opportunity at a particular station would tend to reduce over time. This is due to normal demand growth using up available capacity. Yet, in some cases, demand opportunities can improve as a result of planned transmission system or generation developments.

The results of the analysis are presented on a regional basis below. The results provide a high-level indication that in 2029, there will be opportunities at the stations examined based on the data assumptions applied in the analysis. It should be noted that the analysis does not reflect changes that have occurred since the data freeze such as changes to contracted demand connections. These opportunities are all subject to adequacy requirements being met and other policy requirements as determined by the CRU.

8.7 Transmission System Capability for New Demand in the Dublin Area

Dublin is the largest load centre on the island of Ireland. This section is included due to the considerable interest and number of enquiries for connection to the grid around Dublin (see Chapter 3 on Demand). The volume of enquiries and the uncertainty of their final power requirements require us to make a qualitative assessment of demand opportunities for the future.

The scale of individual demand connection enquiries to the transmission system varies from 20 MW to over 250 MW. The enquiries mainly comprise data centres supporting the information, communications, and technology (ICT) infrastructure of large multi-national companies. Any potential new consumer looking to connect in the Dublin area should contact EirGrid as early as possible to review available connectivity options. In particular, data centres and large energy users need to consider the status of Dublin as a constrained area for demand per CRU21124.

8.7.1 CRU direction on data centre connections

The greater Dublin area has experienced high levels of data centre growth in recent years. This demand growth is expected to continue over the coming years as existing data centres utilise their full contracted MIC.

Connecting more data centres to the greater Dublin area will exacerbate the constraint issues that have developed in this area and present risks associated with security of the transmission system.

In light of these issues and the CRU's direction on the connection of data centres (CRU21124), EirGrid has clarified that the greater Dublin area is considered a constrained region for the purpose of processing of data centre connections.

8.7.2 Looking Forward

Scenario Planning is conducted by the TSOs to help ensure we can meet the future needs of society with regards to electricity, as well as outline Ireland's pathway to a clean energy transition. We call our all-island scenario planning Tomorrow's Energy Scenarios (TES) which looks out to 2035, 2040 and 2050. Our scenarios detail a range of potential futures for the electricity sector, with specific focus on what this means for the electricity transmission system over the next twenty years and beyond.

The underlying assumptions in the scenarios are validated using feedback received from stakeholders such as policy makers, industry and the public as part of an open consultation. When the scenarios are finalised, we use them to test the performance of the electricity transmission grid and publish the results in the TES System Needs Assessment (SNA). From the TES SNA a strategic vision and roadmap for implementation is developed.

The roadmap contains candidate network solutions which require further detailed analysis,these additional projects will be included in future TDPs.

The need and requirement for transmission capacity is continuously evolving. In addition to the needs identified in TES SNA, further system needs may be identified in the period between iterations of the Tomorrow's Energy Scenarios. Examples of changes that may arise include plant closures, changes to the condition of network assets and new connections that emerge through the connection offer process.

8.8 Transmission System Capability for New Demand in Ireland

Demand opportunities available on an Ireland regional basis are discussed below. These are all subject to adequacy requirements being met and other policy requirements as determined by the CRU. Results presented in this section are based on the assumptions detailed in Chapter 6.

8.8.1 Challenges in Providing for New Demand in Ireland

The projection of the demand capacity in Ireland needs to take account of generation adequacy, the large impact of data centres, the need to supply the demand to new housing and the need to supply the electrification of heat, transport and industry. Finally, there is the need for local and national support to help deliver the relevant transmission reinforcements in a timely manner to allow the new demand to be met.

8.8.2 Opportunities for New Demand in the Midlands and West

The indicative demand opportunities available in the Midlands and West are shown in Figure 8-3. It is shown that there is potential demand opportunities available for new customers in the region[60]. Cashla 220 kV station would be suitable connection point for major industrial load centres. This station is capable of accommodating an additional 75 MW of demand without additional network reinforcements.

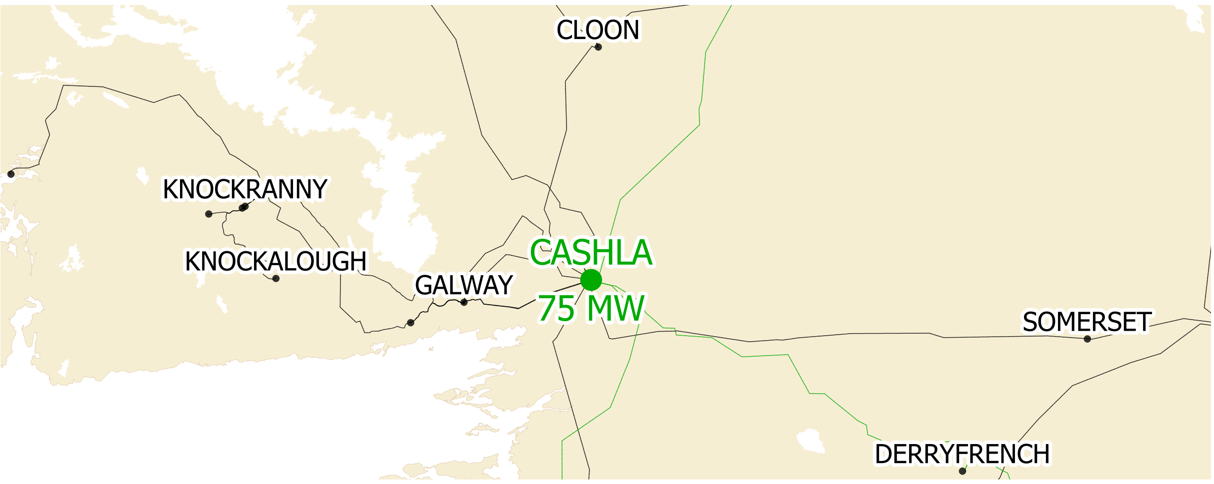


Figure 8-3: Capability for Additional Demand in Midlands and West Regions

60 Please note that the demand opportunities results are not cumulative. Each station is assessed individually, taking account of forecast demand growth only at stations outside of the test node. These figures are indicative only, with further detailed assessment of each station required. Customers considering connecting demand to the Irish transmission system are advised to contact EirGrid as early in the project as possible.

8.8.3 Opportunities for New Demand in the South

The demand opportunities available for the South region are shown in Figure 8-4. It can be seen that there are potential opportunities available for industrial customers in this region.

In particular the Killonan and Knockraha 220 kV stations would be suitable connection points for major industrial load centres, with the capability of accommodating 75 MW at each station without additional network reinforcements.

It is worth noting that since the data freeze date (January 2024), major new demand needs have been identified by the DSO in the Cork and Cork city area. This means that the available capacity at Knockraha will now likely be much lower than the 75 MW value.

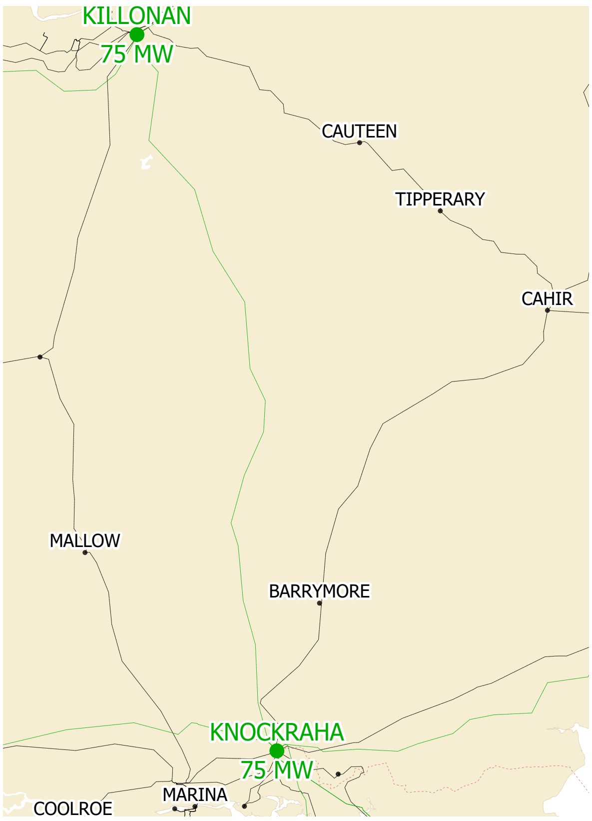


Figure 8-4: Capability for Additional Demand in South Region

8.9 Transmission System Capability for New Demand in Northern Ireland

Section 8.5.1 discusses the demand opportunities available in the South-Eastern region of Northern Ireland. Section 8.5.2 discusses the demand opportunities available in the Northern and Western region. These results are based on the assumptions detailed in Chapter 6.

8.9.1 Opportunities for New Demand in South-East of Northern Ireland

The demand opportunities available in the South-Eastern region are shown in Figure 8-5.

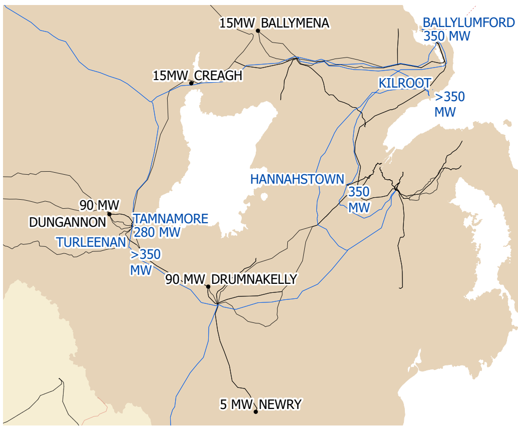


Figure 8-5: Capability for Additional Demand (MW) in the South-East of Northern Ireland

It can be seen that there are potential opportunities available for industrial customers at most stations examined in the region. Those stations with capacity are capable of accommodating approximately 350 MW[61] of additional demand without additional network reinforcements.

Those 275 kV stations with an identified capacity of 0 MW are restricted by the ability of the structures and busbars to withstand mechanical forces arising from potential faults. SONI and NIE Networks are bringing forward projects to address this issue, however, these are at an early stage and no additional capacity can as yet be identified with sufficient certainty. The fault contributions from non-synchronous connections such as data centres tend to be significantly smaller, particularly those likely to connect at 110 kV. Any such potential connection at these nodes would be assessed based on its fault current contribution.

8.9.2 Opportunities for New Demand in North and West of Northern Ireland

The demand opportunities available for the North and West of Northern Ireland are shown in Figure 8-6.

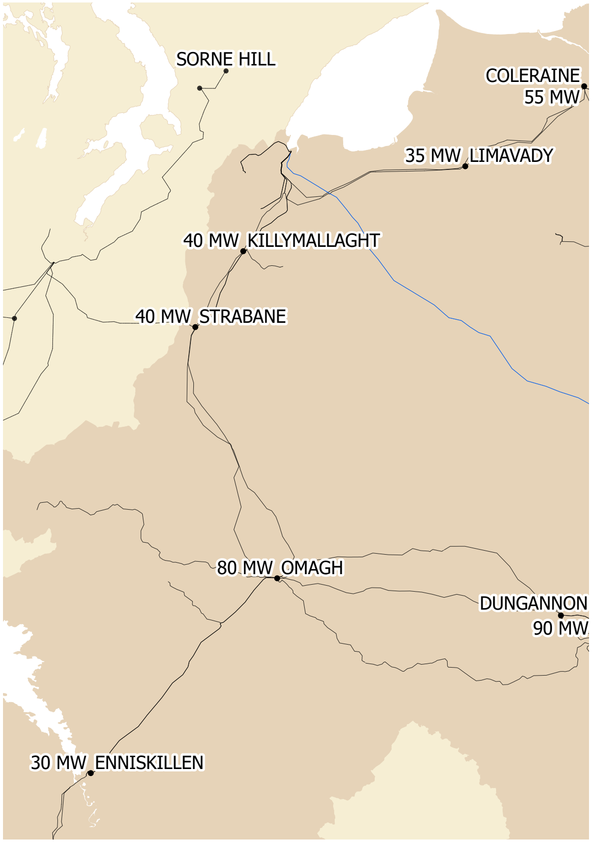


Figure 8-6: Capability for Additional Demand in the North and West of Northern Ireland

It can be seen that there are potential opportunities available for industrial customers at all stations examined in the region except Coolkeeragh. It should be noted that the North-West of Northern Ireland requires specific assessment in line with the TSSPS (see Chapter 6).

61 Please note that the demand opportunities results are not cumulative. Each station is assessed individually, taking account of forecast demand growth only at stations outside of the test node. These figures are indicative only, with further detailed assessment of each station required. Customers considering connecting demand to the NI transmission system are advised to contact SONI as early in the project as possible.

As the North-West is connected by a single double circuit 275 kV spur, an N-1-1 contingency is performed as a credible contingency:

- The loss of the Coolkeeragh-Magherafelt 275 kV double circuit; and
- Coolkeeragh steam and gas units are out on maintenance.

However, the capacity at Coolkeeragh is limited by the ability of the 275 kV structures to withstand mechanical loading from potential faults. SONI and NIE Networks are bringing forward a project to address this issue, however, this is at an early stage.

Enniskillen station represents the second lowest capability of the 110 kV nodes assessed. Enniskillen 110 kV is connected to Dromore 110 kV station via two 110 kV circuits. The loss of one of these circuits creates a thermal overload on the other. This limits demand connection capability.

8.10 How to Use the Information for Demand

Although not every station was considered, the results presented can be regarded as a guide to opportunities at other stations in the same area.

Customers wishing to use the demand opportunity results described in this chapter when considering where to connect should follow these steps:

- Consult the maps in Appendix A to find the nearest transmission station to the proposed development. Also, the nearest station for which opportunity has been assessed should be identified, where it differs from the nearest transmission station.
- The anticipated demand growth at the relevant station can be obtained from the demand forecasts presented in Appendix C. The transmission system is being planned to meet this level of demand increase.
- Consider the impact of changes to the transmission system since the analysis was carried out.
- Consult with EirGrid or SONI on the proposed location as early as possible as well as consulting the EirGrid application process or the SONI application process.

Early consultation with us is encouraged so that we can work jointly to explore options relating to any potential proposals and enable timely decision making.

Note that all opportunities are all subject to adequacy requirements being met and any policy requirements as determined by either the CRU or the UR.

Appendix A: Maps and Schematic Diagrams

Appendix A contains geographical maps of the All-Island Transmission System and short bus codes for every transmission voltage node on the island. Geographical maps are presented illustrating the All-Island Transmission System in 2024 and as planned for in 2033 as at data freeze date of 31st January 2024.

A.1 Network Maps

This section includes two network maps:

- Figure A-1 is a map of the All-Island Transmission System as at January 2024; and
- Figure A-2 is a map of the planned All-Island Transmission System in 2033.

Note: There are a number of network reinforcement projects that do not have a finalised reinforcement solution. They are shown on the Transmission System Map as a transparent bubble in Figure A-2. The solutions that will be used for these projects have not yet been finalised.

Figure A-1: Map of the All-Island Transmission System as at January 2024

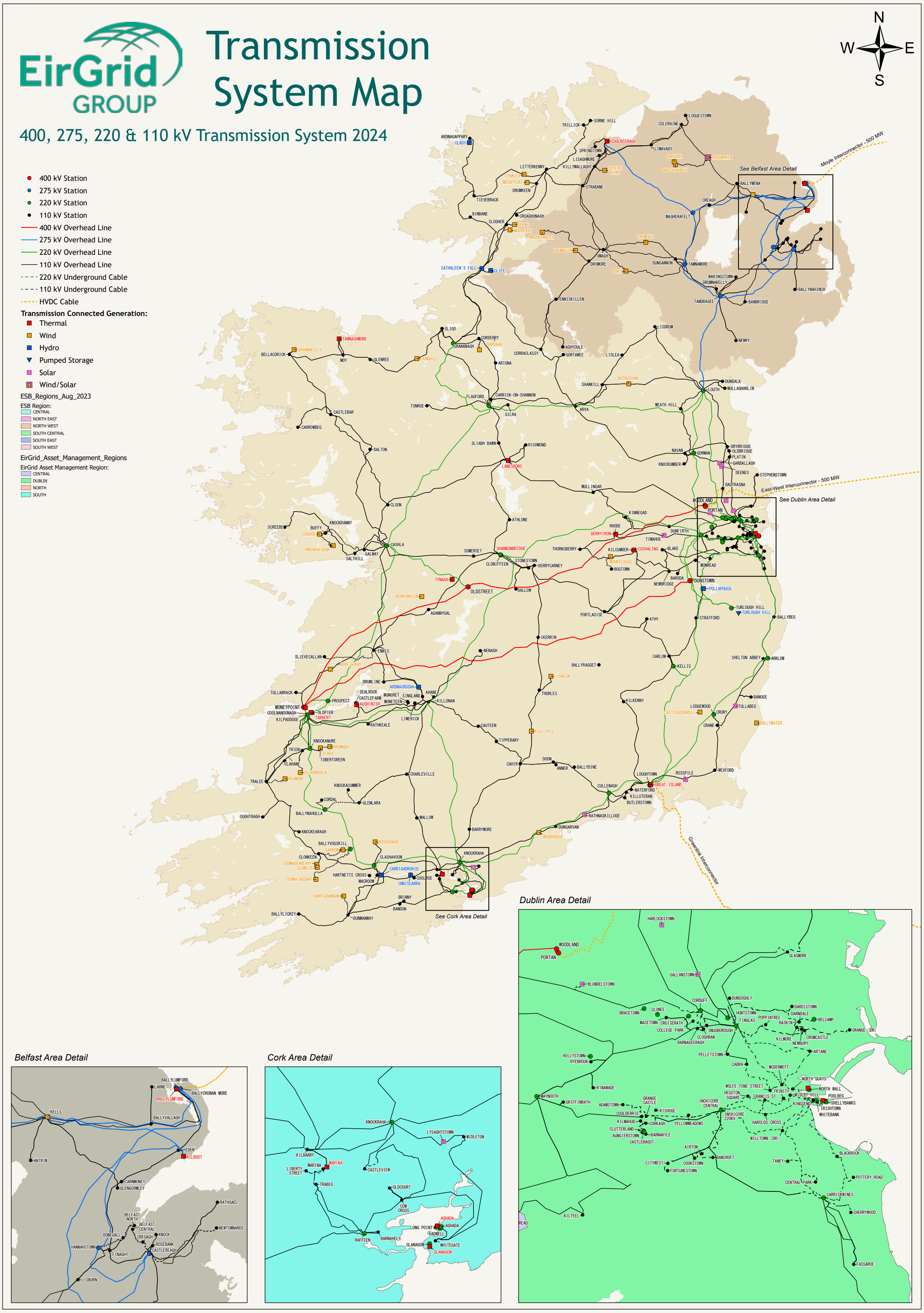
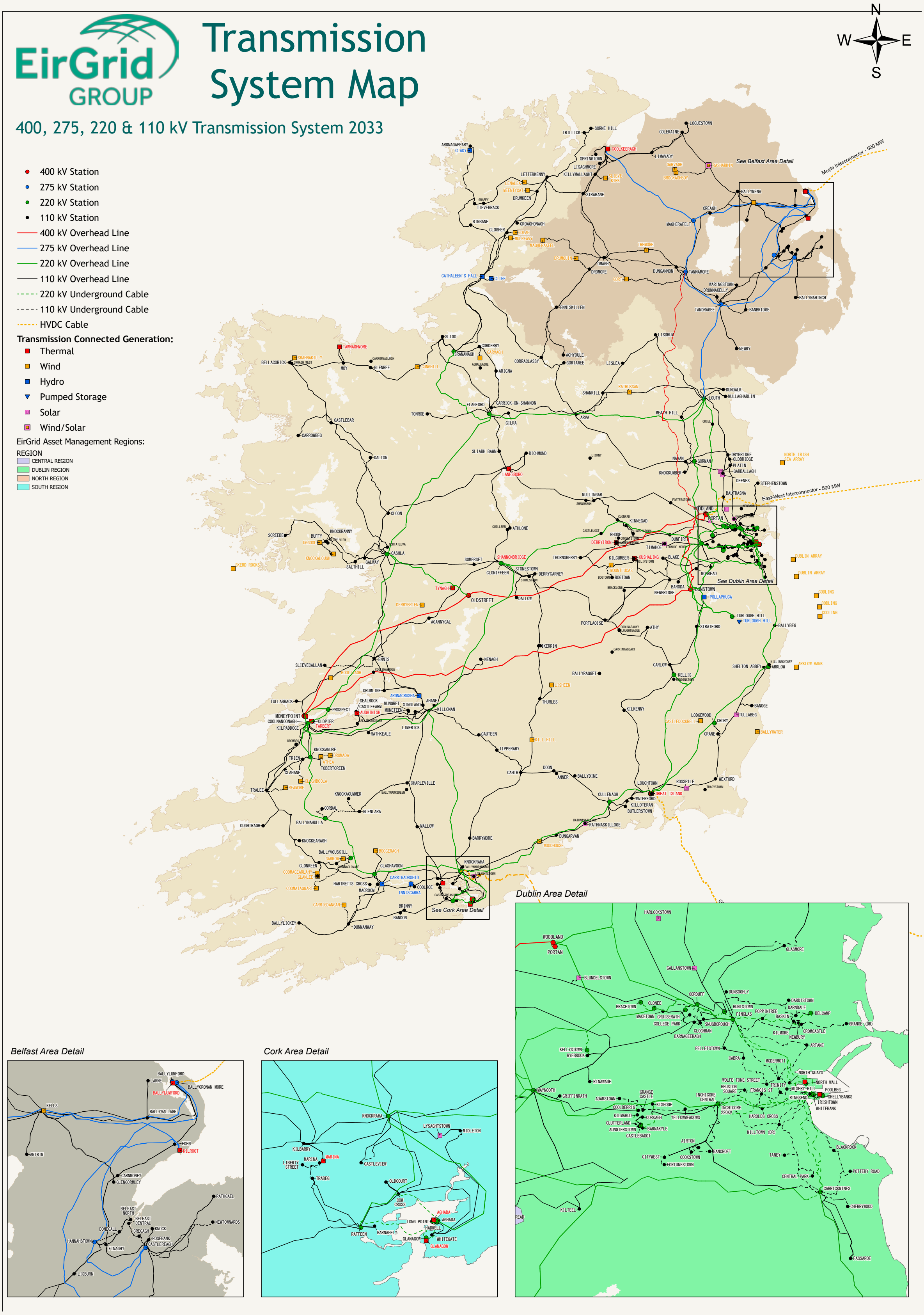


Figure A-2: Map of the planned All-Island Transmission System in 2033.



A.2 Short Bus Codes

The following table associates full station names with the two or three letter codes used in the schematic diagrams in Section A.3, in the tables in Appendices B and C, and the power flow tables in Appendix H. Stations in Northern Ireland and Ireland with the same three letter bus code are distinguished with (N) for Northern Ireland and (I) for Ireland.

Table A-1: Short Bus Codes

Short Bus Code	Full Name
AA	Ardnacrusha
AD	Aghada
ADM	Adamstown
AGH	Aghyoule
AGL	Agannygal
AGN	Aungierstown
AGI	Agivey Cluster
AGT	Aught
AGY	Ardnagappary
AHA	Ahane
AIR	Airport Road
ANR	Anner
ANT	Antrim
ARI	Arigna
ARK	Arklow
ARM	Armagh
ART	Artane
ARV	Arva
ATE	Athea
ATH	Athlone
ATY	Athy

Table A-1: Short Bus Codes

Short Bus Code	Full Name
AUG	Aughinish
BAG	Barnageeragh
BAL	Baltrasna
BAN (I)	Bandon
BAN (N)	Banbridge
BAR	Barrymore
BCM	Ballycummin
BCT	Bancroft
BDA	Baroda
BDM	Ballydam
BDN	Ballydine
BDV	Barnadivane
BEG	Ballybeg
BFP	Belfast Power Station
BGD	Belgard Road
BGH	Boggeragh
BGN	Bogtown
BGT	Ballyragget
BIN	Binbane
BK	Bellacorick
BKM	Bunkimalta

Table A-1: Short Bus Codes

Short Bus Code	Full Name
BKY	Barnakyle
BLA	Blackrock
BLC	Belcamp
BLE	Ballinknockane
BLI	Ballylickey
BLK	Blake
BLU	Blundelstown
BMA	Ballymena
BNH	Ballynahinch
BNM	Belfast North
BOG	Banoge
BOL	Booltiagh
BPS	Ballylumford Power Station
BRA	Bracklone
BRI	Brinny
BRO	Brockaghboy
BRT	Bracetown
BRY	Barnahely
BUF	Buffy
BUT	Butlerstown
BVG	Ballyvallagh
BVK	Ballyvouskill
BWR	Ballywater
BYC	Ballycronan More (Moyle)
BYH	Ballynahulla

Table A-1: Short Bus Codes

Short Bus Code	Full Name
CAB	Cabra
CAE	CAES
CAG	Carrickalangan
CAH	Cahir
CAM	Cam Cluster
CAR	Carnmoney
CAS	Castlereagh
CBG	Carrowbeg
CBL	Cloghboola
CBR	Castlebar
CBT	Castlebagot
CCN	Cloncreen
CD	Carrigadrohid
CDN	Carrigdangan
CDF	Carrickaduff
CDK	Castledockrill
CDL	Cordal
CDU	Corduff
CDY	Corderry
CEN	Belfast Central
CF	Cathaleen's Fall
CFD	Clonfad
CFM	Castlefarm
CGL	Coomagearlahy
CH	Cahernagh
CHA	Charleville

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
CHE	Cherrywood
CHR	Cahernagh
CKG	Corkagh
CKM	Carrickmines
CKN	Clonkeen
CL	Cliff
CLA	Clashavoon
CLD	Coolderrig
CLE	Clonee
CLG	Cloghran
CLH	Clahane
CLM	Culmore_RD
CLN	Cloon
CLO	Clogher
CLS	Clonshaugh
CLW	Carlow
CNB	Coolnabacky
CNG	Coolnanoonag
CNF	Caraunduff
CNN	Croaghnagawna
COL (I)	College Park
COL (N)	Coleraine
COO	Cookstown
COR	Corraclassy
COS	Carrick-on-Shannon
COW	Cow Cross

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
CPK	Central Park
CPS	Coolkeeragh Power Station
CRA	Crane
CRD	Croaghonagh
CRE	Cregagh
CRG	Creagh
CRH	Cruiserath
CRM	Cromcastle
CRN	Croaghaun
CRO	Coolroe
CRR	Curragha
CRY	Crory
CSH	Cashla
CTG	Coomataggart
CTN	Cauteen
CTY	City West
CUL	Cullenagh
CUN	Cunghill
CUR	Cureeny
CUS	Cushaling
CVW	Castleview
DAL	Dallow
DRN	Darndale
DDK	Dundalk
DEE	Deenes

Table A-1: Short Bus Codes

Short Bus Code	Full Name
DER	Derryiron
DEY	Derrycarney
DFR	Dunfirth
DGN	Dungarvan
DHN	Derrylahan
DJG	Drombeg
DLN	Derrylyn
DLT	Dalton
DMY	Dunmanway
DON	Donegall
DOO	Doon
DRM	Drumkeen
DRN	Darndale
DRO	Dromada
DRO (N)	Dromore
DRQ	Drumquin Cluster
DRU (I)	Drumline
DRU (N)	Drumnakelly
DRY	Drybridge
DSN	Dunstown
DTN	Dardistown
DUN	Dungannon
DYN	Derrybrien
EDE	Eden
ENN (I)	Ennis
ENN (N)	Enniskillen

Table A-1: Short Bus Codes

Short Bus Code	Full Name
FAS	Fassaroe
FAS E	Fassaroe East
FGH	Firlough
FIN (I)	Finglas
FIN (N)	Finaghy
FLA	Flagford
FNT	Finnstown
FRN	Francis Street
GAE	Glanlee
GAL	Galway
GRV	Garvagh
GCA	Grange Castle
GGO	Glanagow
GGT	Garrintaggart
GI	Great Island
GIL	Gilra
GLA	Glasmore
GLE (I)	Glenlara
GLE (N)	Glengormley
GLN	Glen
GAN	Gallanstown
GLH	Glencloosagh
GLR	Glenree
GOL	Golagh
GOR (I)	Gorman
GOR (N)	Gort Cluster

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
GRA	Grange
GRH	Garballagh
GRI	Griffinrath
GRO	Garrow
GWE	Gortawee
HAN	Hannastown
HAR	Harolds Cross
HEU	Heuston Square
HN	Huntstown
HRR	Harristown
IA	Inniscarra
IKE	Ikerrin
INC	Inchicore
ISH	Irishtown
KBY	Kilbarry
KBY2	Kilbarry No. 2
KCR	Knockacummer
KCY	Kilcarbery
KDN	Kildonan
KEL	Kells
KLC	Kells Cluster
KER	Knockearagh
KHL	Kill Hill
KIN	Kinnegad
KKY	Kilkenny
KLH	Knockalough

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
KLM	Kilmore
KLN	Killonan
KLS	Kellis
KMA	Knocknamona
KMT	Killymallaght
KNO	Knock
KNR	Knockanure
KNV	Knockavanna
KNY	Knockranny
KPG	Kilpaddoge
KPN	Killinaparson
KPS	Kilroot Power Station
KRA	Knockraha
KSE	Kishoge
KTL	Kilteel
KTN	Killoteran
KUD	Kilmahud
KUR	Knockumber
KYT	Kellystown
LA	Lanesboro
LAR	Larne
LCK	Lickny
LET	Letterkenny
LGT	Lysaghtstown
LIB	Liberty Street
LIM (I)	Limerick

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
LIM (N)	Limavady
LIS (I)	Lisdrum
LIS (N)	Lisburn
LMR	Lisaghmore
LNA	Lenalea
LOG	Loguestown
LOU	Louth
LPT	Longpoint
LSN	Lisheen
LUM	Lumcloon
LWD	Lodgewood
MAC	Macroom
MAG	Magherafelt
MAL	Mallow
MAY	Maynooth
MCD	McDermott
MCE	Macetown
MEE	Meentycat
MEN	Monatooreen
MGT	Mulgeeth
MHL	Misery Hill
MID	Midleton
MIL	Milltown
MKL	Magherakeel Cluster
MLC	Mountlucas
MLG	Mully Graffy

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
MLN	Mullagharlin
MNH	Metro North
MON	Monread
MOY	Moy
MP	Moneypoint
MR	Marina
MRN	Mooretown
MRY	Mulreavy
MTA	Metro Airport
MTH	Meath Hill
MTN	Moneteen
MUC	Muckerstown
MUL	Mullingar
MUN	Mungret
NAN (I)	Nangor
NAR	Newtownards
NAV	Navan
NBY	Newbury
NEN	Nenagh
NEW (I)	Newbridge
NEW (N)	Newry
NQS	North Quays
NW	North Wall
OLD	Oldcourt
OMA	Omagh
ORL	Oriel

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
OST	Oldstreet
OUG	Oughtragh
PA	Pollaphuca
PB	Poolbeg
PGN	Pigeon Top
PLA	Platin
PLS	Portlaoise
PMT	Peamount
POP	Poppintree
POT	Pottery Road
PPT	Philipstown
PRO	Prospect
PRT	Portan
PTN	Pelletstown
RAF	Raffeen
RAT (I)	Rathkeale
RAT (N)	Rathgael
RE	Ringsend
REM	Reamore
RIC	Richmond
RNW	Rinawade
ROP	Rosspile
ROS	Rosebank
RRU	Ratrussan
RSK	Rasharkin Cluster
RSY	Ringaskiddy

Table A-1: Short Bus Codes	
Short Bus Code	**Full Name**
RTO	Rathnaskillo
RYB	Ryebrook
SAL	Salthill
SBH	Snughborough
SCR	Screeb
SH	Shannonbridge
SHE	Shelton Abbey
SHL	Shellybanks
SK	Sealrock
SKL	Shankill
SKY	Srahnakilly
SLB	Sliabh Bawn
SLC	Slievecallan
SLI	Sligo
SLK	Slieve Kirk
SNG	Singland
SOM	Somerset
SOR	Sorne Hill
SPR	Springtown
SRA	Srananagh
STR (I)	Stratford
STR (N)	Strabane
SVN	Stevenstown
SXH	Shantallow
TAN	Tandragee
TAW	Tawnaghmore

Table A-1: Short Bus Codes

Short Bus Code	Full Name
TB	Tarbert
TBG	Trabeg
TBK	Tullabrack
TEN	Timahoe
TGW	Terrygowan
TH	Turlough Hill
THU	Thurles
TIP	Tipperary
TIV	Tievebrack
TLK	Trillick
TLY	Tanley
TMN	Tamnamore
TON	Tonroe
TRE	Tremoge Cluster
TRI	Trien
TRL	Tralee
TRN	Trinity
TSB	Thornsberry
TTU	Tullabeg
TUR	Turleenan
TYN	Tynagh
UGL	Uggool
WAR	Waringstown
WAT	Waterford
WEX	Wexford
WH	Woodhouse

Table A-1: Short Bus Codes

Short Bus Code	Full Name
WHI	Whitegate
WOL	Wolfe Tone
YLW	Yellowmeadow

A.3 Schematic Diagrams of the All Island Transmission System

Schematic diagrams of the All-Island Transmission System are included to assist users in understanding the transmission system and in the identification of the changes outlined in Appendix B. Lines, cables, transformers, station busbars and reactive compensation devices are illustrated in the diagrams. The type of generation (thermal, wind, hydro or solar) at a station is also displayed. Table A-2 indicates the diagram conventions.

The schematic diagram for 2024 shows the transmission system as of January 2024. The schematic diagram for 2033 shows the planned transmission system due to be completed by the end of 2033.

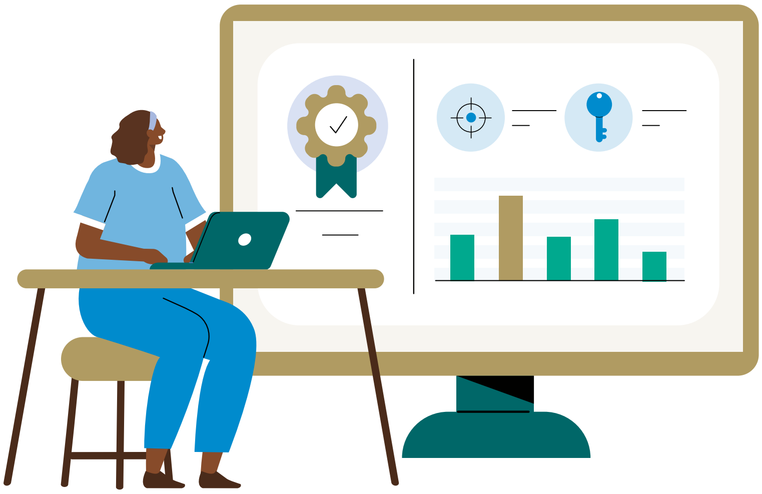
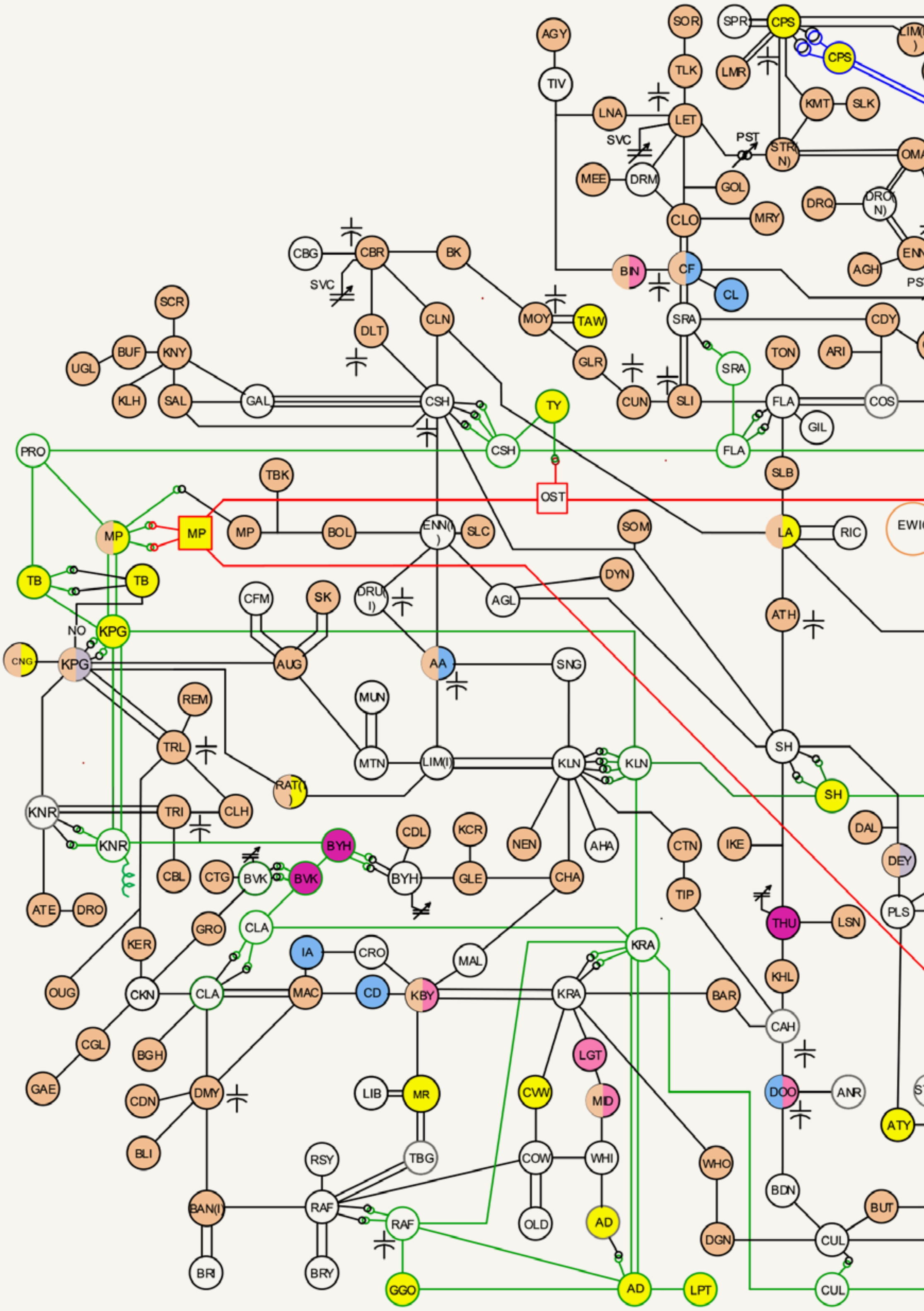


Table A 2: Schematic Legend

Symbol	Network element represented
	110 kV Circuit
	220 kV Circuit
	275 kV Circuit
	400 kV Circuit
	System Link
	110 kV Busbar
	220 kV Busbar
	275 kV Busbar
	400 kV Busbar
	Busbar with thermal generation
	Busbar with wind generation (>5 MW)
	Busbar with hydro generation
	Busbar with solar generation (> 5 MW)
	Busbar with wind and thermal generation
	Busbar with wind and hydro generation
	Busbar with wind and solar generation
	Capacitor
	Static Var compensator/STATCOM
	Reactor
PST	Phase shifting transformer
NO	Transformer
	Normally open point
SC	Series compensation

Figure A-4: Schematic Diagram of the planned All-Island Transmission System as at December 2024



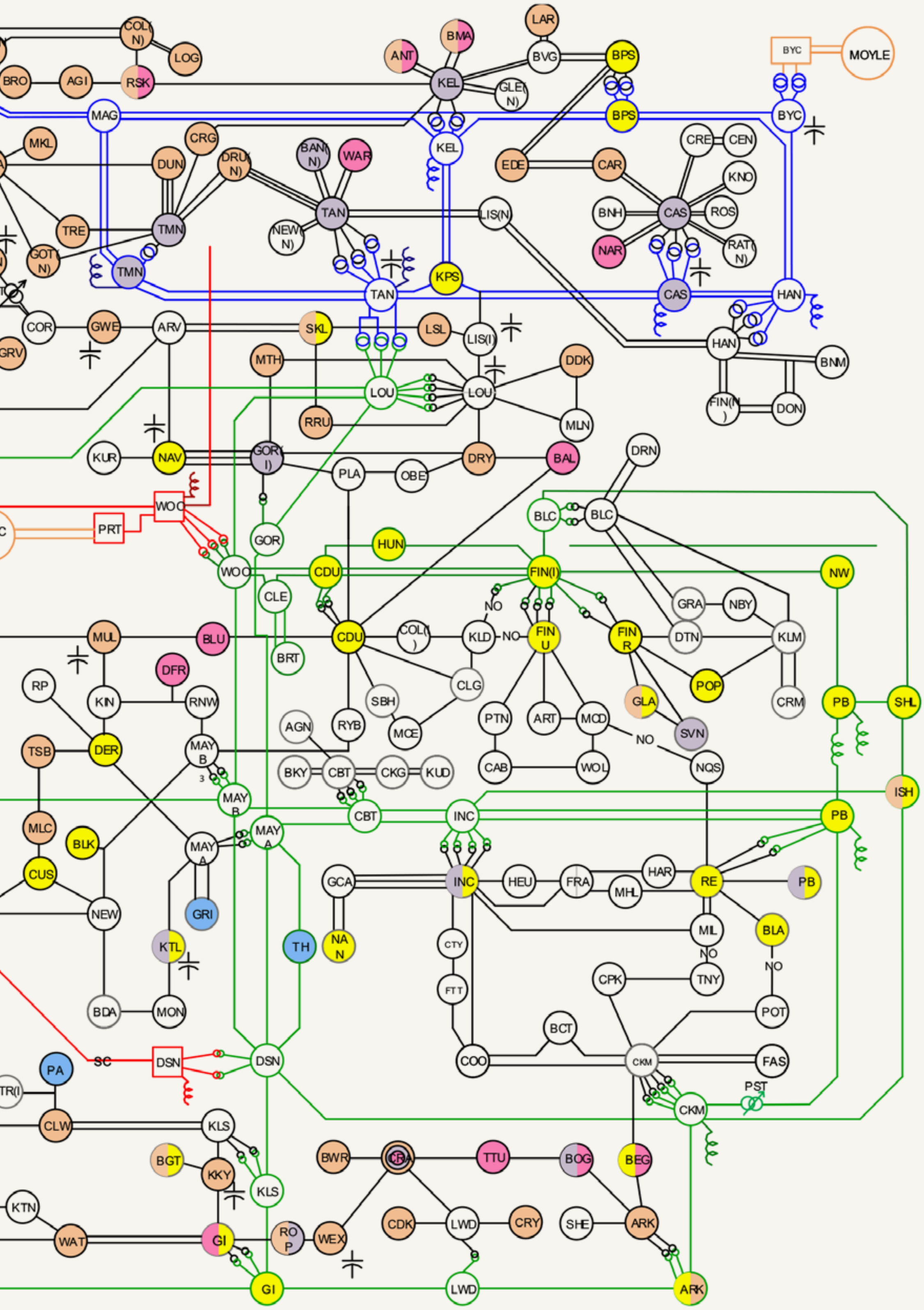
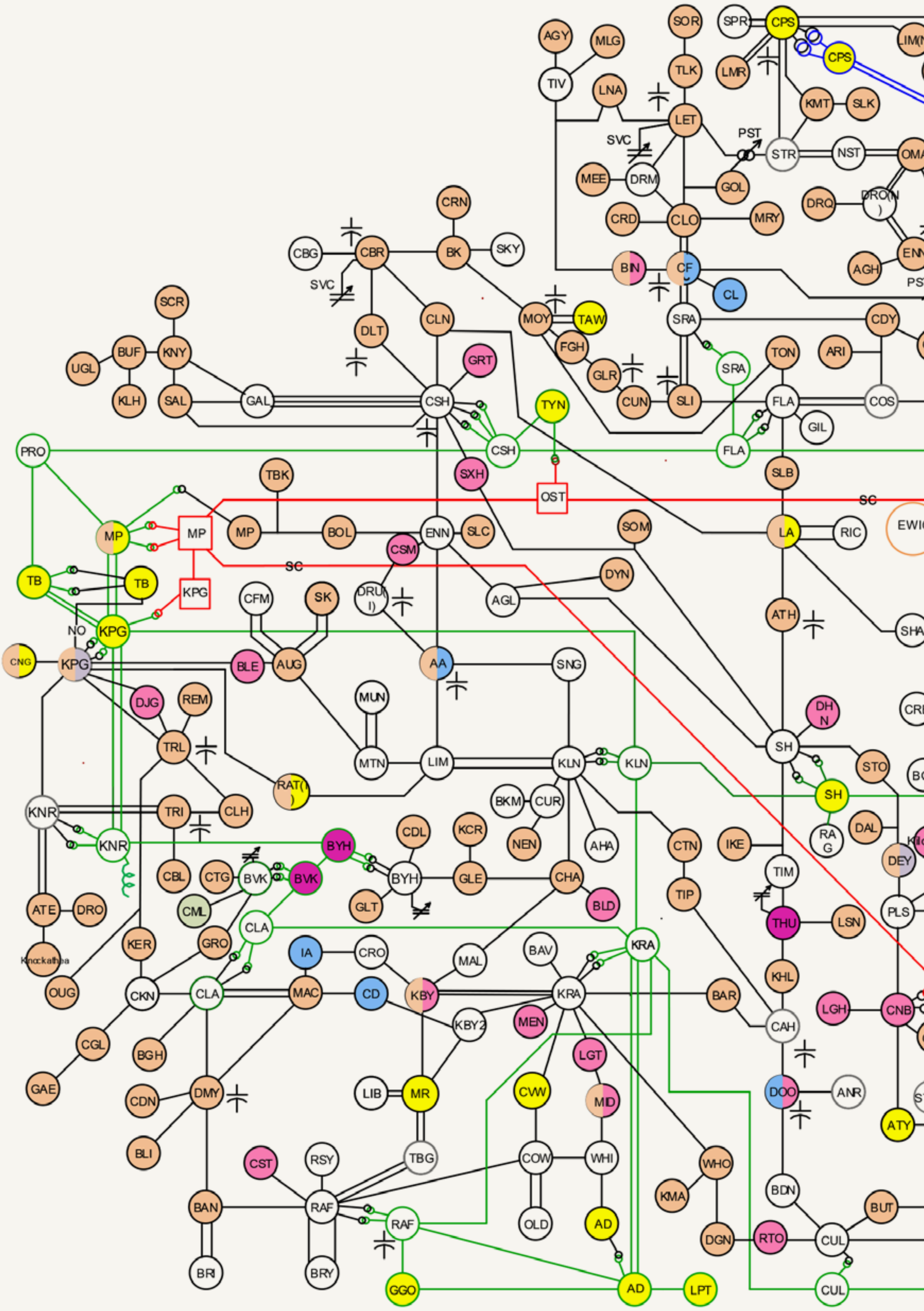
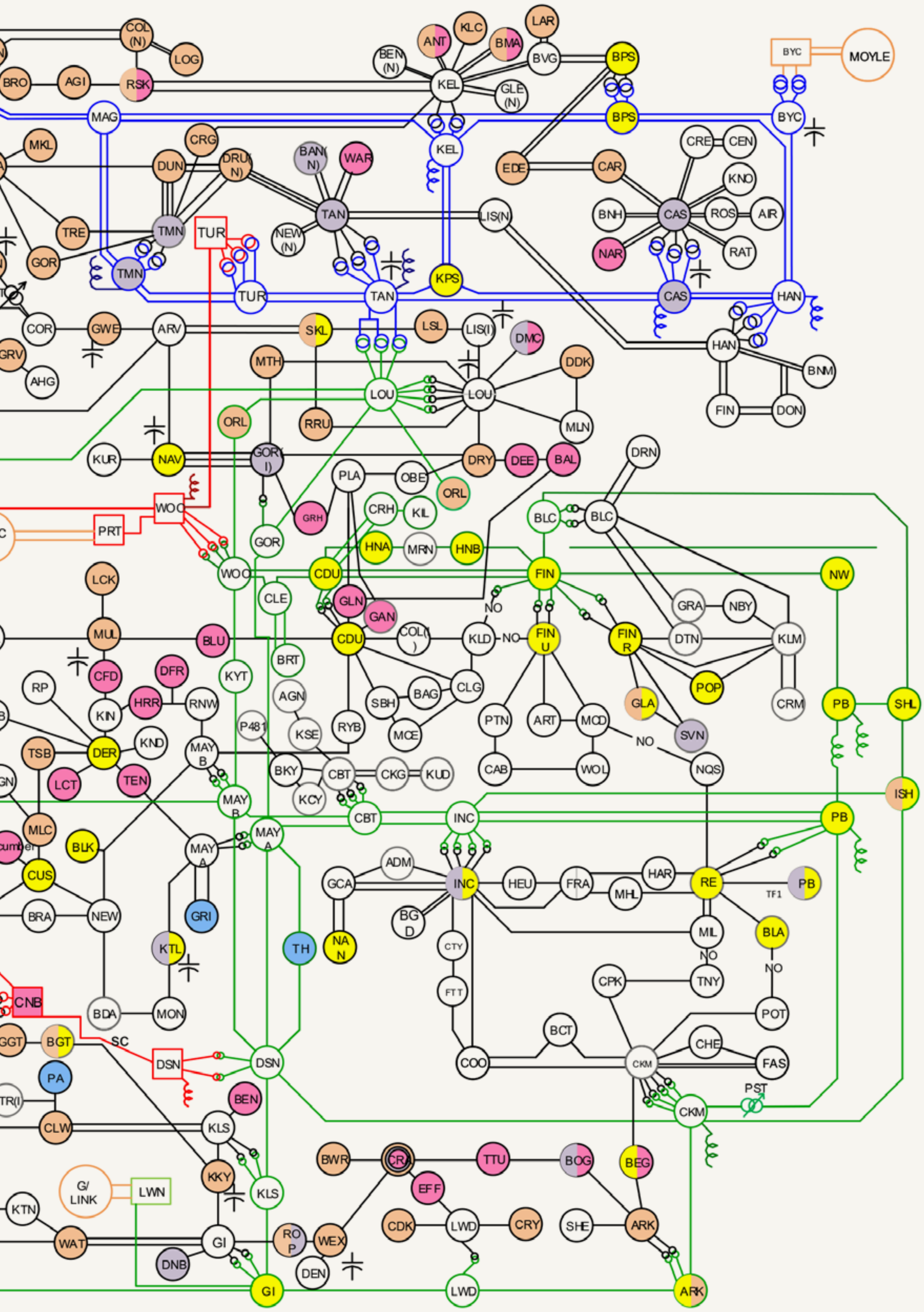

COL(N)
LOG
BRO
AGI
RSK
BMA
LAR
ANT
KEL
BVG
BPS
GLE(N)
BYC
MOYLE
MAG
BPS
BYC
KEL
MKL
CRG
DUN
DRU(N)
BAN(N)
WAR
EDE
CAR
CRE
CEN
KNO
TRE
TMN
TAN
LIS(N)
BNH
CAS
ROS
NEW(N)
NAR
RAT(N)
GOT(N)
TMN
KPS
TAN
CAS
HAN
COR
GWE
ARV
SKL
LSL
LIS(I)
HAN
GRV
MTH
DDK
BNM
LOU
LOU
RRU
FIN(N)
DON
MLN
KUR
NAV
GOR(I)
PLA
OBE
DRY
BAL
DRN
WOC
PRT
GOR
BLC
BLC
HUN
WOC
CDU
FIN(I)
NW
CLE
GRA
NBY
NO
MUL
BLU
CDU
COL(I)
KLD
NO
FIN U
FIN R
DTN
KLM
BRT
DFR
RP
CLG
POP
KIN
RNW
SBH
GLA
CRM
PB
SHL
AGN
RYB
PTN
ART
MCD
TSB
DER
MAY B
MCE
NO
SVN
BKY
CBT
CKG
KUD
CAB
WOL
NQS
ISH
MAY B
MLC
CBT
INC
PB
MAY A
BLK
MAY A
CUS
GCA
INC
HEU
FRA
HAR
RE
PB
MHL
NEW
GRI
ML
BLA
KTL
TH
NA N
CTY
NO
NO
FTT
CPK
TNY
BDA
MON
POT
BCT
SC
DSN
DSN
COO
CKM
FAS
PA
PST
TR(I)
CKM
CLW
KLS
BGT
BWR
CRA
TTU
BOG
BEG
KKY
KLS
KTN
CDK
LWD
CRY
SHE
ARK
WAT
GI
RO P
WEX
GI
LWD
ARK

Figure A-4: Schematic Diagram of the planned All-Island Transmission System as at December 2033




COL (N)
LOG
BRO
AGI
RSK
ANT
KLC
BMA
LAR
BEN (N)
KEL
BVG
BPS
GLE (N)
BYC
MOYLE
MAG
BPS
BYC
MKL
CRG
DUN
DRU (N)
BAN (N)
WAR
KEL
EDE
CAR
CRE
CEN
KNO
TRE
TMN
TUR
TAN
NEW (N)
LIS(N)
BNH
CAS
ROS
AIR
NAR
RAT
GOR
TMN
TUR
TAN
KPS
CAS
HAN
COR
GWE
ARV
SKL
LSL
LIS(I)
DMC
HAN
GRV
AHG
MTH
DDK
BNM
LOU
LOU
ORL
RRU
MLN
FIN
DON
KUR
NAV
GOR (I)
DRY
DEE
BAL
DRN
PLA
OBE
ORL
WOO
PRT
CRH
KIL
BLC
BLC
GRH
GOR
HNA
MRN
HNB
WOO
CDU
FIN
NW
LCK
CLE
GLN
GAN
NO
GRA
NBY
MUL
BLU
CDU
COL (I)
KLD
NO
FIN U
FIN R
DTN
KLM
BRT
CFD
DFR
KYT
RP
HRR
RNW
AGN
SBH
BAG
CLG
POP
GLA
CRM
PB
SHL
KIN
P481
KSE
RYB
MCE
PTN
ART
MCD
SVN
NO
TSB
DER
KND
MAY B
BKY
CBT
CKG
KUD
CAB
WOL
NQS
LCT
TEN
KCY
MAY B
ISH
CBT
INC
PB
MLC
MAY A
BLK
MAY A
ADM
CUS
GCA
INC
HEU
FRA
HAR
MHL
RE
PB
TF1
BRA
NEW
GRI
BG D
MIL
BLA
KTL
TH
NA N
CTY
NO
NO
CPK
TNY
FTT
CNB
BDA
MON
POT
BCT
GGT
BGT
SC
CHE
DSN
DSN
COO
CKM
FAS
PA
PST
BEN
CKM
TR(I)
CLW
KLS
BWR
CRA
TTU
BOG
BEG
EFF
KKY
KLS
G/ LINK
LWN
KTN
CDK
LWD
CRY
SHE
ARK
WAT
GI
ROP
WEX
DNB
DEN
GI
LWD
ARK

Appendix B: Transmission System Characteristics

This appendix presents details of the physical and electrical characteristics of the all-island transmission system in tabular form:

- Section B.1 details the data for the existing[1] transmission system; and
- Section B.2 details the data for planned transmission system developments[2].

The following is a list of tables in Section B.1:

The following is a list of tables in Section B.2:

1 As at January 2024.
2 Includes transmission system reinforcement projects and developments necessary to connect new generation and demand.

Tables B-2 and B-8 include the ratings for lines and cables in MVA for winter and summer reference temperature conditions at 1 per unit (pu) voltage. The higher ambient temperature in summer dictates a reduced thermal rating for overhead lines. The rating is the maximum permissible power that the circuit can transport on a continuous basis.

Reference ambient temperatures are:

- winter: 11°C[3] ; and
- summer: 25°C.

The electrical characteristics of the all-island transmission system at the four nominal voltage levels are documented. They are represented in per unit values, with a 100 MVA base, and the applicable reference voltage. Table B-1 below displays the four nominal and reference voltage levels on the all-island transmission system.

Table B-1: Nominal and Reference Voltage Levels

Nominal Voltage Level (kV)	Reference Voltage (kV)
400	400
275	275
220	220
110	110

In some cases equipment associated with a line or cable may be lower rated than the circuit or line. However, this equipment[4] is easier to upgrade than lines and cables and is therefore not expected to restrict access to the transmission system.

A small number of 110 kV stations are connected to the transmission system via a tee. A tee is an un-switched connection into an existing line between two other stations. For the purposes of describing the various sections of lines in the following tables, tee points are identified by the name of the tee'd 110 kV station with a suffix "T" added.

3 ESB Networks previously calculated winter ratings based on an assumed winter temperature of 5°C. In 2018 this was changed to 11°C.
4 For example, current transformers.

B.1 Characteristics of the Existing Transmission System (January 2024)

Characteristics of Existing Transmission Circuits

Table B-2: Characteristics of Existing Transmission Circuits										
Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
380	DSN	MP	1	208.5	0.004	0.044	1.14	1283	1331	1454
380	MP	OST	1	104.14	0.004	0.027	0.489	1283	1331	1454
380	OST	WOO	1	126	0.002	0.028	0.636	997	997	997
380	WOO	WOO	1	0.5	0	0	0.043	685	685	685
275	BPS	HAN	2	45.5	0.002	0.019	0.114	710	820	881
275	BPS	KEL	1	34.5	0.002	0.014	0.089	710	820	881
275	BPS	MAG	1	65.5	0.003	0.027	0.169	710	820	881
275	BPS	MOY	1	0.8	0	0	0.002	710	820	881
275	CAS	HAN	1	18.4	0.001	0.008	0.046	710	820	881
275	CAS	HAN	2	18.4	0.001	0.008	0.046	710	820	881
275	CAS	KPS	1	66.8	0.003	0.028	0.171	710	820	881
275	CAS	TAN	1	45.6	0.002	0.019	0.114	710	820	881
275	HAN	MOY	1	44.7	0.002	0.019	0.112	710	820	881
275	KEL	KPS	1	29	0.001	0.012	0.075	710	820	881
275	KEL	KPS	2	29	0.001	0.012	0.075	710	820	881
275	KEL	MAG	1	31.1	0.001	0.013	0.08	710	820	881
275	KPS	TAN	1	80.8	0.004	0.034	0.206	710	820	881
275	LOU	TAN	1	50	0.003	0.021	0.127	710	820	881
275	LOU	TAN	2	50	0.003	0.021	0.127	710	820	881
275	MAG	TMN	1	25.68	0.001	0.011	0.065	710	820	881
275	MAG	TMN	2	25.68	0.001	0.011	0.065	710	820	881
275	TAN	TMN	1	25.74	0.001	0.011	0.065	710	820	881
275	TAN	TMN	2	25.74	0.001	0.011	0.065	710	820	881
220	AD	AD	1	1.4	0	0.001	0.038	593	593	593
220	AD	GGO	1	3.78	0	0.002	0.104	536	573	573
220	AD	KRA	1	25.6	0.003	0.022	0.034	393	429	468
220	AD	KRA	2	25.6	0.003	0.022	0.034	393	429	468
220	AD	LPT	1	0.97	0	0	0.026	537	574	574

Table B-2: Characteristics of Existing Transmission Circuits										
Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
220	AD	RAF	1	14.4	0.001	0.009	0.252	434	474	513
220	ARK	CKM	1	53.61	0.006	0.046	0.081	434	474	513
220	ARK	LOD	1	39.02	0.005	0.034	0.051	434	474	513
220	BLC	FIN	1	10	0	0.002	0.332	457	457	457
220	BRT	CLE	1	2.5	0	0	0.083	563	583	635
220	BRT	CLE	2	2.5	0	0	0.083	563	583	635
220	BVK	BYH	1	14.5	0.002	0.013	0.019	761	780	794
220	BVK	CLA	1	16.78	0.002	0.014	0.025	740	769	792
220	CBT	INC	1	10	0.001	0.007	0.153	548	548	548
220	CBT	MAY	1	13.7	0.004	0.01	0.169	647	669	692
220	CDU	CRU	1	2	0	0.001	0.098	644	667	730
220	CDU	CRU	2	1.64	0	0.001	0.08	643	666	730
220	CDU	FIN	1	3.73	0	0.003	0.005	434	474	513
220	CDU	FIN	2	3.73	0	0.003	0.005	434	474	513
220	CDU	HN	1	3.73	0	0.001	0.134	555	555	555
220	CDU	WOO	2	17.84	0.002	0.016	0.023	434	474	513
220	CKM	DSN	1	41.61	0.005	0.036	0.109	434	474	513
220	CKM	ISH	1	11.89	0	0.005	0.326	593	593	593
220	CLA	KRA	1	42.93	0.005	0.037	0.057	646	704	751
220	CLE	CDU	1	5.06	0.001	0.004	0.007	434	474	513
220	CLE	WOO	1	13.5	0.002	0.012	0.018	434	474	513
220	CSH	FLA	1	88.09	0.01	0.076	0.115	350	393	436
220	CSH	PRO	1	88.54	0.01	0.077	0.116	392	429	468
220	CSH	TYN	1	39.89	0.005	0.034	0.058	761	777	792
220	CUL	GI	1	23.34	0.003	0.02	0.044	746	746	793
220	CUL	KRA	1	86	0.012	0.074	0.117	646	704	765
220	DSN	KLS	1	59.3	0.007	0.051	0.078	393	429	468
220	DSN	MAY	1	30.55	0.004	0.026	0.04	350	393	436
220	DSN	MAY	2	36.29	0.004	0.032	0.048	350	393	436
220	DSN	TH	1	26.62	0.003	0.022	0.144	351	351	351

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
220	FIN	HN	1	1.4	0	0.001	0.038	537	560	560
220	FIN	NW	1	11.85	0.001	0.004	0.67	332	332	332
220	FIN	SHL	1	13.4	0	0.005	0.367	536	557	557
220	FLA	LOU	1	110.08	0.013	0.098	0.145	384	430	475
220	FLA	SRA	1	56.01	0.006	0.047	0.077	434	474	513
220	GGO	RAF	1	9.5	0	0.005	0.414	547	567	627
220	GI	KLS	1	70.43	0.008	0.061	0.101	393	429	468
220	GI	LOD	1	48.08	0.006	0.042	0.07	434	474	513
220	GOR	LOU	1	32.41	0.004	0.028	0.042	434	474	476
220	GOR	MAY	1	42.19	0.005	0.037	0.055	350	393	436
220	INC	ISH	1	12.06	0	0.005	0.33	562	582	634
220	INC	MAY	1	19.13	0.003	0.016	0.026	793	811	824
220	INC	PB	1	12.5	0.001	0.004	0.498	267	267	267
220	INC	PB	2	11.3	0	0.003	0.722	351	351	351
220	ISH	SHL	1	1.31	0	0.001	0.036	593	593	593
220	KLN	KLP	1	70.57	0.008	0.061	0.114	434	474	513
220	KLN	KRA	1	82.16	0.013	0.069	0.107	512	536	564
220	KLN	SH	1	89.7	0.014	0.08	0.12	269	313	354
220	KLP	KNR	1	20.76	0.003	0.018	0.054	731	750	762
220	KLP	KNR	2	21.37	0.001	0.008	0.897	660	660	660
220	KLP	MP	1	5.4	0	0.002	0.236	660	660	660
220	KLP	MP	2	5.4	0	0.002	0.236	660	660	660
220	KLP	TB	1	2.5	0	0.002	0.028	645	669	731
220	KLP	TB	2	2.6	0	0.002	0.026	434	474	513
220	KNR	BYH	1	37.79	0.005	0.033	0.061	740	769	792
220	KRA	RAF	1	19.25	0.002	0.017	0.026	351	394	436
220	KYT	MAY	1	13.5	0.001	0.01	0.111	726	726	820
220	KYT	WOO	1	13.5	0.002	0.011	0.093	434	474	513
220	LOU	WOO	1	61.2	0.007	0.053	0.08	434	474	476
220	MAY	SH ~	1	105.6	0.017	0.094	0.142	269	313	354

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
220	MAY	TH	1	53.1	0.006	0.044	0.184	325	351	351
220	MP	PRO	1	12.7	0.001	0.011	0.017	537	600	610
220	NW	PB	1	4.5	0	0.001	0.261	332	332	332
220	OST	TYN	1	10.04	0.001	0.008	0.014	434	474	513
220	PB	CKM	1	14.5	0.001	0.005	0.579	267	267	267
220	PB	PB	1	1	0	0.037	0	450	450	450
220	PB	SHL	1	0.12	0	0	0.003	574	574	574
220	PRO	TB	1	10.16	0.001	0.007	0.173	467	467	467
110	AA	DRU	1	18.15	0.027	0.063	0.006	99	110	121
110	AA	ENN	1	32.33	0.048	0.111	0.012	99	110	121
110	AA	LIM	1	11.7	0.007	0.037	0.012	178	194	210
110	AA1	SNG	1	5.46	0.003	0.017	0.007	178	194	210
110	AD	WHI	1	3.1	0.005	0.011	0.001	99	110	121
110	ADM	GCA	1	2.5	0.002	0.004	0.025	160	166	181
110	ADM	INC	1	10.7	0.005	0.005	0.118	160	166	181
110	AGH (N)	ENN (N)	1	31.1	0.039	0.095	0.019	109	114	124
110	AGL	DBR	1	8	0.012	0.028	0.003	105	114	123
110	AGL	ENN	1	38.2	0.059	0.131	0.012	74	83	91
110	AGL	SH	1	45.88	0.068	0.157	0.017	104	113	119
110	AGN	CBT	1	0.2	0	0	0.002	128	128	128
110	AGN	CBT	2	0.2	0	0	0.002	128	128	128
110	AHA	KLN	1	3.77	0.004	0.012	0.004	45	45	45
110	ANR	DOO	1	2	0.003	0.007	0.001	45	45	45
110	ANT	KEL	1	8.93	0.012	0.03	0.003	82	95	103
110	ANT	KEL	2	8.93	0.012	0.03	0.003	82	95	103
110	ARD	TIV	1	35	0.054	0.12	0.011	91	91	91
110	ARI	ARI-T	1	0.21	0	0.001	0	105	116	123
110	ARK	BOG	1	29	0.021	0.095	0.01	178	194	210
110	ARK	SHE	2	2.2	0.004	0.008	0.001	63	79	92
110	ART	FIN	1	9	0.005	0.01	0.055	120	124	136

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	ART	MCD	1	4.9	0.003	0.006	0.03	108	108	115
110	ARV	COS	1	43.04	0.067	0.148	0.014	104	113	123
110	ARV	GWE	1	30.6	0.019	0.099	0.011	178	194	210
110	ARV	NAV	1	65.5	0.041	0.213	0.023	178	194	210
110	ARV	SKL	1	18.52	0.012	0.06	0.007	178	194	210
110	ARV	SKL	2	23.56	0.015	0.076	0.01	178	194	210
110	ATE	DRO	1	5.47	0.001	0.006	0.06	120	124	136
110	ATE	KNR	1	6.71	0.004	0.021	0.007	178	194	210
110	ATH	LA	1	35.78	0.054	0.123	0.012	99	110	121
110	ATH	SH	1	21.63	0.014	0.07	0.011	178	190	190
110	ATN	INC	1	6.5	0.005	0.01	0.065	120	124	136
110	ATN	INC	2	6.5	0.005	0.01	0.065	120	124	136
110	ATY	CLW	1	24.23	0.036	0.083	0.008	99	110	121
110	ATY	PLS	1	25.48	0.038	0.088	0.008	99	110	121
110	AUG	CFM	1	0.65	0.001	0.002	0.001	96	96	96
110	AUG	CFM	2	0.67	0.001	0.002	0.001	96	96	96
110	AUG	KLP	1	32.83	0.021	0.107	0.012	178	194	210
110	AUG	MTN	1	27.5	0.017	0.089	0.01	178	194	210
110	AUG	SK	3	1	0.001	0.001	0.006	120	120	120
110	AUG	SK	4	1	0.001	0.001	0.006	120	120	120
110	BAG	CLG	1	0.85	0	0.001	0.009	192	192	192
110	BAL	CDU	1	15.93	0.011	0.055	0.006	178	194	210
110	BAL	DRY	1	20	0.013	0.065	0.007	178	194	210
110	BAN	BRI	1	2.6	0.004	0.009	0.001	74	83	91
110	BAN	BRI	2	2.5	0.004	0.009	0.001	74	83	91
110	BAN	DMY	1	25.9	0.04	0.089	0.008	99	110	121
110	BAN	RAF	1	26.89	0.041	0.091	0.012	99	110	121
110	BAN (N)	TAN	1	18.4	0.024	0.062	0.006	82	95	103
110	BAN (N)	TAN	2	18.4	0.019	0.049	0.005	82	95	103
110	BAR	BAR-T	1	0.31	0	0.001	0	136	148	159

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	BCT	CKM	1	3.1	0.002	0.005	0.031	109	109	116
110	BCT	COO	1	15.1	0.014	0.045	0.027	124	124	133
110	BDA	MON	1	11.2	0.01	0.03	0.029	99	110	121
110	BDA	NEW	1	7.2	0.006	0.017	0.028	122	122	122
110	BDN	CUL	1	21.8	0.031	0.075	0.007	196	213	217
110	BDN	DOO	1	11.3	0.007	0.037	0.004	178	194	210
110	BEG	CKM	1	32.3	0.015	0.116	0.01	136	148	159
110	BGT	KKY	1	22	0.014	0.072	0.008	178	197	210
110	BIN	CF	1	34.26	0.053	0.118	0.011	99	110	121
110	BIN	TIV	1	23.2	0.024	0.077	0.008	134	148	159
110	BK	CBR	1	37.39	0.053	0.128	0.014	195	202	217
110	BK	MOY	1	27	0.017	0.088	0.01	178	194	210
110	BK ~	SKY	1	4	0.001	0.004	0.044	195	202	221
110	BLA	POT	1	5.2	0.002	0.004	0.092	109	109	115
110	BLA	RE	1	7.7	0.003	0.006	0.136	124	124	151
110	BLI	DMY	1	27.57	0.043	0.094	0.01	68	68	68
110	BLK	BLK-T	1	0.5	0.001	0.002	0	136	148	159
110	Blu	CDU	1	18.93	0.017	0.057	0.038	130	130	130
110	Blu	MUL	1	56.78	0.079	0.192	0.032	105	114	123
110	BMA	KEL	1	10	0.013	0.035	0.003	109	119	124
110	BMA	KEL	2	11.5	0.015	0.04	0.004	109	119	124
110	BNH	CAS	1	21.2	0.028	0.071	0.007	82	95	103
110	BNH	CAS	2	21.2	0.028	0.071	0.007	82	95	103
110	BNK	CBT	1	1	0	0.001	0.011	175	175	175
110	BNK	CBT	2	0.6	0	0.001	0.011	175	175	175
110	BNM	DON	1	6.02	0.005	0.005	0.053	75	75	82
110	BNM	DON	2	5.81	0.005	0.005	0.053	75	75	82
110	BOG	CLA	1	13.5	0.008	0.04	0.027	178	194	210
110	BOG	TTU	1	11.15	0.007	0.036	0.004	178	197	210
110	BOL	ENN	1	24.69	0.016	0.08	0.009	178	194	210

Table B-2: Characteristics of Existing Transmission Circuits										
Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	BOL	TBK-T	1	18.28	0.012	0.059	0.006	178	194	210
110	BPS	BVG	1	17.3	0.023	0.058	0.006	82	95	103
110	BPS	BVG	2	17.3	0.023	0.058	0.006	82	95	103
110	BRY	RAF	1	1.7	0.003	0.006	0.001	63	79	92
110	BRY	RAF	2	1.8	0.002	0.006	0.001	99	110	121
110	BUT	CUL	1	12.32	0.008	0.038	0.013	178	192	192
110	BUT	KTN	1	2.72	0.004	0.01	0.001	196	209	216
110	BVG	KEL	1	21.2	0.028	0.073	0.007	109	119	124
110	BVG	KEL	2	20.3	0.027	0.07	0.007	109	119	124
110	BVG	LAR	1	7.1	0.007	0.023	0.002	79	79	113
110	BVG	LAR	2	7.1	0.007	0.023	0.002	79	79	113
110	BVK	KLG	1	31.7	0.006	0.036	0.386	195	202	221
110	BWR	CRA	1	22.4	0.008	0.023	0.137	68	68	68
110	BYH	Cor	1	9.54	0.002	0.011	0.105	195	201	220
110	BYH	Gle	1	19.1	0.006	0.022	0.186	134	150	166
110	CAB	PTN	1	2.66	0.002	0.007	0.005	124	124	133
110	CAB	WOL	1	4.7	0.002	0.005	0.029	108	108	115
110	CAH	BAR-T	1	43.69	0.065	0.15	0.014	105	114	123
110	CAH	DOO	1	15.73	0.01	0.051	0.006	178	194	210
110	CAH	KLH	1	17.95	0.011	0.058	0.006	178	194	210
110	CAH	TIP	1	18.06	0.011	0.059	0.006	178	194	210
110	CAR	CAS	1	24.7	0.037	0.088	0.008	69	80	86
110	CAR	CAS	2	24.7	0.037	0.086	0.008	70	81	87
110	CAR	EDE	1	12.4	0.019	0.043	0.004	69	80	86
110	CAR	EDE	2	12.4	0.019	0.044	0.004	69	80	86
110	CAS	CRE	1	2.96	0.001	0.004	0.061	132	132	145
110	CAS	CRE	2	2.96	0.001	0.004	0.061	132	132	145
110	CAS	KNO	1	4.59	0.005	0.004	0.044	66	66	73
110	CAS	KNO	2	4.52	0.005	0.004	0.044	66	66	73
110	CAS	NAR	1	18	0.015	0.04	0.071	109	109	124

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	CAS	NAR	2	19.8	0.018	0.046	0.07	109	124	124
110	CAS	RAT (N)	1	18.9	0.025	0.064	0.006	82	95	103
110	CAS	RAT (N)	2	18.9	0.025	0.064	0.006	82	95	103
110	CAS	ROS	1	1.83	0.001	0.003	0.015	144	144	152
110	CAS	ROS	2	1.83	0.001	0.003	0.015	144	144	152
110	CAU	KLN	1	29.24	0.018	0.095	0.01	178	194	210
110	CBA	TRI	1	13.62	0.007	0.019	0.099	160	166	181
110	CBG	CBR	1	26.71	0.035	0.078	0.059	99	110	121
110	CBR	CLN	1	57.52	0.089	0.198	0.02	99	110	121
110	CBR	DLT	1	27.77	0.043	0.096	0.009	99	110	121
110	CD	KBY	1	32.33	0.02	0.104	0.025	178	194	209
110	CD	MAC	1	2.41	0.002	0.008	0.001	178	194	210
110	CDG	GCA	1	1.87	0	0.002	0.021	140	140	140
110	CDG	GCA	2	2.02	0	0.002	0.022	140	140	140
110	CDK	LOD	1	8.4	0.003	0.009	0.051	91	91	91
110	CDU	GLN	1	11.05	0.007	0.036	0.004	178	194	210
110	CDU	MCE	1	4.13	0.003	0.01	0.016	99	111	121
110	CDU	RYB	1	13	0.014	0.043	0.004	161	171	171
110	CDU	Snu	1	1.77	0	0.003	0.015	238	238	238
110	CDY	ARI-T	1	13.68	0.009	0.044	0.005	178	194	210
110	CDY	GAR	1	5.83	0.004	0.019	0.003	178	194	210
110	CDY	SRA	1	12.7	0.02	0.044	0.004	178	194	210
110	CEN	CRE	1	3.22	0.001	0.004	0.03	144	144	144
110	CEN	CRE	2	3.22	0.001	0.004	0.03	144	144	144
110	CF	CL	1	5.5	0.006	0.018	0.002	68	68	68
110	CF	CLO	2	25.74	0.039	0.088	0.009	178	194	210
110	CF	COR	1	61.3	0.038	0.199	0.022	178	194	210
110	CF	SRA	1	52.63	0.065	0.179	0.021	191	191	191
110	CF~	CLO	1	26.07	0.016	0.088	0.016	178	194	209
110	CF~	SRA	2	49.67	0.031	0.16	0.017	178	194	210

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	CGL	GAE	1	2	0.001	0.001	0.011	91	91	91
110	CHA	GLE	1	28.06	0.042	0.096	0.009	99	110	121
110	CHA	KLN	1	36.9	0.038	0.123	0.013	136	148	159
110	CHA	MAL	1	22.5	0.014	0.073	0.008	178	194	210
110	CHE	FAS	1	2.2	0.004	0.008	0.001	105	116	123
110	CKG	CBT	1	0.75	0	0.001	0.008	184	184	184
110	CKG	CBT	2	0.75	0	0.001	0.008	184	184	184
110	CKM	CHE	1	4	0.004	0.008	0.03	105	116	123
110	CKM	COO	1	16	0.013	0.042	0.06	111	111	138
110	CKM	FAS	1	2.9	0.005	0.01	0.001	105	116	123
110	CKM	FAS	1	7.5	0.012	0.026	0.002	105	116	123
110	CKM	POT	1	3.2	0.001	0.002	0.057	119	119	127
110	CKN	CGL	1	6.3	0.004	0.02	0.003	178	190	190
110	CKN	CMC	1	15.17	0.009	0.008	0.137	120	120	120
110	CKN	KER	1	20.3	0.013	0.066	0.007	178	194	210
110	CLA	CKN	1	29.97	0.019	0.096	0.015	178	190	190
110	CLA	DMY	1	38.83	0.024	0.126	0.015	178	194	210
110	CLA	MAC	1	5.66	0.002	0.01	0.099	195	201	220
110	CLA	MAC	2	5.66	0.004	0.018	0.002	161	176	191
110	CLG	CDU	1	2.5	0.001	0.003	0.028	195	202	221
110	CLH	TRI	1	9	0.014	0.031	0.003	99	110	121
110	CLH	TRL	1	13.5	0.02	0.045	0.013	105	114	123
110	CLN	LA	1	64.76	0.095	0.222	0.021	99	111	122
110	CLO	CKL	1	9.61	0.002	0.008	0.13	183	183	183
110	CLO	GOL-T	1	0.25	0	0.001	0.001	177	198	217
110	CLO	MRY	1	7.68	0.002	0.009	0.09	136	136	136
110	CLU	KUD	1	0.9	0	0.001	0.01	187	206	223
110	CLW	KLS	1	5.4	0.008	0.019	0.002	99	110	121
110	CLW	KLS	2	5.28	0.008	0.019	0.002	99	110	121
110	CLW	STR-T	1	17.6	0.027	0.061	0.006	68	68	68

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	CMC	BVK	1	4.91	0.002	0.002	0.054	195	201	220
110	COL	CDU	1	2.66	0.001	0.004	0.02	143	143	143
110	COL	FIN	1	5.02	0.003	0.013	0.037	104	129	142
110	COL (N)	CPS	1	46.7	0.061	0.161	0.015	82	95	103
110	COL (N)	LIM (N)	1	18.63	0.024	0.064	0.006	82	95	103
110	COL (N)	LOG	1	8.1	0.011	0.027	0.003	82	95	103
110	COL (N)	LOG	2	8.1	0.011	0.027	0.003	82	95	103
110	COL (N)	RSK	1	20.01	0.024	0.069	0.007	186	191	193
110	COO	FTT	1	4.4	0.004	0.011	0.019	110	110	132
110	COO	INC	1	6.17	0.006	0.016	0.029	111	111	138
110	COR	ENN (N)	1	27.5	0.041	0.095	0.009	99	110	121
110	COR	GWE	1	10.9	0.007	0.036	0.004	178	194	210
110	COS	ARI-T	1	20.7	0.013	0.065	0.007	178	194	210
110	COS	FLA	1	3.4	0.005	0.012	0.001	99	110	121
110	COS	FLA	2	3.3	0.005	0.011	0.001	99	110	121
110	COW	OLD	1	2.3	0.004	0.008	0.001	33	33	33
110	COW	OLD	2	2.2	0.003	0.008	0.001	42	42	42
110	COW	RAF	1	6.9	0.01	0.024	0.003	99	110	121
110	COW	WHI	1	17.79	0.027	0.062	0.006	99	110	121
110	CPK	TAN-T	1	3.38	0.002	0.004	0.025	100	100	100
110	CPK	TNY	1	5.59	0.003	0.006	0.072	109	109	116
110	CPS	KMT	1	14.5	0.011	0.048	0.005	143	158	166
110	CPS	LIM (N)	1	29.5	0.039	0.101	0.01	82	95	103
110	CPS	LMR	1	9	0.012	0.03	0.003	82	95	103
110	CPS	LMR	2	9	0.012	0.03	0.003	82	95	103
110	CPS	SPR	1	9.23	0.011	0.029	0.012	82	95	103
110	CPS	SPR	2	9.38	0.011	0.029	0.013	82	95	103
110	CPS	STR (N)	1	27	0.018	0.053	0.017	143	158	166
110	CRA	LOD	1	6.69	0.004	0.022	0.004	178	194	210
110	CRA	TTU	1	13.65	0.011	0.045	0.005	178	197	210

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	CRA	WEX	1	22.82	0.024	0.076	0.008	136	148	159
110	CRG	KEL	1	23.1	0.029	0.077	0.013	82	95	103
110	CRG	TMN	1	36.24	0.045	0.119	0.022	109	114	124
110	CRM	KLM	1	1.35	0.001	0.002	0.014	114	114	114
110	CRM	KLM	2	1.35	0.001	0.002	0.014	114	114	114
110	CRO	IA	1	2.74	0.004	0.01	0.001	196	213	217
110	CRO	KBY	1	14.35	0.02	0.049	0.016	178	194	201
110	CSH	CLN	1	22.8	0.014	0.074	0.008	178	194	210
110	CSH	DLT	1	60.76	0.074	0.205	0.02	99	110	121
110	CSH	ENN	1	53.47	0.034	0.174	0.019	178	194	210
110	CSH	GAL	1	13.8	0.022	0.048	0.004	105	114	123
110	CSH	GAL	2	11.3	0.018	0.039	0.004	105	114	123
110	CSH	GAL	3	11.3	0.018	0.039	0.004	105	114	123
110	CSH	SHL	1	24.85	0.024	0.074	0.068	97	97	97
110	CSH	SOM-T	1	50.02	0.078	0.172	0.016	99	110	121
110	CTN	TIP	1	13.15	0.008	0.043	0.005	178	194	210
110	CTY	FTT	1	1.5	0.001	0.001	0.018	124	124	132
110	CTY	INC	1	8.9	0.011	0.03	0.003	103	119	134
110	CUL	DGN	1	34.24	0.022	0.109	0.02	178	192	192
110	CUL	WAT	1	13.14	0.007	0.03	0.055	178	194	201
110	CUN	ONH	1	26.29	0.039	0.09	0.009	178	194	210
110	CUN	SLI	1	21.1	0.03	0.073	0.007	178	194	210
110	CUS	MLU	1	13.67	0.015	0.048	0.005	136	148	159
110	CUS	NEW	1	24.61	0.026	0.082	0.008	134	147	152
110	CUS	PLS	1	42.14	0.044	0.14	0.014	134	148	159
110	CVW	COW	1	17.22	0.024	0.054	0.018	99	110	121
110	CVW	KRA	1	7.59	0.012	0.026	0.004	99	110	121
110	DAL	DAL-T	1	12.2	0.019	0.042	0.004	105	116	123
110	DDK	LOU	1	16.81	0.026	0.058	0.005	99	110	121
110	DDK	MLN	1	7.5	0.012	0.026	0.002	99	110	121

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	DER	KIN	1	15.11	0.012	0.05	0.005	99	110	121
110	DEY	DAL-T	1	6.35	0.004	0.021	0.002	178	194	210
110	DEY	PLS	1	48.45	0.03	0.157	0.017	178	194	210
110	DGN	WHE	1	8.65	0.006	0.028	0.003	178	194	210
110	DMY	CDN	1	10.88	0.016	0.04	0.004	209	213	217
110	DMY	MAC	1	26.22	0.039	0.09	0.009	196	213	217
110	DON	FIN (N)	1	3.67	0.004	0.011	0.008	69	81	86
110	DON	FIN (N)	2	3.74	0.004	0.011	0.007	69	80	86
110	DON	HAN	1	6.07	0.002	0.005	0.14	144	144	158
110	DON	HAN	2	5.89	0.002	0.005	0.14	144	144	158
110	DRM	CLO	1	27	0.039	0.091	0.015	103	116	123
110	DRM	LET	1	8.35	0.012	0.028	0.003	99	110	123
110	DRM	MEE	1	5	0.008	0.017	0.002	99	110	121
110	DRO	ENN (N)	1	24.59	0.032	0.082	0.008	82	95	103
110	DRO	ENN (N)	2	24.59	0.032	0.082	0.008	82	95	103
110	DRO	OMA	1	9.21	0.012	0.031	0.003	199	200	200
110	DRO	OMA	2	9.21	0.012	0.031	0.003	199	215	225
110	DRU	ENN	1	17.44	0.027	0.06	0.006	99	110	121
110	DRU	TAN	1	4.4	0.004	0.014	0.002	79	96	113
110	DRU	TAN	2	4.4	0.004	0.014	0.002	79	96	113
110	DRU	TAN	3	4.1	0.005	0.014	0.001	108	119	126
110	DRU	TMN	1	22.69	0.029	0.075	0.008	109	119	124
110	DRU	TMN	2	21.53	0.028	0.073	0.012	109	119	124
110	DRY	GOR	1	19.39	0.029	0.067	0.006	99	110	121
110	DRY	LOU	1	31.9	0.02	0.104	0.011	99	110	121
110	DRY	OBE	1	2.87	0.004	0.009	0.004	105	114	123
110	DTN	FIN	1	9.25	0.002	0.014	0.111	120	124	136
110	DTN	KLM	1	3.2	0.002	0.005	0.032	124	124	151
110	DUN	OMA	1	36.1	0.042	0.124	0.012	186	191	193
110	DUN	TMN	1	6.53	0.004	0.017	0.005	157	171	178

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	DUN	TMN	2	5.82	0.009	0.023	0.002	144	144	144
110	DUN	TMN	3	6.01	0.004	0.02	0.019	186	191	193
110	ENN	SLC	1	31	0.003	0.048	0.271	195	201	220
110	FAS	FAS	1	5	0.008	0.017	0.002	105	116	123
110	FIN	GLA	1	14.02	0.022	0.048	0.005	99	111	122
110	FIN	GRA	1	13.2	0.005	0.012	0.236	101	101	125
110	FIN	MCD	1	7.9	0.003	0.007	0.141	99	111	114
110	FIN	POP	1	4.3	0.002	0.005	0.026	109	109	116
110	FIN	PTN	1	3.52	0.003	0.01	0.006	109	109	116
110	FIN	SVN	1	32.22	0.039	0.104	0.056	105	114	123
110	FIN (N)	HAN	1	3.03	0.001	0.003	0.022	144	144	144
110	FIN (N)	HAN	2	3.21	0.001	0.003	0.022	144	144	144
110	FLA	GIL	1	10.6	0.016	0.036	0.003	68	68	68
110	FLA	SLB	1	21.7	0.034	0.075	0.007	99	110	123
110	FLA	SLI	1	50.5	0.078	0.174	0.016	99	110	121
110	FLA	TON	1	32.31	0.05	0.111	0.01	76	76	76
110	FRS	HAR	1	2.28	0.002	0.004	0.03	107	107	114
110	FRS	HEU	1	2.4	0.002	0.004	0.024	124	124	133
110	FRS	INC	1	5.6	0.004	0.01	0.073	107	107	114
110	FRS	TRN	1	2.8	0.002	0.004	0.028	120	128	136
110	GAL	SEE	1	25.53	0.005	0.031	0.138	179	182	185
110	GAL	SHL	1	6.12	0.003	0.003	0.067	99	106	106
110	GBH	PLA	1	6.05	0.009	0.021	0.002	105	114	123
110	GCA	GRI-T	1	8.87	0.009	0.029	0.006	103	120	131
110	GCA	INC	1	8.1	0.008	0.025	0.009	103	103	115
110	GCA	INC	2	8.1	0.008	0.025	0.009	103	103	115
110	GCA	NAN	1	1.82	0.001	0.002	0.011	120	120	131
110	GCA	NAN	2	1.74	0.001	0.002	0.011	120	120	131
110	GCA	YMD	1	5.09	0.001	0.006	0.056	187	206	223
110	GI	KKY	1	49.2	0.031	0.16	0.017	178	194	210

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	GI	RO1	1	19.7	0.012	0.064	0.01	178	194	210
110	GI	WAT	1	11.7	0.007	0.038	0.004	178	194	210
110	GI	WAT	2	12.92	0.008	0.042	0.005	178	194	210
110	GLA	SVN	1	18	0.017	0.055	0.052	134	147	157
110	Gle	Kno	1	11.32	0.003	0.013	0.124	122	122	122
110	GLE (N)	KEL	1	21.4	0.027	0.068	0.027	82	82	90
110	GLE (N)	KEL	2	21.4	0.027	0.068	0.027	82	82	90
110	GLN	PLA	1	26.55	0.017	0.086	0.009	178	197	210
110	GOL	GOL-T	1	3.9	0.006	0.014	0.001	105	116	123
110	GOR	GBH	1	14.13	0.021	0.048	0.005	105	114	123
110	GOR	GOR	1	0.5	0	0.001	0.006	187	206	223
110	GOR	MTH	1	26.39	0.026	0.087	0.012	99	110	121
110	GOR	NAV	1	5.33	0.008	0.019	0.002	99	110	121
110	GOR	NAV	2	6.3	0.009	0.022	0.002	99	110	121
110	GOR	NAV	3	5.49	0.005	0.017	0.007	99	110	121
110	GOR (N)	OMA	1	17.12	0.009	0.067	0.02	200	200	200
110	GOR (N)	TMN	1	34.83	0.019	0.161	0.029	200	200	200
110	GRA	NBY	1	5.05	0.002	0.005	0.089	124	124	124
110	GRI	GRI-T	1	1	0.002	0.004	0	105	116	123
110	GRI	MAY	1	2.2	0.003	0.009	0.001	99	111	122
110	HAN	LIS (N)	1	9.2	0.01	0.026	0.018	82	95	103
110	HAN	LIS (N)	2	9.2	0.009	0.026	0.018	80	93	100
110	HAR	RE	1	5.63	0.004	0.01	0.073	107	107	114
110	HEU	INC	1	3.6	0.003	0.005	0.036	124	124	133
110	IA	MAC	1	18.16	0.027	0.062	0.006	196	213	217
110	IKE	IKE-T	1	0.15	0	0.001	0	91	91	91
110	INC	MIL	1	8.4	0.004	0.009	0.051	103	119	134
110	INC	YMD	1	3.18	0.001	0.004	0.035	187	206	223
110	KBR	CUS	1	0.5	0	0.001	0.006	140	140	140
110	KBY	KRA	1	11.9	0.008	0.039	0.004	178	194	210

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	KBY	KRA	2	12.5	0.018	0.043	0.004	99	110	121
110	KBY	MAL	1	29.2	0.018	0.095	0.01	134	147	159
110	KBY	MR	1	4.44	0.004	0.015	0.004	103	119	130
110	KBY	MR	2	4.65	0.005	0.015	0.004	103	119	130
110	KEL	RSK	1	25.9	0.039	0.133	0.013	185	190	193
110	KER	OUG-T	1	22.6	0.014	0.074	0.008	178	194	210
110	KIN	DFR-T	1	29.25	0.021	0.096	0.01	99	110	121
110	KIN	MUL	1	24.92	0.016	0.077	0.023	178	194	210
110	KLH	THU	1	21.24	0.013	0.069	0.008	178	194	210
110	KLM	NBY	1	1.2	0.001	0.001	0.02	119	124	133
110	KLM	POP	1	6	0.003	0.007	0.036	109	109	116
110	KLN	LIM	1	9	0.014	0.031	0.003	99	110	121
110	KLN	LIM	2	11.7	0.018	0.04	0.009	80	93	104
110	KLN	NNA	1	33.6	0.052	0.116	0.011	76	76	76
110	KLN	SNG	1	4.05	0.003	0.013	0.003	178	194	210
110	KLP	CNO	1	0.3	0	0	0.003	140	140	140
110	KLP	KNR	1	14.95	0.015	0.05	0.005	136	148	159
110	KLP	RAT	1	32.42	0.033	0.107	0.018	136	148	159
110	KLP	TB	1	1.61	0.002	0.006	0.001	99	110	121
110	KLP	TB ~	2	1.61	0.002	0.006	0.001	99	110	121
110	KLP	TRL	1	39.37	0.06	0.135	0.013	105	114	123
110	KLP	TRL	2	43.58	0.027	0.14	0.023	178	190	190
110	KLS	KKY	1	34.3	0.053	0.118	0.011	99	110	121
110	KMT	SLK	1	6.2	0.007	0.018	0.006	109	119	124
110	KMT	STR (N)	1	11.2	0.008	0.037	0.004	143	158	166
110	KNR	TRI	1	4.29	0.003	0.013	0.005	178	194	210
110	KNR	TRI	2	4.21	0.004	0.013	0.004	99	110	121
110	KRA	BAR-T	1	19.45	0.02	0.065	0.007	136	148	159
110	KRA	WHE	1	41.46	0.026	0.135	0.015	178	194	210
110	KTL	MAY	1	21.39	0.022	0.072	0.007	99	110	121

Table B-2: Characteristics of Existing Transmission Circuits										
Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	KTL	MON	1	8.88	0.009	0.03	0.003	134	148	159
110	KTN	WAT	1	3.3	0.001	0.003	0.039	99	110	121
110	KUD	CBT	1	0.75	0	0.001	0.008	169	169	169
110	KUR	NAV	1	6.1	0.01	0.021	0.002	99	110	123
110	LA	MUL	1	46.27	0.072	0.16	0.015	99	110	121
110	LA	RIC	1	15.76	0.024	0.054	0.007	99	110	123
110	LA	RIC	2	12.55	0.02	0.043	0.005	99	110	123
110	LA	SLB	1	9.1	0.014	0.031	0.003	99	110	123
110	LET	GOL-T	1	38.4	0.058	0.132	0.014	99	110	121
110	LET	STR (N)	1	22.25	0.035	0.076	0.007	80	88	93
110	LET	TLK	1	34.05	0.051	0.117	0.012	105	114	123
110	LIB	MR ~	1	2.7	0.001	0.003	0.016	68	68	68
110	LIB	MR ~	2	2.74	0.002	0.003	0.017	99	110	119
110	LIM	MTN	1	6.47	0.005	0.024	0.003	178	194	210
110	LIM	RAT	1	28.35	0.041	0.096	0.012	99	110	121
110	LIS	LH1	1	0.12	0	0	0.001	187	206	223
110	LIS	LOU	1	40.4	0.063	0.139	0.013	99	110	121
110	LIS (N)	TAN	1	31	0.04	0.106	0.01	82	95	103
110	LIS (N)	TAN	2	29.2	0.034	0.1	0.009	80	93	100
110	LOU	MLN	1	13	0.02	0.045	0.004	99	110	121
110	LOU	MTH	1	15.1	0.024	0.052	0.005	99	110	121
110	LOU	RRU	1	38.82	0.058	0.133	0.014	95	103	112
110	LSN	THU	1	10.4	0.016	0.036	0.003	104	113	122
110	MAY	BLK-T	1	30.9	0.032	0.103	0.011	99	110	121
110	MAY	GRI-T	1	2.2	0.002	0.007	0.002	99	110	120
110	MAY	RNW	1	7.1	0.005	0.023	0.002	80	92	103
110	MAY	RYB	1	9.02	0.009	0.03	0.005	178	194	210
110	MCD	NQS	1	2	0.001	0.002	0.036	128	128	136
110	MCD	WOL	1	1.4	0.001	0.002	0.009	108	108	115
110	MHL	RE	1	3	0.002	0.004	0.03	130	130	138

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	MHL	TRN	1	1.4	0.001	0.002	0.014	120	128	136
110	MID	WHI	1	20.02	0.03	0.069	0.006	99	110	121
110	MIL	RE	1	4.9	0.003	0.005	0.075	100	100	107
110	MIL	RE	2	5.55	0.003	0.006	0.034	108	108	115
110	MIL	TNY	1	5.55	0.003	0.006	0.07	100	100	107
110	MKL	OMA	1	37.5	0.028	0.113	0.015	139	150	157
110	MLU	TSB	1	18.29	0.016	0.056	0.028	135	147	159
110	MOY	TAW	1	8.39	0.013	0.028	0.004	195	202	217
110	MOY	TAW	2	7.49	0.012	0.029	0.004	105	114	123
110	MP	TBK-T	1	7.29	0.005	0.024	0.003	178	194	210
110	MR	TBG	1	3.25	0.001	0.002	0.036	178	198	219
110	MR	TBG	2	2.8	0.001	0.001	0.031	178	197	219
110	MTN	MUN	1	0.7	0.001	0.002	0	45	45	45
110	MTN	MUN	2	0.7	0.001	0.002	0	45	45	45
110	NEW	BLK-T	1	12.2	0.013	0.041	0.004	136	148	159
110	NEW	PLS	1	43.01	0.055	0.146	0.014	105	114	123
110	NEW (N)	TAN	1	24.1	0.031	0.08	0.008	82	95	103
110	NEW (N)	TAN	2	24	0.031	0.08	0.008	82	95	103
110	NQS	RE	1	2.1	0.001	0.002	0.038	128	128	136
110	OMA	STR (N)	1	35.5	0.046	0.123	0.012	109	119	124
110	OMA	STR (N)	2	35.5	0.047	0.125	0.012	82	95	103
110	OMA	TRE	1	21.45	0.025	0.073	0.007	186	191	193
110	ONH	MOY	1	13.96	0.022	0.048	0.004	105	116	123
110	OUG	OUG-T	1	11	0.017	0.038	0.004	105	116	123
110	PA	STR-T	1	22.4	0.035	0.077	0.007	68	68	68
110	PB	RE	3	1.4	0	0.002	0.046	238	238	254
110	PB	RE	4	1.4	0	0.002	0.046	242	242	258
110	PLA	OBE	1	2.95	0.004	0.01	0.004	105	114	123
110	RAF	RSY	1	2.1	0.003	0.007	0.001	63	82	92
110	RAF	TBG	1	11.03	0.016	0.037	0.005	195	201	220

Table B-2: Characteristics of Existing Transmission Circuits

Voltage (kV)	From	To	No.	Length (km)	Impedance on 100 MVA base (pu)			Rating (MVA)		
					R	X	B	Summer	Autumn	Winter
110	RAF	TBG	2	9.5	0.006	0.031	0.005	178	194	210
110	RE	WBK	1	0.62	0	0	0.021	125	130	141
110	REA	TRL	1	11.99	0.005	0.003	0.11	125	130	141
110	RNW	DFR-T	1	28.98	0.02	0.085	0.009	99	110	121
110	RO1	WEX	1	15.2	0.01	0.049	0.009	178	194	210
110	RRU	SKL	1	12.67	0.02	0.044	0.004	95	103	112
110	SEE	BUF	1	0.5	0	0.001	0.006	140	140	140
110	SEE	KLH	1	11.7	0.003	0.015	0.107	190	190	190
110	SEE	SCR	1	33.33	0.031	0.108	0.04	135	147	159
110	SEE	SHL	1	22.71	0.019	0.063	0.081	195	201	220
110	SEE	UGL	1	3.42	0.001	0.004	0.04	195	201	220
110	SH	DAL-T	1	12	0.008	0.039	0.007	178	194	210
110	SH	IKE-T	1	53.94	0.034	0.175	0.019	178	194	210
110	SH	SOM-T	1	8.5	0.021	0.047	0.006	99	106	111
110	SLI	SRA	1	10.77	0.017	0.038	0.004	99	110	121
110	SLI	SRA	2	11.19	0.019	0.041	0.004	99	110	121
110	Snu	MCE	1	4.72	0.005	0.015	0.005	99	110	121
110	SOM	SOM-T	1	2	0.003	0.007	0.001	105	116	123
110	SOR	TLK	1	4.4	0.007	0.015	0.002	105	116	123
110	STR	STR-T	1	2	0.003	0.007	0.001	45	45	45
110	TAN	WAR	1	12.9	0.013	0.042	0.005	79	96	113
110	TAN	WAR	2	12.9	0.013	0.042	0.005	79	96	113
110	TBK	TBK-T	1	2.9	0.005	0.01	0.001	105	116	123
110	THU	IKE-T	1	25.68	0.016	0.083	0.009	178	194	210
110	TRE	TMN	1	42.93	0.025	0.082	0.025	186	191	193
110	TRL	OUG-T	1	11.3	0.007	0.037	0.004	161	176	191
110	TEN	MAY	1	43.45	0.028	0.146	0.018	74	84	93
110	DER	TSB	1	19.67	0.031	0.068	0.006	99	110	121

Characteristics of Existing Transformers in Ireland

Table B-3: Characteristics of Existing Transformers in Ireland

Station	Transformer	Rating (MVA)	HV/LV (kV)	Impedance on 100MVA base (pu)		Voltage ratio tapping range	
				R pu	X pu	+	-
AD	T2102	125	220/110	0.001	0.124	-0.1	0.18
ARK	T2101	63	220/110	0.007	0.18	-0.23	0.19
ARK	T2102	125	220/110	0.0021	0.1237	-0.097	0.182
BVK	T2101	250	220/110	0.001	0.064	-0.097	0.178
BVK	T2102	250	220/110	0.001	0.064	-0.097	0.178
BLC	T2101	250	220/110	0.001	0.0646	-0.097	0.179
CLA	T2102	250	220/110	0.0013	0.0647	-0.097	0.179
CLA	T2101	250	220/110	0.0013	0.0647	-0.097	0.179
CSH	T2101	238	220/110	0.0004	0.0631	-0.096	0.182
CSH	T2102	250	220/110	0.0004	0.0631	-0.096	0.182
CSH	T2104	175	220/110	0.0021	0.1332	-0.227	0.182
CKM	T2101	250	220/110	0.001	0.0646	-0.097	0.179
CKM	T2102	250	220/110	0.001	0.0646	-0.097	0.179
CKM	T2103	250	220/110	0.001	0.0646	-0.097	0.179
CKM	T2104	250	220/110	0.0004	0.0631	-0.096	0.182
CKM	PST2201	350	220/220	0	0.029	-14.3	16.3
CUL	T2101	250	220/110	0.0005	0.064	-0.09	0.182
CDU	T2101	250	220/110	0.00093	0.06152	-0.097	0.178
CDU	T2102	250	220/110	0.00066	0.061	-0.099	0.177
DSN	T4201	500	380/220	0.0002	0.0317	-0.013	0.156
DSN	T4202	500	380/220	0.0003	0.027	-0.105	0.079
FLA	T2101	125	220/110	0.0027	0.128	-0.097	0.182
FLA	T2102	125	220/110	0.0008	0.1331	-0.097	0.182
FIN	T2101	250	220/110	0.0013	0.0651	-0.098	0.18
FIN	T2102	250	220/110	0.0013	0.0648	-0.099	0.18
FIN	T2104	250	220/110	0.001	0.0638	-0.099	0.177
FIN	T2105	250	220/110	0.001	0.064	-0.099	0.177
GI	T2101	125	220/110	0.0026	0.1331	-0.097	0.182

Table B-3: Characteristics of Existing Transformers in Ireland

Station	Transformer	Rating (MVA)	HV/LV (kV)	Impedance on 100MVA base (pu)		Voltage ratio tapping range	
				R pu	X pu	+	-
GI	T2102	125	220/110	0.0023	0.1237	-0.229	0.182
GOR	T2101	250	220/110	0.001	0.064	-0.097	0.182
INC	T2102	250	220/110	0.001	0.0564	-0.095	0.178
INC	T2104	250	220/110	0.0001	0.06	-0.09	0.182
KNR	T2101	250	220/110	0.001	0.064	-0.097	0.178
KNR	T2102	250	220/110	0.001	0.064	-0.097	0.178
KRA	T2101	250	220/110	0.0013	0.0647	-0.097	0.179
KRA	T2102	250	220/110	0.0013	0.0652	-0.097	0.179
KLN	T2101	63	220/110	0.0065	0.2453	-0.229	0.182
KLN	T2102	63	220/110	0.0095	0.2473	-0.229	0.182
KLN	T2103	250	220/110	0.0004	0.0631	-0.096	0.182
KLN	T2104	125	220/110	0.001	0.123	-0.097	0.182
BYH	T2101	250	220/110	0.001	0.064	-0.097	0.178
BYH	T2101	250	220/110	0.001	0.064	-0.097	0.178
KLS	T2101	125	220/110	0.00132	0.1237	-0.097	0.182
KLS	T2102	125	220/110	0.0008	0.1237	-0.097	0.182
KLP	T2101	250	220/110	0.0004	0.0631	-0.096	0.182
KLP	T2102	250	220/110	0.0004	0.0631	-0.096	0.182
CBT	T2101	250	220/110	0.001	0.0646	-0.097	0.179
CBT	T2102	250	220/110	0.001	0.0646	-0.097	0.179
CBT	T2103	250	220/110	0.001	0.0646	-0.097	0.179
CBT	T2104	250	220/110	0.001	0.0646	-0.097	0.179
LOU	T2101	125	220/110	0.0022	0.1331	-0.229	0.182
LOU	T2103	125	220/110	0.0023	0.1324	-0.229	0.182
LOU	T2102	125	220/110	0.0022	0.1324	-0.23	0.182
LOU	T2104	250	220/110	0.001	0.064	-0.097	0.178
LOU	AT1	300	220/275	0.0008	0.03	-0.154	0.154
LOU	AT3	300	220/275	0.0008	0.0303	-0.154	0.154
LOU	AT2	600	220/275	0.0008	0.015	-0.154	0.154
LOD	T2101	250	220/110	0.001	0.064	-0.099	0.18

Table B-3: Characteristics of Existing Transformers in Ireland

Station	Transformer	Rating (MVA)	HV/LV (kV)	Impedance on 100MVA base (pu)		Voltage ratio tapping range	
				R pu	X pu	+	-
MAY	T2103	125	220/110	0.0021	0.1324	-0.227	0.182
MAY	T2104	250	220/110	0.001	0.064	-0.099	0.177
MAY	T2101	125	220/110	0.0021	0.1339	-0.227	0.182
MAY	T2102	238	220/110	0.001	0.064	-0.097	0.178
MP	T4202	500	380/220	0.0003	0.027	-0.105	0.079
MP	T2101	250	220/110	0.001	0.064	-0.097	0.178
MP	T4202	500	380/220	0.0002	0.0329	-0.013	0.156
OST	T4202	500	380/220	0.0003	0.027	-0.105	0.079
PB	T2103	250	220/110	0.0013	0.059	-0.089	0.173
PB	T2104	250	220/110	0.0013	0.0609	-0.089	0.173
RAF	T2101	238	220/110	0.001	0.064	-0.097	0.178
RAF	T2102	250	220/110	0.000446	0.0558	-0.097	0.178
SH	T2102	125	220/110	0.00131	0.1237	-0.097	0.182
SH ~	T2101	125	220/110	0.00574	0.1237	-0.097	0.182
SRA	T2102	250	220/110	0.001	0.064	-0.097	0.182
TB	T2102	238	220/110	0.00099	0.0554	-0.097	0.179
WOO	T4201	500	380/220	0.0002	0.0316	-0.014	0.155
WOO	T4202	500	380/220	0.0002	0.0316	-0.014	0.155
WOO	T4204	550	380/220	0.0002	0.027	0.018	0.018
INC	T2101	250	220/110	0.001	0.0564	-0.095	0.178
INC	T2103	250	220/110	0.0001	0.06	-0.09	0.182
WOO	Woodland	582	380/260	0	0.024	-0.225	0.195

Characteristics of Existing 3 Winding Transformers in Northern Ireland

Table B-4: Characteristics of Existing 3 Winding Transformers in Northern Ireland													
Substation/ Transformer	**HV/LV (kV)**	**Impedance pu on 100 MVA base**						**Rating (MVA)**			**Off nominal ratio (pu)**		**No. of taps**
		W1-2		**W2-3**		**W3-1**							
		R	**X**	**R**	**X**	**R**	**X**	**W1**	**W2**	**W3**	**Upper**	**Lower**	
BPS IBTx 1	275/110	0.0018	0.0641	0.0018	0.2092	0	0.1325	240	240	30	1.15	0.85	19
BPS IBTx 2	275/110	0.0018	0.0641	0.0018	0.2059	0	0.128	240	240	30	1.15	0.85	19
TMN IBTx 1	275/110	0.0014	0.0644	0.0037	0.2315	0.0002	0.1514	240	240	60	1.15	0.85	19
TMN IBTx 2	275/110	0.0014	0.0644	0.004	0.2299	0.0003	0.15	240	240	60	1.15	0.85	19
CAS IBTx 1	275/110	0.0014	0.0639	0.0014	0.2236	0	0.1449	240	240	30	1.15	0.85	19
CAS IBTx 2	275/110	0.0018	0.0641	0.0018	0.2092	0	0.1325	240	240	30	1.15	0.85	19
CAS IBTx 3	275/110	0.0018	0.0656	0.0018	0.2375	0	0.1593	240	240	30	1.15	0.85	19
CPS IBTx 1	275/110	0.001	0.0699	0.0032	0.2173	0.0031	0.123	240	240	60	1.15	0.85	19
CPS IBTx 2	275/110	0.0014	0.0639	0.0014	0.2236	0	0.1449	240	240	30	1.15	0.85	19
HAN IBTx 1	275/110	0.0018	0.0591	0.0018	0.1261	0	0.056	240	240	45	1.15	0.85	19
HAN IBTx 2	275/110	0.0014	0.0639	0.0014	0.2236	0	0.1449	240	240	60	1.15	0.85	19
HAN IBTx 3	275/110	0.001	0.07	0.0031	0.2166	0.0032	0.1233	240	240	60	1.15	0.85	19
KEL IBTx 1	275/110	0.0018	0.0609	0.0018	0.1273	0	0.057	240	240	45	1.15	0.85	19
KEL IBTx 2	275/110	0.0018	0.0607	0.0018	0.1317	0	0.057	240	240	45	1.15	0.85	19
TAN IBTx 1	275/110	0.0018	0.0641	0.0018	0.2092	0	0.1325	240	240	30	1.15	0.85	19
TAN IBTx 2	275/110	0.0018	0.0641	0.0018	0.2092	0	0.1325	240	240	30	1.15	0.85	19
TAN IBTx 3	275/110	0.001	0.0698	0.0032	0.217	0.0032	0.123	240	240	60	1.15	0.85	19

Characteristics of Existing Transformers in Northern Ireland[5]

Table B-5: Characteristics of Existing 2 Winding Transformers in Northern Ireland							
Station	**HV/LV (kV)**	**Rating (MVA)**	**Impedance pu on rating base**		**Off nominal ratio**		**No. of taps**
			R	**X**	**Upper**	**Lower**	
AGH (N)	110/33	90	0.0039	0.2464	1.1	0.8	19
ANT	110/33	90	0.0039	0.2464	1.1	0.8	19
ANT	110/33	90	0.0039	0.2473	1.1	0.8	19
BMA	110/33	90	0.0039	0.2447	1.1	0.8	19
BMA	110/33	90	0.0039	0.2463	1.1	0.8	19
BMA	110/33	90	0.0065	0.2893	1.1	0.8	19
BMA	110/33	90	0.0065	0.2867	1.1	0.8	19
BAN (N)	110/33	30	0.0171	0.4133	1.1	0.8	15
BAN (N)	110/33	30	0.019	0.414	1.1	0.8	15
BAN (N)	110/33	30	0.019	0.4167	1.1	0.8	15
BAN (N)	110/33	30	0.019	0.415	1.1	0.8	15
BNH	110/33	90	0.0037	0.2419	1.1	0.8	19
BNH	110/33	90	0.0038	0.2413	1.1	0.8	19
BNM	110/33	90	0.0039	0.2461	1.1	0.8	19
BNM	110/33	90	0.0039	0.2461	1.1	0.8	19
CAR	110/33	90	0.0039	0.248	1.1	0.8	19
CAR	110/33	90	0.0039	0.248	1.1	0.8	19
CEN	110/33	90	0.0037	0.2422	1.1	0.8	19
CEN	110/33	90	0.0038	0.2419	1.1	0.8	19
COL (N)	110/33	60	0.0074	0.2512	1.1	0.8	19
COL (N)	110/33	60	0.0075	0.2508	1.1	0.8	19
CPS	110/33	90	0.0087	0.2559	1.1	0.8	19
CPS	110/33	90	0.0087	0.2573	1.1	0.8	19
CRG	110/33	60	0.0074	0.2515	1.1	0.8	19
CRG	110/33	60	0.0074	0.2508	1.1	0.8	19
CRE	110/33	75	0.0091	0.1953	1.1	0.8	19
CRE	110/33	75	0.0091	0.1967	1.1	0.8	19
DON	110/33	60	0.0119	0.3607	1.1	0.8	19

5 110/33 kV transformers in Northern Ireland are included here as these are controlled by SONI. 110/38 kV transformers in Ireland are not included here as these are controlled by ESB Networks.

Table B-5: Characteristics of Existing 2 Winding Transformers in Northern Ireland

Station	HV/LV (kV)	Rating (MVA)	Impedance pu on rating base		Off nominal ratio		No. of taps
			R	X	Upper	Lower	
DON	110/33	60	0.0119	0.3658	1.1	0.8	19
DON	110/33	90	0.004	0.2403	1.1	0.8	19
DON	110/33	60	0.0119	0.3658	1.1	0.8	19
DRU	110/33	90	0.0061	0.2423	1.1	0.8	19
DRU	110/33	90	0.0061	0.2426	1.1	0.8	19
DUN	110/33	90	0.0087	0.2566	1.1	0.8	19
DUN	110/33	90	0.0087	0.2599	1.1	0.8	19
EDE	110/33	45	0.0125	0.2733	1.1	0.8	19
EDE	110/33	45	0.0123	0.2738	1.1	0.8	19
ENN (N)	110/33	45	0.0126	0.272	1.1	0.8	19
ENN (N)	110/33	45	0.0126	0.2733	1.1	0.8	19
ENN (N)	110/33	60	0.0078	0.2512	1.1	0.8	19
FIN (N)	110/33	45	0.0076	0.2533	1.1	0.8	19
FIN (N)	110/33	45	0.0076	0.2549	1.1	0.8	19
GLE (N)	110/33	90	0.0119	0.2692	1.1	0.8	19
KEL	110/33	90	0.0039	0.2461	1.1	0.8	19
KNO	110/33	90	0.0039	0.2461	1.1	0.8	19
KNO	110/33	90	0.0039	0.2461	1.1	0.8	19
LAR	110/33	45	0.0116	0.2778	1.1	0.8	15
LAR	110/33	45	0.0116	0.2771	1.1	0.8	15
LIM (N)	110/33	45	0.0125	0.2809	1.1	0.8	15
LIM (N)	110/33	45	0.0122	0.2764	1.1	0.8	15
LIS (N)	110/33	90	0.0087	0.254	1.1	0.8	19
LIS (N)	110/33	90	0.0086	0.2569	1.1	0.8	19
LMR	110/33	45	0.0076	0.254	1.1	0.8	19
LMR	110/33	45	0.0076	0.2533	1.1	0.8	19
LOG	110/33	45	0.0126	0.2738	1.1	0.8	19
LOG	110/33	45	0.0128	0.28	1.1	0.8	19
NAR	110/33	60	0.0075	0.2505	1.1	0.8	19
NAR	110/33	60	0.0073	0.25	1.1	0.8	19
NEW (N)	110/33	90	0.0038	0.2427	1.1	0.8	19

Table B-5: Characteristics of Existing 2 Winding Transformers in Northern Ireland							
Station	**HV/LV (kV)**	**Rating (MVA)**	**Impedance pu on rating base**		**Off nominal ratio**		**No. of taps**
			R	**X**	**Upper**	**Lower**	
NEW (N)	110/33	90	0.0038	0.2419	1.1	0.8	19
OMA	110/33	90	0.0039	0.2481	1.1	0.8	19
OMA	110/33	90	0.0039	0.249	1.1	0.8	19
RAT (N)	110/33	90	0.0087	0.2549	1.1	0.8	19
RAT (N)	110/33	90	0.0046	0.2402	1.1	0.8	19
ROS	110/33	90	0.0087	0.2576	1.1	0.8	19
ROS	110/33	90	0.0087	0.2533	1.1	0.8	19
STR (N)	110/33	45	0.0076	0.2522	1.1	0.8	19
STR (N)	110/33	45	0.0076	0.2516	1.1	0.8	19
WAR	110/33	90	0.0039	0.2481	1.1	0.8	19
WAR	110/33	90	0.0039	0.2488	1.1	0.8	19

Characteristics of Existing Power Flow Controllers

Table B-6: Characteristics of Existing Power Flow Controllers							
Station	**Voltage (kV)**	**Circuit**	**Rating (MVA)**	**Impedance on 100 MVA Base (pu)**		**Phase angle range (electrical degrees)**	
				R	**X**	**+**	**-**
CKM	220	CKM – PB	350	0	0.029	15.3	15.3
ENN (N)	110	ENN (N) – COR	125	0	0.0213	45	45
STR (N)	110	STR (N) – LET	125	0	0.0213	45	45

Characteristics of Existing Reactive Compensation

Table B-7: Characteristics of Existing Reactive Compensation				
Station	Voltage (kV)		Capability (Mvar)	
			Generate	Absorb
AA	110	1 Capacitor	30	
ATH	110	3 Capacitors (1 Mobile)	90	
BYC	275	4 Capacitors (4 x 59)	236	
BAN	110	1 Capacitor	15	
BK	110	1 Capacitor	10	
BVK	110	1 Static Var Compensator	-50	50
CAH	110	4 Capacitors (4 x 15)	60	
CKM	38	1 Shunt Reactor		-20
CSH	110	2 Capacitors (2 x 40)	80	
CAS	22	2 Shunt Reactor (2 x 30)		60
CAS	22	2 Capacitors (2 x 25)	50	
CAS	220	1 Static Var Compensator	60	-60
CF	110	1 Capacitor	15	
CBR	110	2 Capacitor	60	
CBR	110	1 Static Var Compensator	-10	60
CKM-SR	220	1 Shunt Reactor		-100
COL (N)	110	1 Capacitor	36	
CPS	110	1 Capacitor	40	
CGL	20	3 Capacitors (3 x 3)	9	
CUN	20	2 Capacitors (2 x 4)	8	
DLT	110	1 Capacitor	15	
DRB	20	2 Capacitors (2 x 6.5)	13	
DOO	110	1 Capacitor	15	
DRU	110	1 Capacitor	15	
DMY	110	1 Capacitor	15	
ENN (N)	33	1 Capacitor	5	
FIN	38	1 Shunt Reactor		-20
GAR	20	1 Static Var Compensator	-7.5	7.5
GAR	20	2 Capacitors (1 x 12.38, 1 x 1.5)	13.9	
GAR	21	1 Shunt Reactor		9
GIL	20	1 Capacitor	12	

Table B-7: Characteristics of Existing Reactive Compensation				
Station	**Voltage (kV)**		**Capability (Mvar)**	
			Generate	**Absorb**
GWE	110	1 Capacitor	15	
HAN	22	2 Shunt Reactors (2 x 30)		60
IA	38	2 Shunt Reactors (2 x 20)		-40
KEL	22	2 Shunt Reactors (2 x 30)		60
KTL	110	1 Capacitor	30	
KKY	110	2 Capacitor (2 x 15)	30	
KNR	220	1 Shunt Reactor		50
KNY	110	1 Capacitor	30	
LLA	33	Lenalea	3	
LIS (I)	110	2 Capacitors (2 x 15)	30	
LSN	20	1 Capacitor	4	
LET	110	2 Capacitor (1 Mobile)	45	
LET	110	1 Static Var Compensator	30	
LOU	110	1 Capacitor	30	
MOY	110	2 Capacitors (2 x 15)	30	
MP	6.6	1 Capacitor	1	
MUL	110	2 Capacitors (2 x 15)	30	
MRY	20	1 Capacitor	4	
PB	220	2 Shunt Reactors (2 x 50)		100
RAF	110	1 Capacitor	60	
RE	38	1 Shunt Reactor		20
SKL	110	1 Capacitor (1 Mobile)	30	
SLI	110	1 Capacitor	15	
TMN	22	1 Shunt Reactor		-30
TAN	22	2 Capacitors (2 x 25)	50	
TAN	22	3 Shunt Reactors (3 x 30)		90
THU	110	1 Capacitor	15	
THU	110	1 Static Var Compensator	30	30
TRI	110	1 Capacitor	30	
TRL	110	1 Capacitor	30	
SLB	20	1 Capacitor	15	
WEX	110	2 Capacitors (2 x 15)	30	
SLK	20	1 Capacitor	13	

B.2 Transmission System Developments

Future developments of the transmission system are listed in this section according to the year in which they are expected to be completed. The physical and electrical characteristics of future transmission plant or changes to the characteristics brought about by planned developments are listed in the tables. These characteristics are indicative at this stage and will be reviewed when the item of plant is commissioned.

Expected Changes in Transmission Circuits

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	220	GI	LTN	1	0.4	0.0001	0.0002	0.011	593	593	2024
Add	110	LET	LLA	1	12.23	0.0128	0.0408	0.0042	136	159	2024
Remove	110	KRA	MID	1	10.7	0.0167	0.0368	0.0035	99	121	2024
Add	110	AGT	CRD	1		0.0084	0.0223	0.0502	200	200	2024
Add	110	CPS	CRD	1		0.001013	0.002801	0.0867	200	200	2024
Add	110	LLA	SKL	1	18	0.0274	0.0606	0.0126	105	123	2024
Add	110	LCK	MUL	1	26	0.0185	0.0387	0.2608	124	124	2024
Add	110	LIS	LLA	1	22.7	0.0347	0.0767	0.0141	105	123	2024
Remove	110	LIS	SKL	1	39.3	0.0611	0.1352	0.0126	99	121	2024
Amend	110	CAS	FIN (N)	2	9.1	0.01369	0.03189	0.003	70	87	2024
Amend	110	CAS	FIN (N)	1	9.1	0.01376	0.0323	0.003	69	86	2024
Add	110	CBT	KGE	1	1.9	0.0005	0.0021	0.021	187	223	2024
Remove	110	CAR	CAS	1		0.03714	0.0875	0.00798	69	86	2024
Add	110	KRA	LGT	1	7.83	0.0121	0.0267	0.004	105	123	2024
Remove	110	LET	TIV	1	45.2	0.0471	0.1508	0.0154	136	159	2024
Add	110	LLA	TIV	1	33.13	0.0345	0.1106	0.0113	136	159	2024
Add	110	AGN	KGE	1	1.7	0.0004	0.0019	0.0188	187	223	2024
Remove	110	AGN	CBT	2	0.2	0.0001	0.0003	0.0022	128	128	2024
Add	110	MID	LGT	1	3.13	0.0047	0.0106	0.0025	105	123	2024
Remove	110	MID	WHI	1	20.022	0.0303	0.0691	0.0065	99	121	2024
Add	110	KNM	WHE	1	1.5	0.0011	0.0023	0.0151	124	124	2024
Add	110	BK ~	CGW	1	3.3	0.0021	0.0108	0.0012	178	210	2024

Table B-8: Expected Changes in Transmission Circuits											
Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Remove	110	DER	MAY	1	43.448	0.027698	0.145671	0.017697	74	93	2024
Remove	110	CAR	CAS	2		0.03695	0.08641	0.00803	70	87	2024
Add	110	DGN	RTH	1	15.475	0.0098	0.0502	0.006	178	210	2024
Add	110	ATY	CNB	1	21.94	0.0341	0.0755	0.0071	105	123	2024
Remove	110	ATY	PLS	1	25.482	0.038223	0.087643	0.008479	99	121	2024
Add	110	BAL	Den	1	10.75	0.0068	0.0349	0.0044	178	210	2024
Remove	110	BAL	DRY	1	20	0.0126	0.065	0.0071	178	210	2024
Add	110	BTN	MLU	1	10	0.0071	0.0149	0.1004	124	124	2024
Add	110	BDM	MID	1	3.516	0.0047	0.0122	0.0012	99	121	2024
Add	110	BDM	WHI	1	18.306	0.0268	0.0628	0.006	99	121	2024
Remove	110	CUS	PLS	1	42.14	0.0436	0.1396	0.0143	134	159	2024
Add	110	CUL	RTH	1	19.175	0.0121	0.0622	0.0074	178	210	2024
Add	110	DRY	Den	1	9.55	0.006	0.031	0.004	178	210	2024
Remove	110	CUL	DGN	1	34.239	0.0215	0.1093	0.0203	178	192	2024
Add	220	FIN	MTN	1	1.4	0.0001	0.0006	0.0384	593	593	2025
Add	220	HN	MTN	1	0.15	0.0001	0.0001	0.0042	593	593	2025
Remove	220	INC	MAY	1	19.128	0.0026	0.0164	0.026	793	824	2025
Add	220	GLH	KLP	1	0.5	0.0001	0.0001	0.0166	570	570	2025
Remove	220	MAY	SH ~	1	105.6	0.0169	0.0936	0.141675	269	354	2025
Add	220	CBT	MAY	2	13.982	0.0039	0.01	0.183	647	693	2025
Add	220	CLT	SH ~	1	54.5	0.0086	0.048	0.099	356	420	2025
Remove	220	FIN	HN	1	1.4	0.0001	0.0006	0.0384	537	560	2025
Add	220	CDU	MTN	1	3.728	0.0002	0.0015	0.1021	593	593	2025
Add	220	CBT	INC	2	10	0.0036	0.01	0.1584	647	692	2025
Remove	220	CDU	HN	1	3.728	0.000109	0.001412	0.133753	555	555	2025
Add	220	HN	MTN	1	0.15	0.0001	0.0001	0.0042	593	593	2025
Add	220	CLT	MAY	1	53.05	0.0086	0.047	0.0697	356	420	2025
Add	110	FIN	MCE	1	8.37	0.0081	0.0262	0.0127	99	121	2025
Remove	110	CD	KBY	1	32.338	0.019884	0.1043	0.024969	178	209	2025
Add	110	CD	KLP	1	32.091	0.0202	0.1043	0.0113	178	210	2025

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	110	DJG	KLP	1	13.895	0.0081	0.0452	0.0104	178	210	2025
Add	110	DJG	TRL	1	32.333	0.0203	0.1047	0.0138	178	210	2025
Add	110	KEL	KEL C	1		0.00033	0.00131	0.00798	144	144	2025
Add	110	CTE	RAF	1	4.125	0.0025	0.0024	0.0502	124	124	2025
Add	110	GRA	KLM	1		0.0022	0.0052	0.1055	119	119	2025
Add	110	BNK	KCY	1	0.75	0.0002	0.0009	0.0083	187	223	2025
Remove	110	KBY	MAL	1	29.2	0.0184	0.0949	0.0103	134	159	2025
Add	110	CUR	CRY	1	17.3	0.0039	0.0189	0.1921	190	190	2025
Add	110	CUR	NNA	1	18.83	0.0293	0.0648	0.0061	105	123	2025
Add	110	CFN	MUL	1	18.97	0.012	0.0617	0.0067	178	210	2025
Add	110	DLN	SH	1	3.5	0.0009	0.0043	0.0386	140	140	2025
Remove	110	BNK	CBT	1	1	0.0003	0.0011	0.011	175	175	2025
Add	110	GAR	GLN	1	0.1	0.0001	0.0002	0.0012	140	140	2025
Remove	110	KLP	TRL	2	43.578	0.0271	0.1405	0.0231	178	190	2025
Remove	110	KLM	NBY	1	1.2	0.0006	0.0012	0.0199	119	133	2025
Remove	110	KIN	DFR-T	1	29.25	0.0213	0.0957	0.0103	99	121	2025
Remove	110	KIN	MUL	1	24.919	0.0155	0.077309	0.022705	178	210	2025
Add	110	CBT	KCY	1	0.75	0.0002	0.0009	0.0083	187	223	2025
Add	110	KLP	MAL	1	28.1	0.0184	0.0949	0.0103	134	159	2025
Remove	110	GRA	NBY	1	5.05	0.002	0.0046	0.0887	124	124	2025
Amend	110	HRR	DFR-T	1	24.503	0.0158	0.0797	0.0087	104	157	2025
Remove	110	KBY	KRA	2	12.5	0.0183	0.0428	0.0041	99	121	2025
Remove	110	KLN	NNA	1	33.6	0.0523	0.1156	0.0108	76	76	2025
Add	110	KLN	CUR	1	14.77	0.0109	0.0484	0.0052	136	159	2025
Remove	110	KBY	MR	1	4.438	0.004475	0.01466	0.003997	103	130	2025
Add	110	DRE	OBE	1	5	0.001	0.0068	0.0573	228	228	2025
Add	110	BDL	BNK	1	0.73	0.0006	0.0011	0.0074	140	140	2025
Remove	110	Snu	MCE	1	4.7271	0.0047	0.0151	0.0054	99	121	2025
Add	110	TOY	IKE-T	1	1.54	0.0005	0.003	0.0128	178	210	2025
Add	110	CFN	KIN	1	6.59	0.0042	0.0215	0.0024	178	210	2025

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Remove	110	AUG	KLP	1	32.83	0.0207	0.1067	0.0116	178	210	2025
Add	110	AUG	BLE	1	4.56	0.0029	0.0149	0.0017	178	210	2025
Add	110	BLE	KLP	1	28.23	0.0178	0.0917	0.01	178	210	2025
Add	110	ATH	CUI	1	2.25	0.0016	0.0034	0.0226	140	140	2025
Add	110	BAG	Snu	1	1.2	0.0003	0.0014	0.0133	192	192	2025
Remove	110	SH	IKE-T	1	53.94	0.0339	0.1752	0.019	178	210	2025
Add	110	SH	TOY	1	54.6	0.0339	0.1753	0.0315	178	210	2025
Add	110	BLC	NBY	1	2.3	0.0007	0.0029	0.0254	124	132	2025
Add	110	KLP	KRA	2	12.5	0.0183	0.0428	0.0041	99	121	2025
Amend	110	BLC	NBY	2	2.3	0.0006	0.0028	0.0254	124	132	2025
Remove	380	DSN	MP	1	208.5	0.004054	0.043588	1.139728	1283	1454	2026
Add	380	CEL	KRA	1	0.1	0.0001	0.0001	0.0181	1100	1100	2026
Add	380	KLP	MP	1	6	0.000838	0.000229	0.548912	1210	1210	2026
Amend	380	DSN	CNB	1	45	0.0009	0.0101	0.226	1577	1944	2026
Amend	380	CNB	MP	1	164.8	0.0032	0.0367	0.831	1577	1944	2026
Add	220	PB	SBK	1	0.06	0.0001	0.0001	0.002	593	593	2026
Remove	220	FIN	SHL	1	13.4	0.0005	0.0053	0.3668	536	557	2026
Add	220	BLC	SHL	1	23.4	0.001	0.0034	0.7769	570	570	2026
Remove	110	ARV	NAV	1	65.497	0.0412	0.2128	0.0231	178	210	2026
Add	110	ARV	BRH	1	52.6	0.0331	0.1708	0.02	178	210	2026
Add	110	AA	CHY	1	21	0.0049	0.0229	0.232	192	192	2026
Add	110	BRH	NAV	1	52.6	0.0331	0.1708	0.02	178	210	2026
Add	110	GI	KVG	1	29.8	0.017	0.0875	0.057	178	210	2026
Remove	110	GI	KKY	1	49.2	0.0309	0.1599	0.0174	178	210	2026
Remove	110	GLN	PLA	1	26.55	0.0167	0.0863	0.0094	178	210	2026
Remove	110	GOL	GOL-T	1	3.9	0.0061	0.0135	0.0013	105	123	2026
Add	110	DER	KDN	1	0.26	0.0001	0.0004	0.003	228	228	2026
Add	110	ARK	OLS	1	6.7	0.0035	0.0184	0.024	178	210	2026
Add	110	ARK	KDF	1	1.2	0.0008	0.0007	0.0147	124	124	2026
Remove	110	ARK	BOG	1	29.006	0.0207	0.0952	0.0102	178	210	2026

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	110	DRQ	PT~.	1	2.4	0.0017	0.002688	0.018721	60	60	2026
Add	110	BOG	OLS	1	25.506	0.0178	0.0804	0.031	178	210	2026
Add	110	TMN	HRN	1		0.000187	0.000726	0.005032	144	144	2026
Add	110	CRA	EFF	1	2.53	0.0016	0.0083	0.001	178	210	2026
Remove	110	CRA	LOD	1	6.692	0.0042	0.0216	0.0035	178	210	2026
Add	110	CHA	BLN	1	3	0.0007	0.0036	0.0331	140	140	2026
Add	110	BGT	GGT	1	13.45	0.0085	0.0437	0.0048	178	210	2026
Remove	110	BK	MOY	1	27	0.017	0.0877	0.0096	178	210	2026
Add	110	BK	LTK	1	2.19	0.0006	0.0024	0.025	192	192	2026
Add	110	EFF	LOD	1	5.06	0.0032	0.0165	0.002	178	210	2026
Add	110	DRU	COG	1	6.127	0.0094	0.021	0.0026	99	121	2026
Add	110	DRQ	CMK.	1		0.000594	0.00224	0.015601	80	50	2026
Add	110	DNN	GHK	1	8.5	0.0061	0.0127	0.0853	140	140	2026
Add	110	DNN	WEX	1	9.8	0.007	0.0146	0.0983	140	140	2026
Add	110	DER	CBN	1	0.9	0.0003	0.0014	0.0103	228	228	2026
Add	110	BVK	CLY	1	10	0.0071	0.0149	0.1004	140	140	2026
Add	110	SEE	FVW	1	2	0.0004	0.0028	0.0229	228	228	2026
Add	110	BLT	GLN	1	26.5	0.0165	0.085	0.015	178	190	2026
Add	110	BLT	PLA	1	0.8	0.0003	0.0016	0.006	178	190	2026
Add	110	FIN	NBN	1		0	0.01	0			2026
Remove	110	DRU	ENN	1	17.437	0.027	0.0601	0.0063	99	121	2026
Add	110	LA	RPL	1	5.5	0.0035	0.0179	0.002	178	210	2026
Add	110	AIR	ROS	1		0.013124	0.034062	0.003377	82	103	2026
Add	110	AIR	ROS	1		0.013124	0.034062	0.003377	82	103	2026
Add	110	KKY	KVG	1	29.15	0.0166	0.0853	0.057	178	210	2026
Remove	110	DEY	DAL-T	1	6.35	0.004	0.0207	0.0023	178	210	2026
Add	110	DEY	STN	1	3.94	0.0025	0.0128	0.0014	178	210	2026
Add	110	CNB	GGT	1	13.85	0.0087	0.045	0.0049	178	210	2026
Add	110	MUL	SGH	1	4.25	0.0027	0.0139	0.0015	178	210	2026
Add	110	MGT	DFR-T	1	6.175	0.0037	0.0188	0.0105	104	157	2026

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	110	LTK	MOY	1	29.13	0.0175	0.0901	0.033	178	192	2026
Add	110	LA	SGH	1	42.25	0.0266	0.1373	0.0149	178	210	2026
Add	110	COL (N)	COL	1		0.000038	0.000258	0.002908	200	200	2026
Remove	110	NEW	PLS	1	43.01	0.0553	0.146	0.0143	105	123	2026
Add	110	CLO	GOL	1	4	0.0063	0.0138	0.002	105	123	2026
Add	110	DER	LCN	1	0.09	0.0001	0.0002	0.0011	228	228	2026
Add	110	DAL-T	STN	1	3.36	0.0022	0.011	0.0012	178	210	2026
Add	110	CSH	GTL	1	3.36	0.0021	0.002	0.0409	124	124	2026
Add	110	KRA	BBH	1	2.8	0.0017	0.0016	0.0341	124	124	2026
Add	110	COG	ENN	1	11.41	0.0177	0.0394	0.0037	99	121	2026
Add	110	KLS	BDT	1	2.65	0.0018	0.0039	0.0266	140	140	2026
Amend	380	OST	WOO	1	126	0.0025	0.028	0.644	997	997	2027
Add	380	DSN	CNB	1	45	0.0009	0.01	0.226	1577	1944	2027
Add	380	CNB	MP	1	164.8	0.0033	0.0367	0.858	1577	1944	2027
Remove	380	OST	WOO	1	126	0.0024	0.028	0.636	997	997	2027
Add	380	TUR	WOO	1		0.0027	0.0311	0.7066	1424	1731	2027
Add	275	TAN	TUR	2		0.00092	0.00862	0.05139	710	881	2027
Remove	275	TAN	TMN	2		0.00116	0.01085	0.0647	710	881	2027
Add	275	TMN	TUR	2		0.00024	0.00227	0.01354	710	881	2027
Add	275	TAN	TUR	1		0.00092	0.00862	0.05139	710	881	2027
Add	275	TMN	TUR	1		0.00024	0.00227	0.01354	710	881	2027
Remove	275	TAN	TMN	1		0.00116	0.01085	0.0647	710	881	2027
Add	220	PB	COD	1	30	0.001	0.0117	0.8212	593	593	2027
Add	220	BLC	FGN	1	20	0.0007	0.0078	0.5474	593	593	2027
Add	220	CKM	JTN	1	25	0.001	0.0036	0.83	570	570	2027
Add	220	CKM	JTN	2	25	0.001	0.0036	0.83	570	570	2027
Add	220	PB	COD	1	30	0.001	0.0117	0.8212	593	593	2027
Add	220	MP	CWA	1	100	0.0039	0.0143	3.32	570	570	2027
Remove	220	LOU	WOO	1	61.2	0.0071	0.053	0.08	434	476	2027
Add	220	PB	COD	1	30	0.001	0.0117	0.8212	593	593	2027

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	220	ORL	ORL	1	20.1	0.0007	0.0079	0.5502	593	593	2027
Add	220	ORL	ORL	1	15.9	0.0007	0.0023	0.5279	570	570	2027
Add	220	GNT	ARK	1	30	0.0012	0.0043	0.996	570	570	2027
Add	220	GNT	ARK	2	30	0.0012	0.0043	0.996	570	570	2027
Add	220	ARK	GNT	1	1.95	0.0002	0.0017	0.0025	434	513	2027
Add	110	FLG	MOY	1	15.87	0.0086	0.0449	0.0484	178	210	2027
Remove	110	ARK	SHE	2	2.2	0.0035	0.0077	0.0008	63	92	2027
Add	110	ARK	PHY	2	2.38	0.0015	0.0078	0.0009	178	210	2027
Add	110	FLG	ONH	1	5.701	0.0022	0.0119	0.0448	178	210	2027
Add	110	PHY	SHE	1	0.375	0.0003	0.0013	0.0002	178	210	2027
Add	110	ARK	PHY	1	2.25	0.0015	0.0074	0.0008	178	210	2027
Remove	110	RNW	DFR-T	1	28.979	0.0202	0.085	0.009	99	121	2027
Add	110	HAN	HAN	1	1.5	0.0011	0.0023	0.0151	140	140	2027
Add	110	BVG	BVG	1	0.17	0.0002	0.0003	0.0018	140	140	2027
Add	380	DSN	WOO	1	52.85	0.0003	0.0059	6.114	1283	1473	2028
Add	275	BPS	MOY	2		0.000015	0.000194	0.071014	710	881	2028
Remove	220	KLP	TB	1	2.5	0.000315	0.00195	0.028	645	731	2028
Add	220	GSH	TB	1	6.9	0.0004	0.0038	0.1972	746	794	2028
Add	220	GSH	KLP	1	5.4	0.0002	0.0023	0.2102	746	842	2028
Amend	110	BNM	CEN	1		0.000249	0.00169	0.019047	200	200	2028
Add	110	MOY	TON	1	58	0.01707	0.0659	0.7937	228	228	2028
Amend	110	BNM	CEN	1		0.000249	0.00169	0.019047	200	200	2028
Add	380	RCB	WOO	1	50	0.001	0.0111	0.2524	997	997	2029
Add	380	BLC	WOO	1	37	0.003552	0.003552	3.7018496	1283	1473	2029
Add	380	OST	RCB	1	80	0.0015	0.0178	0.4038	997	997	2029
Add	220	DRG	RCB	2	9.05	0.0004	0.0046	0.2903	746	794	2029
Add	220	SBK	SHL	1	0.06	0.0001	0.0001	0.002	593	593	2029
Add	220	DRG	RCB	1	9.09	0.0004	0.0046	0.2903	746	794	2029
Remove	220	PB	SHL	1	0.12	0.0001	0.0001	0.0033	574	574	2029
Add	110	KEL	TGN	1		0.009702	0.041247	0.004431	185	195	2029

Table B-8: Expected Changes in Transmission Circuits

Action	Voltage (kV)	From	To	ckt	total	Impedance on 100 MVA Base (pu)			Rating (MVA)		Year
						R	X	B	Summer	Winter	
Add	110	KTY	CRE	1		0.00118008	0.00471463	0.0341974	200	200	2029
Add	110	KTY	CEN	2		5.00826E-05	0.000344628	0.00387735	200	200	2029
Add	110	KTY	CRE	2		0.00118008	0.00471463	0.0341974	200	200	2029
Remove	110	CRG	KEL	1		0.02933	0.07667	0.01292	82	103	2029
Add	110	CRG	TGN	1		0.01276	0.034	0.00896	109	124	2029
Add	110	RSK	TGN	1		0.012635	0.072311	0.030873	211	235	2029
Add	110	YKT	KTY	1		0.00011686	0.000804132	0.00904716	200	200	2029
Add	110	BLC	MTN	1	5	0.0119	0.0085	0.055	372	420	2029
Add	110	DON	YKT	1		0.000617686	0.00425041	0.0478207	200	200	2029
Add	110	YKT	BNM	1		0.000100165	0.000689256	0.00775471	200	200	2029
Remove	110	CEN	CRE	1		0.00113	0.00437	0.03032	144	144	2029
Add	110	CNB	KKY	1	30	0.0039	0.0467	0.365	295	295	2029
Add	110	MTN	MTA	1	3	0.0007	0.0033	0.0333	190	190	2029
Add	110	KTY	CEN	1		5.00826E-05	0.000344628	0.00387735	200	200	2029
Add	110	YKT	KTY	2		0.00011686	0.000804132	0.00904716	200	200	2029
Add	110	DON	YKT	2		0.000617686	0.00425041	0.0478207	200	200	2029
Remove	110	CEN	CRE	2		0.00113	0.00437	0.03032	144	144	2029
Add	110	NBY	MTA	1	2.5	0.0006	0.0028	0.0278	190	190	2029
Add	110	YKT	BNM	2		0.000100165	0.000689256	0.00775471	200	200	2029

Expected Changes in Transformers in Ireland

Table B-9: Expected Changes in Transformers in Ireland

Action	Station	Transformer	Rating (MVA)	HV/LV (kV)	Impedance on 100 MVA base (pu)		Voltage ratio tapping range		Year
					R	X	+	-	
Add	GLK	T2101	582	220/150	0	0.024	0.23	0.19	2024
Add	CDU	T2104	250	220/110	0.00066	0.061	0.1	0.18	2024
Add	DSN	T4103	500	380/220	0.0003	0.027	0.1	0.08	2025
Add	BLC	T2102	250	220/110	0.001	0.0646			2025
Add	CEL	T4101	834	380/365		0.022	0.3	0.07	2026
Add	KLP	T4101	500	380/220	0.0003	0.027	0.1	0.08	2026
Add	KRA	T4101	790	380/220	0.0005	0.017	0.1	0.08	2026
Add	CNB	T4101	500	380/110	0.00048	0.072	0.16	0.16	2026
Add	CNB	T4102	500	380/110	0.00048	0.072	0.16	0.16	2026
Add	KLN	T2104	250	220/110	0.0004	0.0631	0.1	0.18	2027
Remove	KLN	T2104	125	220/110	0.001	0.123	0.1	0.18	2027
Remove	KLN	T2102	63	220/110	0.0095	0.2473	0.23	0.18	2027
Remove	KLN	T2101	63	220/110	0.0065	0.2453	0.23	0.18	2027
Add	GI	T2102	250	220/110	0.0004	0.0631	0.1	0.18	2028
Remove	GI	T2101	125	220/110	0.0026	0.1331	0.1	0.18	2028
Remove	GI	T2102	125	220/110	0.0023	0.1237	0.23	0.18	2028
Add	GI	T2101	250	220/110	0.0004	0.0631	0.1	0.18	2028
Add	RCB	T4102	500	380/220	0.0003	0.027	0.1	0.08	2029
Add	BLC	T4101	500	380/220	0.001	0.0646			2029
Add	RCB	T4101	500	380/220	0.0003	0.027	0.1	0.08	2029
Add	ARK	T2102	250	220/110	0.0004	0.0631	0.1	0.18	2029
Remove	ARK	T2102	125	220/110	0.0021	0.1237	0.1	0.18	2029
Add	ARK	T2101	250	220/110	0.0004	0.0631	0.1	0.18	2029
Remove	ARK	T2101	63	220/110	0.007	0.18	0.23	0.19	2029

Expected Changes in 3 Winding Transformers in Northern Ireland

Table B-10: Characteristics of 3-Winding Transformer Changes in Northern Ireland

Action	Station	Transformer Name	Rating	HV/LV (kV)	R pu	X pu	Tapping Range -	Tapping Range +	Relevant date
Add	CAS	CAST2-	240	110/275	0.001	0.0689	0.1	0.1	2024
Amend	CAS	CSTAT1P	240	110/275	0.0014	0.0639	0.15	0.15	2024
Remove	CAS	CSTAT1P	240	110/275	0.0014	0.0639	0.15	0.15	2024
Add	HAN	HNNHAT1	240	110/275	0.001	0.07	0.15	0.15	2025
Remove	HAN	HNNHAT1	240	110/275	0.0018	0.0591	0.15	0.15	2025
Add	CAS	CSTAT1R	240	110/275	0.0018	0.0656	0.15	0.15	2025
Remove	CAS	CSTAT1R	240	110/275	0.0018	0.0656	0.15	0.15	2025
Add	TUR	TURAT3	500	275/380	0.0003	0.0329	0.1	0.1	2027
Add	TUR	TURAT2	500	275/380	0.0003	0.0329	0.1	0.1	2027
Add	TUR	TURAT1	500	275/380	0.0003	0.0329	0.1	0.1	2027

Expected Changes in 2 Winding Transformers in Northern Ireland

Table B-11: Expected Changes in 2 Winding Transformers in Northern Ireland

Action	Station	HV/LV (kV)	Rating	R pu	X pu	off nominal ratio - upper limit	off nominal ratio - lower limit	number of taps	Year
Add	CAM	110/33	90	0.0039	0.2461	1.1	0.8	19	2024
Add	CAM	110/33	90	0.0039	0.2461	1.1	0.8	19	2024
Add	AGT	110/33	80	0.0266	0.335			15	2024
Add	GOR (N)	110/33	90	0.0039	0.2461	1.1	0.8	19	2024
Add	ENN (N)	110/33	90	0.0126	0.2733			15	2024
Add	ENN (N)	110/33	90	0.0126	0.272			15	2024
Add	GRV	110/33	90	0.0039	0.2461	1.1	0.8		2025
Add	GLE (N)	110/33	90	0.0119	0.2692	1.1	0.8	19	2025
Add	CRE	110/33	90	0.0091	0.1953				2025
Add	CRE	110/33	90	0.0091	0.1967				2025
Add	PT~.	110/33	60	0.0228	0.3201				2026
Add	AIR	110/33	90	0.0073	0.25	1.1	0.8	19	2026
Add	BAN (N)	110/33	90	0.0039	0.2461			15	2026
Add	BAN (N)	110/33	90	0.0039	0.2461			15	2026
Add	AIR	110/33	90	0.0073	0.25	1.1	0.8	19	2026
Add	CMK.	110/33	50	0.0071	0.4126				2026
Add	HRN	110/33	110	0.005	0.12	1.1625	0.9125	20	2026
Add	LAR	110/33	90	0.0116	0.2278				2026
Add	LAR	110/33	90	0.0116	0.2771				2026
Add	HAN	110/33	100	0.005	0.12				2027
Add	LIM (N)	110/33	90	0.0125	0.2809				2027

Table B-11: Expected Changes in 2 Winding Transformers in Northern Ireland									
Action	**Station**	**HV/LV (kV)**	**Rating**	**R pu**	**X pu**	**off nominal ratio - upper limit**	**off nominal ratio - lower limit**	**number of taps**	**Year**
Add	BVG	110/33	50	0.005	0.24				2027
Add	LIM (N)	110/33	90	0.0122	0.2764				2027
Add	DON	110/33	90	0.0039	0.2461	1.1	0.8	19	2027
Add	GRV	110/33	90	0.0039	0.2461	1.1	0.8		2028
Add	LOG	110/33	90	0.0126	0.2738	1.1	0.8	19	2028
Add	LOG	110/33	90	0.128	0.28	1.1	0.8	19	2028

Appendix C: Demand forecasts at individual transmission interface stations

Transmission Interface Stations and Bulk Supply Points are connection points to the transmission system. These connection points include transmission system connections to the distribution system or directly-connected customers. Table C-1 to Table C-4 list the demand forecasts at each Transmission Interface Station and Bulk Supply Point. The forecasts are noted for each node between 2024 and 2033 at the winter peak, summer peak, and summer valley. The autumn peak forecasts are also given for Northern Ireland.

The station demand values do not include transmission losses. Demand values at stations that interface with the distribution system do include distribution losses.

Transmission Interface Stations are generally 110 kV stations. The exceptions to this are six 220/110 kV interface stations that supply the Dublin network. These interface stations are Belcamp, Carrickmines, Castlebagot, Finglas, Inchicore and Poolbeg.

Only stations feeding demand are included in the tables below, generation stations are not included.

Demand Forecasts at Time of Winter Peak

Table C-1: Demand Forecasts at Time of Winter Peak												
Code	**Station**	**PF**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
ADM	Adamstown	0.995	19.17	19.23	19.42	19.52	19.62	19.59	19.75	19.97	20.23	20.36
AGH (N)	AGHYOULE	0.99	20.73	20.49	20.54	21.23	21.45	21.4	21.44	21.37	10.92	22.1
AHA	Ahane	0.9998	5.12	5.16	5.26	5.31	5.37	5.35	5.43	5.55	5.68	5.76
AIR	Airport Road	0.99		0	23.86	25.5	26.62	28.31	29.18	29.89	15.2	30.77
ATN	Airton	0.999	56.94	58.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94
ANR	Anner	0.897	14	14	14	14	14	14	14	14	14	14
ANT	Antrim	0.98		44.98	45.61	47.65	48.44	48.8	49.4	49.97	25.89	52.4
AA	Ardnacrusha	0.9994	72.49	72.95	74.35	75.15	75.9	75.64	76.84	78.51	80.41	81.44
ARD	Ardnagappary	0.9806	9.67	9.73	9.92	10.02	10.12	10.09	10.25	10.47	10.73	10.86
ARI	Arigna	1	4.92	4.95	5.05	5.1	5.15	5.14	5.22	5.33	5.46	5.53
ARK	Arklow	0.9974	41.44	41.7	42.51	42.96	43.39	43.25	43.93	44.87	45.98	46.56
ART	Artane	1	17.59	17.7	18.04	18.23	18.42	18.35	18.64	19.05	19.51	19.76
ATH	Athlone	0.9947	75.71	76.19	77.66	78.49	79.28	79.01	80.25	81.99	83.98	85.06
ATY	Athy	0.9814	22.45	22.59	23.03	23.28	23.51	23.43	23.8	24.31	24.91	25.22
AGN	Aungierstown	0.997	13.98	18.94	20.94	23.93	25.92	28.91	30.91	33.9	35.89	35.89
BEG	Ballybeg	1	15.76	15.86	16.17	16.34	16.5	16.45	16.71	17.07	17.48	17.71
BDN	Ballydine	0.9857	16.72	16.79	17	17.12	17.23	17.19	17.37	17.61	17.9	18.05
BLY	Ballylickey	0.9967	13.1	13.18	13.44	13.58	13.72	13.67	13.89	14.19	14.53	14.72
BMA	BALLYMENA	0.9551	63.94	62.46	60.78	61.96	60.82	61.73	64.5	63.16	32.62	66.03
BNH	BALLYNAHINCH	0.99	56.72	56.81	57.78	60.57	62.18	63.03	64.41	65.85	34.46	69.76
BGT	Ballyragget	0.9772	23.59	23.74	24.2	24.46	24.7	24.62	25.01	25.55	26.17	26.51
BAL	Baltrasna	0.9991	15.66	15.75	16.06	16.23	16.39	16.34	16.59	16.95	17.37	17.59
BAN (N)	BANBRIDGE	0.99	39.84	39.9	40.52	42.37	43.4	43.94	44.79	45.73	23.89	48.36
BCT	Bancroft	0.9864	43	43	43	43	43	43	43	43	43	43
BAN	Bandon	0.9928	46.79	47.09	48	48.51	49	48.82	49.59	50.67	51.9	52.57
BOG	Banoge	1	7.74	7.78	7.93	8.02	8.1	8.07	8.2	8.38	8.58	8.69
BAG	Barnageeragh	0.994	14.91	20.87	26.84	32.79	35.78	35.78	35.78	36	35.78	35.78
BRY	Barnahely	0.9875	39.18	39.42	40.18	40.6	41.01	40.87	41.52	42.42	43.46	44.01
BNK	Barnakyle	1	18	24	30	36	42	48	54	60	66	66
BDA	Baroda	0.9881	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
BAR	Barrymore	0.9974	31.46	31.65	32.26	32.61	32.94	32.82	33.34	34.06	34.89	35.34

Table C-1: Demand Forecasts at Time of Winter Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
CEN	BELFAST CENTRAL	0.99	48.39	47.44	47.02	48.57	49.03	48.83	48.8	48.72	24.96	50.53
BK	Bellacorick	0.9966	5.26	5.29	5.4	5.45	5.51	5.49	5.58	5.7	5.83	5.91
BIN	Binbane	1	18.71	18.83	19.19	19.4	19.59	19.52	19.83	20.26	20.75	21.02
BRK	Blackrock	0.9614	62.49	62.88	64.09	64.78	65.43	65.2	66.23	67.66	69.31	70.2
BLK	Blake	0.9989	26.28	26.45	26.96	27.25	27.52	27.43	27.86	28.46	29.15	29.53
Blu	Blundelstown	0.9501	0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
BRI	Brinny	0.9706	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95
BUT	Butlerstown	0.9947	42.29	42.55	43.37	43.84	44.28	44.12	44.82	45.79	46.9	47.5
CAB	Cabra	0.9607	13.21	13.29	13.55	13.69	13.83	13.78	14	14.3	14.65	14.84
CAH	Cahir	0.9913	26.87	27.04	27.56	27.86	28.14	28.04	28.48	29.1	29.81	30.19
CLW	Carlow	0.9961	65.54	65.95	67.22	67.94	68.63	68.39	69.47	70.97	72.7	73.63
CAR	CARNMONEY	0.99	38.61	38.24	38.47	39.9	40.49	40.59	40.91	41.1	21.18	42.88
COS	Carrick on Shannon	0.9974	29.73	29.92	30.5	30.82	31.13	31.03	31.52	32.2	32.98	33.4
CKM	Carrickmines	0.9992	67.69	68.11	69.43	70.17	70.87	70.63	71.75	73.3	75.08	76.04
CBG	Carrowbeg	0.9963	17.02	17.13	17.46	17.64	17.82	17.76	18.04	18.43	18.88	19.12
CBR	Castlebar	0.9968	29.85	30.04	30.62	30.94	31.26	31.15	31.64	32.32	33.11	33.53
CFM	Castlefarm	0.9006	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
CVI	Castleview	0.9961	28.71	28.89	29.45	29.76	30.06	29.96	30.43	31.09	31.85	32.25
CF	Cath_Fall	0.9744	17.04	17.15	17.48	17.66	17.84	17.78	18.06	18.45	18.9	19.14
CPK	Central Park	0.9987	9.67	9.73	9.92	10.02	10.12	10.09	10.25	10.47	10.73	10.86
CHA	Charleville	0.9866	21.59	21.73	22.15	22.38	22.61	22.53	22.89	23.38	23.95	24.26
CHE	Cherrywood	0.9998	22.2	22.34	22.77	23.02	23.25	23.17	23.53	24.04	24.63	24.94
CTY	City West	0.9604	13.44	13.53	13.79	13.93	14.07	14.03	14.25	14.55	14.91	15.1
CLG	Cloghran	0.9912	71	71	71	71	71	71	71	71	71	71
CLE	Clonee	0.998	127.74	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72
CLO	Cloon	0.9891	27.31	27.48	28.01	28.31	28.59	28.49	28.94	29.57	30.29	30.68
CLU	Clutterland	0.998	37.92	47.9	57.88	67.86	77.84	87.82	97.8	106	115.77	115.77
COL (N)	COLERAINE	0.99	39.28	39.32	39.83	41.48	42.44	42.9	43.7	44.54	23.23	47.02
COL	College Park	0.9994	23.05	23.2	23.64	23.9	24.14	24.06	24.43	24.96	25.57	25.9
COO	Cookstown	0.997	75.66	76.13	77.59	78.43	79.21	78.95	80.2	81.93	83.92	85
CDG	Coolderrig	1	30	36	38	38	38	38	38	38	38	38
CPS	COOLKEERAGH	0.99	53.56	53.61	54.04	55.58	56.17	56.34	56.7	56.93	38.99	58.5
CLR	Coolroe	1	10.89	10.96	11.17	11.29	11.4	11.36	11.54	11.79	12.08	12.23

Table C-1: Demand Forecasts at Time of Winter Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
CDU	Corduff	0.9921	33.41	33.62	34.27	34.63	34.98	34.86	35.41	36.18	37.06	37.53
CKG	Corkagh	0.999	124.88	141.86	155.84	155.84	155.84	155.84	155.84	155.84	155.84	155.84
COW	Cow Cross	0.9989	16.44	16.54	16.86	17.04	17.21	17.15	17.42	17.8	18.23	18.47
CRA	Crane	0.9991	38.82	39.07	39.82	40.24	40.66	40.51	41.15	42.04	43.06	43.61
CRG	CREAGH	0.99	55.51	56.6	58.47	62.14	64.5	66	67.84	69.52	36.42	73.73
CRE	CREGAGH	0.99	61.38	61.56	64.78	67.09	65.01	66.74	69.84	70.37	34.81	70.46
CRH	CRUISERATH	0.999	66.93	81.92	96.9	111.89	126.87	141.86	156.84	171.83	171.83	171.83
DAL	Dallow	0.9958	19.44	19.56	19.94	20.15	20.35	20.28	20.6	21.05	21.56	21.83
DLT	Dalton_A1	0.9914	29.14	29.33	29.89	30.21	30.52	30.41	30.89	31.56	32.33	32.74
DTN	Dardistown	0.9743	9.67	9.73	9.92	10.02	10.12	10.09	10.25	10.47	10.73	10.86
DND	Darndale	0.9941	117.29	121	121	121	121	121	121	121	121	121
DON	DONEGALL	0.99	88.49	88.13	87.75	90.75	91.87	91.63	92.1	92.31	47.82	96.81
DRE	Donore	0.9804	0	14.37	14.46	14.51	14.56	14.55	14.62	14.74	14.86	14.93
DOO	Doon	0.9932	28.41	28.59	29.14	29.45	29.75	29.65	30.11	30.76	31.51	31.92
DRU	Drumline	0.9889	26.49	26.65	27.17	27.46	27.73	27.64	28.07	28.68	29.38	29.75
DRU (N)	DRUMNAKELLY	0.99	82.15	81.75	82.47	85.81	87.43	88.38	90.06	91.89	47.99	97.13
DRY	Drybridge	0.9992	89.75	85.45	87.1	88.03	88.92	88.61	90.01	91.96	94.19	95.4
DDK	Dundalk	0.9976	60.05	60.43	61.59	62.25	62.88	62.66	63.65	65.03	66.61	67.46
DFR	Dunfirth	1	10.08	10.14	10.33	10.45	10.55	10.51	10.68	10.91	11.18	11.32
DUN	DUNGANNON	0.99	95.1	94.64	95.42	99.14	100.82	101.22	102.22	102.87	53.01	107.3
DGN	Dungarvan	0.9948	46.16	46.45	47.35	47.86	48.34	48.17	48.93	49.99	51.21	51.86
DMY	Dunmanway	0.9953	35.32	35.55	36.23	36.62	36.99	36.86	37.44	38.25	39.18	39.68
EDE	EDEN	0.99	34.51	34.25	34.83	36.49	37.42	37.91	38.66	39.44	20.63	41.76
ENN	Ennis	0.9974	64.9	65.31	66.57	67.28	67.95	67.73	68.79	70.28	72	72.91
ENN (N)	Enniskillen	0.99	53.37	53.81	54.99	57.68	59.24	60.06	61.29	62.55	32.65	66.09
FAS	Fass East	1	59.47	59.84	61	61.65	62.27	62.05	63.03	64.4	65.96	66.81
FIN (N)	FINAGHY	0.99	31.31	31.67	30.43	31.84	33.09	33.71	34.41	33.19	17.28	34.98
F_M	Finglas	1	166.88	167.93	171.16	152.95	154.48	153.95	156.39	159.77	163.65	165.75
FTT	Fortunestown	0.9995	15.15	15.25	15.54	15.71	15.87	15.81	16.06	16.41	16.81	17.02
GAL	Galway	0.9985	89.67	90.23	91.97	92.95	93.89	93.56	95.04	97.1	99.46	100.74
GIL	Gilra	0.9706	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42
GLS	Glasmore	0.9618	69.25	69.69	71.03	71.79	72.51	72.27	73.41	74.99	76.82	77.8
GLE (N)	GLENGORMLEY	0.99	18.09	18.34	18.5	19.3	19.24	19.34	20.03	20.32	10.61	21.47

Table C-1: Demand Forecasts at Time of Winter Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
GLE	Glenlara	0.9801	14.36	14.45	14.73	14.89	15.04	14.98	15.22	15.55	15.93	16.13
GWE	Gortawee	0.9839	33.44	33.5	33.71	33.83	33.94	33.9	34.07	34.32	34.6	34.75
GRA	Grange	0.9779	57.72	58.08	59.2	59.83	60.44	60.23	61.18	62.5	64.02	64.84
GCA	Grange Castle	1	62.8	63.19	64.41	65.1	65.75	65.53	66.56	68	69.66	70.54
GI	Great Island	0.9865	19.82	19.95	20.33	20.55	20.76	20.68	21.01	21.47	21.99	22.27
GRI	Griffinrath	0.9995	67.69	68.11	69.43	52.13	52.65	52.47	53.3	54.45	55.77	56.49
HX2	Harolds Cross	0.9602	18.64	18.76	19.12	19.33	19.52	19.45	19.76	20.19	20.68	20.94
HEU	Heuston Square	0.999	9.67	9.73	9.92	10.02	10.12	10.09	10.25	10.47	10.73	10.86
IKE	Ikerrin	0.9906	25.85	26.01	26.51	26.79	27.06	26.97	27.4	27.99	28.67	29.04
F_I	Inchicore	1	163.17	164.2	167.37	169.15	170.86	170.27	172.96	176.7	180.99	183.32
KYT	Kellystown	0.95	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85
KBY	Kilbarry	0.9997	85.21	80.88	82.44	83.32	84.16	83.87	85.19	87.03	89.15	90.29
KCY	Kilcarbery	0.99	0	3.96	7.92	11.88	15.84	19.8	23.76	27.72	31.68	35.64
KKY	Kilkenny	0.9928	51.34	51.66	52.65	53.22	53.75	53.57	54.41	55.59	56.94	57.67
KTN	Killoteran	0.9867	10.66	10.72	10.93	11.05	11.16	11.12	11.29	11.54	11.82	11.97
KUD	Kilmahud	0.9874	29.61	33.56	35	35	35	35	35	35	35	35
KLP	Kilnap	0.9804	0	4.87	4.96	5.01	5.06	5.05	5.12	5.24	5.36	5.43
KIL	Kilteel	0.9916	34.1	34.31	34.97	35.34	35.7	35.58	36.14	36.92	37.82	38.3
KIN	Kinnegad	0.9725	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
KGE	Kishoge	0.99	2.97	4.95	7.92	9.9	12.87	14.85	17.82	19.8	21.78	21.78
KNO	KNOCK	0.99	45.57	44.7	44.58	45.56	45.94	45.81	46.06	46.42	24.04	48.67
KER	Knockearagh	0.9933	41.32	41.58	42.38	42.83	43.26	43.12	43.8	44.74	45.83	46.42
KUR	Knockumber	0.9069	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66
LAZ	Lanesboro_A1	0.9961	17.86	17.97	18.32	18.51	18.7	18.64	18.93	19.34	19.81	20.06
LAR	LARNE	0.99	43.21	42.64	43.47	45.73	47.24	48.54	49.24	50.61	26.65	53.94
LET	Letterkenny	0.994	66.08	66.5	67.78	68.5	69.19	68.96	70.04	71.56	73.3	74.24
LIB	Liberty St	0.9975	23.21	23.35	23.8	24.06	24.3	24.22	24.6	25.13	25.74	26.07
LIM (N)	LIMAVADY	0.99	22.07	22.13	22.71	23.34	23.48	24.02	24.84	24.77	12.75	25.81
LIM	Limerick	0.9974	80.74	92.93	94.49	95.38	96.22	95.93	97.26	99.11	101.24	102.39
LMR	LISAGHMORE	0.98	38.13	37.59	37.69	39.03	39.58	39.64	40.05	40.44	20.95	42.4
LIS (N)	LISBURN	0.99	64.36	64.6	65.85	69.04	70.81	71.71	72.99	74.45	38.88	78.7
LIS	Lisdrum	0.979	34.85	35.07	35.74	36.13	36.49	36.37	36.94	37.74	38.66	39.15
LOG	LOGUESTOWN	0.98	37.99	37.89	38.47	40.29	41.28	41.75	42.54	43.33	22.61	45.76
MCE	Macetown	1	25.18	25.31	25.71	25.93	26.15	26.07	26.41	26.88	27.43	27.72

Table C-1: Demand Forecasts at Time of Winter Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
MAC	Macroom	0.8676	18.37	18.49	18.84	19.05	19.24	19.17	19.47	19.9	20.38	20.64
MAL	Mallow	0.9929	23.46	23.61	24.06	24.32	24.56	24.48	24.86	25.4	26.02	26.35
MR	Marina	0.9991	19.34	19.46	19.84	20.05	20.25	20.18	20.5	20.94	21.45	21.73
MTH	Meath Hill	0.9816	52.22	52.54	53.56	54.13	54.67	54.49	55.35	56.54	57.92	58.66
MTA	Metro Airport	0.95	0	0	0	0	0	23.75	23.75	23.75	23.75	23.75
MTN	Metro North	0.95	0	0	0	0	0	29.45	29.45	29.45	29.45	29.45
MID	Midleton	0.9967	42.96	43.22	44.05	44.53	44.97	44.82	45.53	46.51	47.64	48.25
MIL	Milltown	0.9997	20.73	20.85	21.25	21.48	21.7	21.63	21.96	22.43	22.98	23.28
MHL	Misery Hill	0.9998	18.38	18.5	18.85	19.06	19.25	19.18	19.48	19.91	20.39	20.65
MON	Monread	0.9911	19.13	19.25	19.62	19.83	20.03	19.96	20.27	20.71	21.22	21.49
MTN	Mooretown	0.99	0	2.97	10.89	18.8	26.73	35	43	51	58.41	58.41
MOY	Moy	0.9987	26.88	27.05	27.57	27.87	28.15	28.05	28.49	29.11	29.82	30.2
MLN	Mullagharlin	0.9935	7.8	7.82	7.88	7.92	7.95	7.94	8	8.07	8.16	8.21
MUL	Mullingar	0.9994	49.31	49.63	50.58	51.13	51.63	51.46	52.27	53.41	54.7	55.4
MUN	Mungret A	0.8715	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
NAN	Nangor	0.9731	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11
NAV	Navan	0.9924	67.02	67.44	68.74	69.48	70.18	69.94	71.04	72.58	74.34	75.29
NNA	Nenagh	0.9821	24.88	25.04	25.52	25.79	26.05	25.96	26.37	26.94	27.6	27.95
NEW	Newbridge	0.9944	46.45	46.75	47.65	48.16	48.64	48.47	49.24	50.3	51.53	52.19
NBY	Newbury	0.9817	32	32	32	32	32	32	32	32	32	32
NEW (N)	NEWRY	0.99	73.89	73.34	73.46	76.37	77.67	80.05	80.22	80.77	41.95	84.91
NAR	NEWTOWNARDS	0.99	41.06	41.06	41.67	43.56	44.53	44.93	45.6	46.33	24.12	48.82
NQS	North Quays	0.9998	21.8	21.94	22.36	22.6	22.83	22.75	23.11	23.61	24.19	24.5
ODE	Oldbridge	0.985	12.8	19.7	26.6	34	41	48	48	48	47.28	47.28
OLD	Oldcourt	0.9487	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
OMA	OMAGH	0.99	56.66	56.99	57.72	60.25	61.72	62.3	63.17	63.96	33.18	67.17
OUG	Oughtragh	0.9998	26	26.17	26.67	26.95	27.23	27.13	27.56	28.16	28.84	29.21
PTN	Pelletstown	0.9994	14.18	14.26	14.54	14.7	14.84	14.79	15.03	15.35	15.72	15.93
PLA	Platin	0.9503	18	18	18	18	18	18	18	18	18	18
POP	Poppintree	0.9995	28.35	28.53	29.08	29.39	29.69	29.58	30.05	30.7	31.45	31.85
PLS	Portlaoise	0.9982	43.85	44.13	44.98	45.46	45.92	45.76	46.48	47.49	48.64	49.26
POT	Pottery Road	0.9991	15.94	16.04	16.34	16.52	16.69	16.63	16.89	17.26	17.68	17.9
BNM	Power Station West	0.99	46.15	46.18	46.65	48.66	49.52	49.91	50.72	51.23	26.73	54.11

Table C-1: Demand Forecasts at Time of Winter Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
RAT (N)	RATHGAEL	0.99	52.23	51.99	52.64	54.93	56.13	56.69	57.88	59.57	31.27	63.3
RAT	Rathkeale	0.9996	41.87	42.13	42.94	43.4	43.84	43.69	44.38	45.34	46.44	47.04
RIC	Richmond	0.9866	39.51	39.76	40.52	40.96	41.37	41.23	41.88	42.79	43.83	44.39
RNW	Rinawade	0.988	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13
BR	Ringsend	1	116.14	116.86	119.11	120.4	121.6	121.19	123.09	125.76	128.82	130.46
ROS	ROSEBANK	0.99	33.87	33.99	34.69	36.46	37.5	38.07	38.89	39.76	20.82	42.14
RYB	Ryebrook	0.9279	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52
SHL	Salthill	0.9993	45.84	46.13	47.02	47.52	48	47.84	48.59	49.64	50.85	51.5
SCR	Screeb	0.9995	20.24	20.37	20.76	20.98	21.19	21.12	21.45	21.92	22.45	22.74
SKL	Shankill	0.9825	54.51	54.85	55.91	56.51	57.07	56.88	57.78	59.03	60.46	61.24
SHE	Shelton Abbey	0.9563	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29
SNG	Singland	0.9979	15.36	15.45	15.75	15.92	16.08	16.02	16.28	16.63	17.03	17.25
SLI	Sligo	0.9985	54.19	54.53	55.58	56.18	56.74	56.55	57.44	58.68	60.11	60.88
Snu	Snugborough	0.998	35.93	40.92	45.9	49.9	52.89	52.89	52.89	52.89	52.89	52.89
SOM	Somerset	0.9907	24.39	24.54	25.01	25.28	25.53	25.45	25.85	26.41	27.05	27.4
SPR	SPRINGTOWN	0.99	32.95	32.73	32.86	34.3	34.92	35.12	35.51	35.84	18.55	37.54
SVN	Stephenstown	1	10.66	10.72	10.93	11.05	11.16	11.12	11.29	11.54	11.82	11.97
STR (N)	STRABANE	0.99	40.47	40.49	41.07	42.91	43.87	44.26	44.89	45.43	23.53	47.64
STR	Stratford	0.9941	22.68	22.83	23.27	23.52	23.75	23.67	24.05	24.57	25.16	25.48
TNY	Taney	0.9994	7.52	7.57	7.72	7.8	7.88	7.85	7.97	8.15	8.34	8.45
TNB	Thornsberry	0.9901	34.01	34.22	34.88	35.25	35.61	35.49	36.05	36.83	37.72	38.21
THU	Thurles	0.9957	26.75	26.91	27.43	27.73	28.01	27.91	28.35	28.96	29.67	30.05
TIP	Tipperary	0.9905	21.12	21.25	21.66	21.89	22.11	22.04	22.38	22.87	23.43	23.73
TON	Tonroe	0.9867	16.45	16.55	16.87	17.05	17.22	17.16	17.43	17.81	18.24	18.48
TBG	Trabeg	0.9995	70.75	76.77	78.14	78.92	79.65	79.4	80.57	82.19	84.05	85.05
TRL	Tralee	0.9983	51.24	51.56	52.56	53.12	53.65	53.47	54.31	55.49	56.84	57.56
TRI	Trien	0.9978	22.47	22.61	23.05	23.3	23.53	23.45	23.82	24.33	24.93	25.25
TLK	Trillick	0.9949	20.07	20.2	20.59	20.81	21.02	20.95	21.28	21.74	22.27	22.55
TRN	Trinity	0.9991	11.05	11.12	11.34	11.46	11.57	11.53	11.72	11.97	12.26	12.42
TBR	Tullabrack	0.9786	11.6	11.68	11.9	12.03	12.15	12.11	12.3	12.57	12.87	13.04
WLN	Walterstown	0.9731	0	0	0	47.59	47.97	47.84	48.45	49.29	50.26	50.78
WAR	WARINGSTOWN	0.99	64.98	64.93	65.65	68.42	69.7	70.14	70.96	71.62	37.01	74.91
WAT	Waterford	0.9916	58.02	58.38	59.51	60.14	60.75	60.54	61.5	62.83	64.36	65.18
WEX	Wexford	0.9994	56.83	57.2	58.29	58.92	59.52	59.31	60.24	61.55	63.04	63.85

Table C-1: Demand Forecasts at Time of Winter Peak												
Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
WHI	Whitegate	0.87	9	9	9	9	9	9	9	9	9	9
WLT	Wolfe Tone	0.96	27.14	27.31	27.84	28.14	28.42	28.32	28.77	29.39	30.11	30.49
YMD	YellowMeadows	0.99	3.96	6.93	9.9	12.87	15.84	18.8	21.78	24.75	27.72	27.72

Demand Forecasts at Time of Summer Peak

Table C-2: Demand Forecasts at Time of Summer Peak												
Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
ADM	Adamstown	0.995	16.7	16.75	16.8	16.87	16.91	16.83	16.94	17.1	17.29	17.39
AGH (N)	AGHYOULE	0.99	16.3	14.26	16.15	16.69	16.86	14.89	16.85	14.88	8.58	15.38
AHA	Ahane	1	3.82	3.84	3.87	3.91	3.93	3.89	3.94	4.03	4.13	4.18
AIR	Airport Road	0.99	0	0	18.76	20.04	20.92	19.7	22.93	20.81	11.95	21.42
ATN	Airton	0.999	56.94	58.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94
ANR	Anner	0.897	14	14	14	14	14	14	14	14	14	14
ANT	Antrim	0.98	0	31.29	35.85	37.45	38.07	33.97	38.83	34.79	20.35	36.48
AA	Ardnacrusha	0.999	54	54.33	54.76	55.28	55.55	54.97	55.78	56.95	58.38	59.16
ARD	Ardnagappary	0.981	7.2	7.25	7.3	7.37	7.41	7.33	7.44	7.6	7.79	7.89
ARI	Arigna	1	3.67	3.7	3.72	3.76	3.78	3.74	3.79	3.87	3.97	4.02
ARK	Arklow	0.997	30.87	31.05	31.29	31.6	31.75	31.42	31.88	32.55	33.37	33.81
ART	Artane	1	13.1	13.18	13.28	13.41	13.48	13.34	13.53	13.82	14.16	14.35
ATH	Athlone	0.995	56.41	56.74	57.19	57.74	58.02	57.41	58.26	59.48	60.98	61.79
ATY	Athy	0.981	16.72	16.82	16.95	17.12	17.2	17.02	17.27	17.63	18.08	18.32
AGN	Aungierstown	0.997	13.98	18.94	20.94	23.93	25.92	28.91	30.91	33.9	35.89	35.89
BEG	Ballybeg	1	11.74	11.81	11.91	12.02	12.08	11.95	12.13	12.38	12.69	12.86
BDN	Ballydine	0.986	13.99	14.03	14.1	14.18	14.22	14.13	14.25	14.42	14.63	14.75
BLY	Ballylickey	0.997	9.76	9.82	9.9	9.99	10.04	9.94	10.08	10.29	10.55	10.69
BMA	BALLYMENA	0.955	50.25	43.46	47.78	48.7	47.81	42.97	50.69	43.97	25.64	45.96
BNH	BALLYNAHINCH	0.99	44.58	39.52	45.42	47.61	48.87	43.88	50.62	45.85	27.09	48.55
BGT	Ballyragget	0.977	17.58	17.68	17.82	17.99	18.08	17.89	18.16	18.54	19	19.26
BAL	Baltrasna	0.999	11.66	11.73	11.82	11.94	12	11.87	12.04	12.3	12.61	12.78
BAN (N)	BANBRIDGE	0.99	31.31	27.76	31.85	33.3	34.12	30.59	35.2	31.83	18.78	33.66
BCT	Bancroft	0.986	43	43	43	43	43	43	43	43	43	43
BAN	Bandon	0.993	34.85	35.05	35.33	35.67	35.85	35.47	36	36.75	37.67	38.17

Table C-2: Demand Forecasts at Time of Summer Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
BOG	Banoge	1	5.76	5.8	5.84	5.9	5.93	5.87	5.95	6.08	6.23	6.31
BAG	Barnageeragh	0.994	14.91	20.87	26.84	32.79	35.78	35.78	35.78	36	35.78	35.78
BRY	Barnahely	0.988	29.18	29.35	29.58	29.86	30.02	29.7	30.13	30.76	31.54	31.96
BNK	Barnakyle	1	18	24	30	36	42	48	54	60	66	66
BDA	Baroda	0.988	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
BAR	Barrymore	0.997	23.43	23.57	23.76	23.99	24.1	23.85	24.2	24.71	25.33	25.67
CEN	BELFAST CENTRAL	0.99	38.03	33	36.96	38.17	38.54	33.99	38.35	33.92	19.62	35.17
BK	Bellacorick	0.996	3.92	3.94	3.97	4.01	4.03	3.99	4.05	4.13	4.23	4.29
BIN	Binbane	1	13.94	14.02	14.13	14.27	14.34	14.19	14.4	14.7	15.07	15.27
BRK	Blackrock	0.961	46.55	46.82	47.19	47.65	47.88	47.38	48.08	49.08	50.32	50.99
BLK	Blake	0.999	19.58	19.69	19.85	20.04	20.14	19.93	20.22	20.64	21.16	21.45
Blu	Blundelstown	0.95	0	0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
BRI	Brinny	0.971	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95
BUT	Butlerstown	0.995	31.5	31.69	31.94	32.25	32.4	32.06	32.54	33.22	34.05	34.51
CAB	Cabra	0.961	9.83	9.89	9.97	10.07	10.11	10.01	10.16	10.37	10.63	10.77
CAH	Cahir	0.991	20.02	20.14	20.3	20.49	20.59	20.37	20.68	21.11	21.64	21.93
CLW	Carlow	0.996	48.83	49.11	49.5	49.98	50.22	49.7	50.43	51.48	52.78	53.49
CAR	CARNMONEY	0.99	30.34	26.61	30.24	31.36	31.83	28.26	32.16	28.61	16.65	29.85
COS	Carrick on Shannon	0.997	22.15	22.28	22.46	22.68	22.79	22.55	22.88	23.36	23.95	24.27
CKM	Carrickmines	0.999	50.43	50.73	51.13	51.62	51.87	51.33	52.09	53.17	54.51	55.24
CBG	Carrowbeg	0.996	12.68	12.75	12.85	12.98	13.04	12.91	13.1	13.37	13.71	13.89
CBR	Castlebar	0.997	22.23	22.37	22.54	22.76	22.87	22.63	22.96	23.44	24.03	24.36
CVI	Castleview	0.996	21.39	21.51	21.68	21.89	22	21.77	22.09	22.55	23.12	23.43
CF	Cath_Fall	0.974	12.69	12.76	12.86	12.99	13.05	12.91	13.11	13.38	13.72	13.9
CPK	Central Park	0.999	7.2	7.25	7.3	7.37	7.41	7.33	7.44	7.6	7.79	7.89
CHA	Charleville	0.987	16.08	16.18	16.31	16.46	16.54	16.37	16.61	16.96	17.39	17.62
CHE	Cherrywood	1	16.53	16.63	16.76	16.92	17.01	16.83	17.08	17.43	17.87	18.11
CTY	City West	0.96	10.01	10.07	10.15	10.25	10.3	10.19	10.34	10.56	10.82	10.97
CLG	Cloghran	0.991	71	71	71	71	71	71	71	71	71	71
CLE	Clonee	0.998	127.74	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72
CLO	Cloon	0.989	20.34	20.46	20.62	20.82	20.92	20.7	21.01	21.45	21.99	22.28
CLU	Clutterland	0.998	37.92	47.9	57.88	67.86	77.84	87.82	97.8	106	115.77	115.77
COL (N)	COLERAINE	0.99	30.87	27.36	31.3	32.61	33.36	29.86	34.35	31.01	18.26	32.73

Table C-2: Demand Forecasts at Time of Summer Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
COL	College Park	0.999	17.17	17.27	17.41	17.58	17.66	17.48	17.74	18.11	18.56	18.81
COO	Cookstown	0.997	56.35	56.69	57.13	57.68	57.97	57.36	58.21	59.43	60.92	61.73
CDG	Coolderrig	1	30	36	38	38	38	38	38	38	38	38
CPS	COOLKEERAGH	0.99	46.37	43.37	46.74	47.96	48.42	45.28	48.83	45.7	34.92	46.78
CLR	Coolroe	1	8.1	8.15	8.22	8.3	8.34	8.25	8.37	8.55	8.76	8.88
CDU	Corduff	0.992	24.89	25.04	25.23	25.48	25.6	25.33	25.71	26.25	26.91	27.27
CKG	Corkagh	0.999	124.88	141.86	155.84	155.84	155.84	155.84	155.84	155.84	155.84	155.84
COW	Cow Cross	0.999	12.25	12.32	12.42	12.54	12.6	12.47	12.65	12.91	13.24	13.42
CRA	Crane	0.999	28.92	29.08	29.32	29.6	29.74	29.44	29.87	30.49	31.26	31.68
CRG	CREAGH	0.99	43.63	39.38	45.96	48.84	50.7	45.94	53.32	48.4	28.63	51.32
CRE	CREGAGH	0.99	48.24	42.83	50.92	52.74	51.1	46.46	54.9	48.99	27.36	49.05
CRH	CRUISERATH	0.999	66.93	81.92	96.9	111.89	126.87	141.86	156.84	171.83	171.83	171.83
DAL	Dallow	0.996	14.48	14.57	14.68	14.82	14.89	14.74	14.96	15.27	15.65	15.86
DLT	Dalton_A1	0.991	21.71	21.84	22.01	22.23	22.33	22.1	22.42	22.89	23.47	23.78
DTN	Dardistown	0.974	7.2	7.25	7.3	7.37	7.41	7.33	7.44	7.6	7.79	7.89
DND	Darndale	0.994	117.29	121	121	121	121	121	121	121	121	121
DON	DONEGALL	0.99	69.55	61.31	68.97	71.33	72.21	63.78	72.39	64.27	37.59	67.38
DRE	Donore	0.981	0	13.12	13.15	13.19	13.21	13.17	13.22	13.3	13.39	13.45
DOO	Doon	0.993	21.16	21.29	21.45	21.66	21.77	21.54	21.86	22.31	22.88	23.18
DRU	Drumline	0.989	19.73	19.85	20	20.2	20.29	20.08	20.38	20.8	21.33	21.61
DRU (N)	DRUMNAKELLY	0.99	64.57	56.87	64.82	67.45	68.72	61.52	70.79	63.97	37.72	67.61
DRY	Drybridge	0.999	66.86	63.64	64.14	64.76	65.07	64.39	65.34	66.71	68.38	69.3
DDK	Dundalk	0.998	44.74	45	45.36	45.8	46.02	45.53	46.21	47.17	48.36	49.01
DUN	DUNGANNON	0.99	74.75	65.84	75	77.92	79.24	70.46	80.34	71.62	41.66	74.69
DGN	Dungarvan	0.995	34.39	34.59	34.87	35.2	35.37	35	35.52	36.26	37.18	37.67
DMY	Dunmanway	0.995	26.31	26.47	26.68	26.94	27.07	26.78	27.18	27.75	28.44	28.83
EDE	EDEN	0.99	27.13	23.83	27.37	28.68	29.42	26.39	30.39	27.46	16.21	29.07
ENN	Ennis	0.997	48.35	48.64	49.02	49.49	49.73	49.21	49.94	50.98	52.26	52.97
ENN (N)	Enniskillen	0.99	41.95	37.44	43.22	45.34	46.56	41.81	48.18	43.55	25.66	46
FIN (N)	FINAGHY	0.99	24.61	22.03	23.92	25.03	26.01	23.47	27.05	23.1	13.58	24.35
F_M	Finglas	1	124.33	125.06	126.04	127.27	113.06	111.88	113.53	115.91	118.83	120.41
FTT	Fortunestown	1	11.28	11.35	11.44	11.55	11.61	11.48	11.65	11.9	12.2	12.36
GAL	Galway	0.999	66.8	67.2	67.72	68.38	68.71	67.99	68.99	70.44	72.21	73.18

Table C-2: Demand Forecasts at Time of Summer Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
GIL	Gilra	0.971	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42
GLS	Glasmore	0.962	51.59	51.9	52.3	52.81	53.07	52.51	53.29	54.4	55.77	56.52
GLE (N)	GLENGORMLEY	0.99	14.22	12.76	14.54	15.17	15.12	13.46	15.75	14.15	8.34	14.94
GLE	Glenlara	0.98	10.7	10.76	10.85	10.95	11	10.89	11.05	11.28	11.56	11.72
GWE	Gortawee	0.984	30.72	30.77	30.83	30.91	30.95	30.87	30.98	31.16	31.37	31.48
GRA	Grange	0.978	43	43.25	43.59	44.02	44.23	43.77	44.41	45.34	46.48	47.11
GCA	Grange Castle	1	46.77	47.05	47.42	47.88	48.11	47.61	48.31	49.32	50.56	51.24
GI	Great Island	0.987	14.77	14.86	14.97	15.12	15.19	15.03	15.25	15.57	15.96	16.18
GRI	Griffinrath	0.999	50.43	50.73	51.13	51.62	38.53	38.13	38.69	39.5	40.49	41.04
HX2	Harolds Cross	0.96	13.89	13.97	14.08	14.21	14.28	14.13	14.34	14.64	15.01	15.21
HEU	Heuston Square	0.999	7.2	7.25	7.3	7.37	7.41	7.33	7.44	7.6	7.79	7.89
IKE	Ikerrin	0.991	19.25	19.37	19.52	19.71	19.8	19.6	19.89	20.3	20.81	21.09
F_I	Inchicore	1	121.56	122.29	123.24	124.44	125.03	123.72	125.56	128.18	131.4	133.17
KYT	Kellystown	0.95	114	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85
KBY	Kilbarry	1	63.47	63.85	60.7	61.29	61.59	60.94	61.84	63.14	64.73	65.6
KCY	Kilcarbery	0.99	0	3.96	7.92	11.88	15.84	19.8	23.76	27.72	31.68	35.64
KKY	Kilkenny	0.993	38.24	38.47	38.77	39.15	39.34	38.93	39.5	40.33	41.34	41.9
KTN	Killoteran	0.987	7.93	7.98	8.04	8.12	8.16	8.07	8.19	8.37	8.58	8.69
KUD	Kilmahud	0.987	29.61	33.56	35	35	35	35	35	35	35	35
KLP	Kilnap	0.981	0	0	3.65	3.69	3.71	3.67	3.72	3.8	3.89	3.95
KIL	Kilteel	0.992	25.39	25.54	25.75	26	26.12	25.85	26.23	26.78	27.45	27.82
KIN	Kinnegad	0.973	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
KGE	Kishoge	0.99	0	2.97	4.95	7.92	9.9	12.87	14.85	17.82	19.8	21.78
KNO	KNOCK	0.99	35.82	31.1	35.04	35.81	36.11	31.89	36.2	32.32	18.9	33.87
KUR	Knockumber	0.907	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66
LAZ	Lanesboro_A1	0.996	13.3	13.38	13.48	13.62	13.68	13.54	13.74	14.02	14.38	14.57
LAR	LARNE	0.99	33.96	29.66	34.17	35.94	37.13	33.79	38.7	35.24	20.94	37.54
LET	Letterkenny	0.994	49.23	49.52	49.91	50.4	50.64	50.11	50.85	51.91	53.22	53.93
LIM (N)	LIMAVADY	0.99	17.34	15.39	17.85	18.34	18.46	16.72	19.52	17.24	10.02	17.96
LIM	Limerick	0.997	60.15	60.51	72.67	73.26	73.55	72.91	73.81	75.11	76.71	77.58
LMR	LISAGHMORE	0.98	29.97	26.15	29.63	30.68	31.11	0	31.48	28.16	16.46	29.51
LIS (N)	LISBURN	0.99	50.58	44.94	51.76	54.27	55.66	49.92	57.37	51.83	30.56	54.78
LIS	Lisdrum	0.979	25.97	26.12	26.33	26.59	26.71	26.43	26.82	27.38	28.07	28.45
LOG	LOGUESTOWN	0.98	29.86	26.36	30.24	31.67	32.45	0	33.44	30.17	17.77	31.85

Table C-2: Demand Forecasts at Time of Summer Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
MCE	Macetown	1	19.92	20.02	20.14	20.29	20.36	20.2	20.43	20.76	21.17	21.39
MAC	Macroom	0.868	13.69	13.77	13.88	14.01	14.08	13.93	14.14	14.43	14.8	14.99
MAL	Mallow	0.993	17.47	17.57	17.71	17.88	17.97	17.78	18.04	18.42	18.88	19.14
MR	Marina	0.999	14.41	14.49	14.61	14.75	14.82	14.66	14.88	15.19	15.57	15.78
MTH	Meath Hill	0.982	38.9	39.13	39.44	39.82	40.01	39.6	40.18	41.02	42.05	42.62
MTA	Metro Airport	0.95	0	0	0	0	0	23.75	23.75	23.75	23.75	23.75
MTN	Metro North	0.95	0	0	0	0	0	29.45	29.45	29.45	29.45	29.45
MID	Midleton	0.997	31.99	32.19	32.44	32.76	32.91	32.56	33.05	33.74	34.59	35.05
MHL	Misery Hill	1	13.69	13.77	13.88	14.01	14.08	13.93	14.14	14.43	14.8	14.99
MON	Monread	0.991	14.25	14.33	14.44	14.58	14.65	14.5	14.71	15.02	15.4	15.61
MTN	Mooretown	0.99	0	0	10.89	18.8	26.73	35	43	51	58.41	58.41
MOY	Moy	0.999	20.03	20.15	20.3	20.5	20.6	20.38	20.69	21.12	21.65	21.94
MLN	Mullagharlin	0.993	6.95	6.96	6.98	7	7.02	6.99	7.03	7.08	7.15	7.18
MUL	Mullingar	0.999	36.73	36.94	37.24	37.6	37.78	37.39	37.94	38.73	39.71	40.24
MUN	Mungret A	0.871	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
NAN	Nangor	0.973	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11
NAV	Navan	0.992	49.92	50.22	50.62	51.11	51.35	50.81	51.57	52.64	53.97	54.69
NNA	Nenagh	0.982	18.53	18.64	18.79	18.97	19.06	18.86	19.14	19.54	20.03	20.3
NEW	Newbridge	0.994	34.61	34.81	35.09	35.43	35.6	35.22	35.74	36.49	37.41	37.91
NBY	Newbury	0.982	32	32	32	32	32	32	32	32	32	32
NEW (N)	NEWRY	0.99	58.08	51.03	57.74	60.03	0	0	63.05	56.23	32.97	59.1
NAR	NEWTOWNARDS	0.99	32.27	28.56	32.75	34.24	0	0	35.84	32.25	18.96	33.98
NQS	North Quays	1	16.25	16.34	16.47	16.63	16.71	16.53	16.78	17.13	17.56	17.8
ODE	Oldbridge	0.985	12.8	19.7	26.6	34	41	48	48	48	47.28	47.28
OMA	OMAGH	0.99	44.54	39.65	0	0	0	0	49.65	44.53	26.08	46.75
OUG	Oughtragh	1	19.37	19.48	19.64	19.83	19.92	19.72	20.01	20.42	20.94	21.22
PTN	Pelletstown	0.999	10.55	10.62	10.7	10.8	10.86	10.74	10.9	11.13	11.41	11.56
PLA	Platin	0.95	18	18	18	18	18	18	18	18	18	18
POP	Poppintree	1	21.12	21.24	21.41	21.62	21.72	21.49	21.81	22.27	22.83	23.13
PLS	Portlaoise	0.998	32.67	32.86	33.12	33.44	33.61	33.25	33.74	34.45	35.32	35.79
POT	Pottery Road	0.999	11.87	11.94	12.03	12.15	12.21	12.08	12.26	12.52	12.83	13
BNM	Power Station West	0.99	36.27	32.13	36.67	38.25	38.93	34.75	39.87	35.67	21.01	37.66
RAT (N)	RATHGAEL	0.99	41.06	36.17	0	0	0	0	45.49	41.47	24.58	44.06

Table C-2: Demand Forecasts at Time of Summer Peak

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
RAT	Rathkeale	1	31.19	31.38	31.63	31.93	32.09	31.75	32.22	32.89	33.72	34.17
RIC	Richmond	0.987	29.43	29.6	29.84	30.13	30.27	29.95	30.4	31.03	31.81	32.24
RNW	Rinawade	0.988	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13
BR	Ringsend	1	86.52	87.02	87.71	88.56	88.98	88.05	89.35	91.22	93.52	94.77
ROS	ROSEBANK	0.99	26.62	23.65	0	0	0	0	30.57	27.68	16.36	29.33
RYB	Ryebrook	0.928	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52
SHL	Salthill	0.999	34.15	34.35	34.62	34.96	35.12	34.76	35.27	36.01	36.91	37.41
SCR	Screeb	1	15.07	15.16	15.28	15.43	15.51	15.34	15.57	15.9	16.3	16.51
SKL	Shankill	0.983	40.6	40.84	41.17	41.57	41.77	41.33	41.94	42.82	43.89	44.48
SNG	Singland	0.998	11.44	11.5	11.59	11.71	11.76	11.64	11.81	12.06	12.36	12.53
SLI	Sligo	0.999	40.37	40.61	40.93	41.33	41.52	41.09	41.7	42.57	43.64	44.22
SOM	Somerset	0.991	18.16	18.27	18.41	18.59	18.68	18.49	18.76	19.15	19.63	19.9
SPR	SPRINGTOWN	0.99	25.9	22.77	0	0	0	0	27.91	24.95	14.58	26.13
SVN	Stephenstown	1	7.93	7.98	8.04	8.12	8.16	8.07	8.19	8.37	8.58	8.69
STR (N)	STRABANE	0.99	31.81	28.17	0	0	0	0	35.28	31.63	18.5	33.16
STR	Stratford	0.994	16.89	16.99	17.13	17.29	17.38	17.19	17.45	17.81	18.26	18.51
TNY	Taney	0.999	5.6	5.63	5.68	5.73	5.76	5.7	5.79	5.91	6.05	6.14
TNB	Thornsberry	0.99	25.33	25.48	25.68	25.93	26.06	25.78	26.16	26.71	27.38	27.75
THU	Thurles	0.996	19.92	20.04	20.2	20.39	20.49	20.27	20.57	21	21.53	21.82
TIP	Tipperary	0.991	15.73	15.83	15.95	16.1	16.18	16.01	16.25	16.59	17.01	17.23
TON	Tonroe	0.987	12.25	12.32	12.42	12.54	12.6	12.47	12.65	12.91	13.24	13.42
TBG	Trabeg	1	52.71	53.02	59.02	59.53	59.8	59.23	60.02	61.16	62.56	63.32
TRL	Tralee	0.998	38.17	38.4	38.7	39.08	39.26	38.85	39.43	40.25	41.26	41.82
TRI	Trien	0.998	16.74	16.84	16.97	17.14	17.22	17.04	17.29	17.65	18.1	18.34
TLK	Trillick	0.995	14.95	15.04	15.16	15.3	15.38	15.21	15.44	15.76	16.16	16.38
TRN	Trinity	0.999	8.23	8.28	8.34	8.43	8.47	8.38	8.5	8.68	8.9	9.02
TBR	Tullabrack	0.979	8.64	8.7	8.76	8.85	8.89	8.8	8.93	9.12	9.34	9.47
WLN	Walterstown	0.973	0	0	0	0	37.66	37.36	37.78	38.37	39.09	39.49
WAR	WARINGSTOWN	0.99	51.08	45.17	0	0	0	0	55.78	49.86	29.09	52.14
WAT	Waterford	0.992	43.22	43.48	43.82	44.25	44.46	43.99	44.65	45.58	46.72	47.35
WEX	Wexford	0.999	42.33	42.58	42.92	43.33	43.54	43.09	43.72	44.64	45.76	46.38
WHI	Whitegate	0.87	9	9	9	9	9	9	9	9	9	9
WLT	Wolfe Tone	0.96	20.22	20.34	20.5	20.69	20.79	20.58	20.88	21.32	21.85	22.15
YMD	YellowMeadows	0.99	3.96	6.93	9.9	12.87	15.84	18.8	21.78	24.75	27.72	27.72

Table C-2: Demand Forecasts at Time of Summer Peak												
Code	**Station**	**PF**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
OLD	Oldcourt	0.949	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
CFM	Castlefarm	0.901	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
DFR	Dunfirth	1	7.5	7.55	7.61	7.68	7.72	7.63	7.75	7.91	8.11	8.22
FAS	Fass East	1	44.31	44.57	44.92	45.35	45.57	45.09	45.76	46.72	47.89	48.54
KER	Knockearagh	0.993	30.78	30.96	31.21	31.51	31.66	31.33	31.79	32.46	33.27	33.72
LIB	Liberty St	0.998	17.29	17.39	17.53	17.7	17.78	17.6	17.86	18.23	18.69	18.94
MIL	Milltown	1	15.44	15.52	15.65	15.8	15.87	15.71	15.94	16.27	16.69	16.91
SHE	Shelton Abbey	0.956	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29
Snu	Snugborough	0.998	35.93	40.92	45.9	49.9	52.89	52.89	52.89	52.89	52.89	52.89

Demand Forecasts at Time of Summer Valley

Table C-3: Demand Forecasts at Time of Summer Valley												
Code	**Station**	**PF**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
ADM	Adamstown	0.986	12.5	12.5	12.5	12.5	12.5	12.49	12.49	12.49	12.49	12.49
AGH (N)	AGHYOULE	0.99	6.07	6	6.02	6.22	6.28	6.27	6.28	6.26	3.2	6.44
AHA	Ahane	0.93	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
AIR	Airport Road	0.99	0	0	6.99	7.47	7.8	8.29	8.55	8.75	4.45	9.01
ATN	Airton	0.999	56.94	58.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94	59.94
ANR	Anner	0.897	14	14	14	14	14	14	14	14	14	14
ANT	Antrim	0.98	0	13.17	13.36	13.96	14.19	14.29	14.47	14.64	7.58	15.07
AA	Ardnacrusha	0.998	33.17	33.16	33.14	33.13	33.11	33.1	33.09	33.08	33.07	33.07
ARD	Ardnagappary	0.974	3	3	3	3	3	2.99	2.99	2.99	2.99	2.99
ARI	Arigna	0.906	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
ARK	Arklow	1	22.36	22.35	22.34	22.34	22.33	22.31	22.3	22.3	22.29	22.29
ART	Artane	0.982	3.69	3.69	3.69	3.69	3.68	3.68	3.68	3.68	3.68	3.68
ATH	Athlone	0.982	25.72	25.7	25.69	25.68	25.67	25.65	25.65	25.64	25.63	25.63
ATY	Athy	0.996	6.28	6.28	6.27	6.27	6.27	6.27	6.26	6.26	6.26	6.26
AGN	Aungierstown	0.997	13.98	18.94	20.94	23.93	25.92	28.91	30.91	33.9	35.89	35.89
BEG	Ballybeg	0.978	4.44	4.44	4.44	4.43	4.43	4.43	4.43	4.43	4.43	4.43
BDN	Ballydine	0.992	9.44	9.44	9.44	9.44	9.43	9.43	9.43	9.43	9.43	9.43
BLY	Ballylickey	0.832	5.2	5.2	5.2	5.19	5.19	5.19	5.19	5.19	5.18	5.18
BMA	BALLYMENA	0.99	18.72	18.3	17.8	18.15	17.82	18.09	18.89	18.5	9.56	19.05

Table C-3: Demand Forecasts at Time of Summer Valley

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
BNH	BALLYNAHINCH	0.99	16.61	16.64	16.92	17.74	18.21	18.46	18.86	19.29	10.09	19.86
BGT	Ballyragget	0.977	8.05	8.05	8.05	8.04	8.04	8.03	8.03	8.03	8.03	8.03
BAL	Baltrasna	0.962	5	5	5	4.99	4.99	4.99	4.99	4.99	4.99	4.98
BAN (N)	BANBRIDGE	0.99	11.67	11.69	11.87	12.41	12.71	12.87	13.12	13.39	7	13.79
BCT	Bancroft	0.986	43	43	43	43	43	43	43	43	43	43
BAN	Bandon	1	18.46	18.46	18.45	18.44	18.43	18.42	18.41	18.41	18.41	18.4
BOG	Banoge	1	3	3	3	3	3	2.99	2.99	2.99	2.99	2.99
BAG	Barnageeragh	0.994	14.91	20.87	26.84	32.79	35.78	35.78	35.78	36	35.78	35.78
BRY	Barnahely	0.982	30.3	30.29	30.27	30.27	30.25	30.24	30.22	30.22	30.21	30.21
BNK	Barnakyle	1	18	24	30	36	42	48	54	60	66	66
BDA	Baroda	0.988	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
BAR	Barrymore	0.985	14.27	14.27	14.26	14.25	14.25	14.24	14.23	14.23	14.23	14.23
CEN	BELFAST CENTRAL	0.99	14.17	13.89	13.77	14.23	14.36	14.3	14.29	14.27	7.31	14.7
BK	Bellacorick	0.979	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.92	1.92	1.92
BIN	Binbane	0.995	7.04	7.04	7.03	7.03	7.03	7.02	7.02	7.02	7.02	7.02
BRK	Blackrock	0.954	20.13	20.12	20.11	20.11	20.1	20.09	20.08	20.07	20.07	20.07
BLK	Blake	1	7.06	7.06	7.05	7.05	7.05	7.04	7.04	7.04	7.04	7.04
Blu	Blundelstown	0.95	0	0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
BRI	Brinny	0.971	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95
BUT	Butlerstown	1	14.83	14.83	14.82	14.81	14.81	14.8	14.79	14.79	14.79	14.79
CAB	Cabra	0.954	3.87	3.87	3.87	3.87	3.86	3.86	3.86	3.86	3.86	3.86
CAH	Cahir	1	9.52	9.52	9.51	9.51	9.51	9.5	9.5	9.49	9.49	9.49
CLW	Carlow	0.963	22.29	22.28	22.27	22.26	22.25	22.24	22.24	22.23	22.22	22.22
CAR	CARNMONEY	0.99	11.31	11.2	11.27	11.69	11.86	11.89	11.98	12.04	6.2	12.4
COS	Carrick on Shannon	1	9.02	9.02	9.01	9.01	9.01	9	9	9	8.99	8.99
CKM	Carrickmines	0.998	22.37	22.36	22.35	22.34	22.33	22.32	22.32	22.31	22.3	22.3
CBG	Carrowbeg	0.997	9.66	9.66	9.65	9.65	9.64	9.64	9.64	9.63	9.63	9.63
CBR	Castlebar	1	9	9	8.99	8.99	8.99	8.98	8.98	8.98	8.97	8.97
CFM	Castlefarm	0.901	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
CVI	Castleview	0.992	14.48	14.48	14.47	14.46	14.46	14.45	14.44	14.44	14.44	14.44
CF	Cath_Fall	0.986	6	6	6	5.99	5.99	5.99	5.99	5.98	5.98	5.98
CPK	Central Park	0.978	4.19	4.19	4.19	4.19	4.18	4.18	4.18	4.18	4.18	4.18
CHA	Charleville	0.994	5.74	5.74	5.74	5.73	5.73	5.73	5.73	5.72	5.72	5.72

Table C-3: Demand Forecasts at Time of Summer Valley

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
CHE	Cherrywood	1	6	6	6	5.99	5.99	5.99	5.99	5.98	5.98	5.98
CTY	City West	0.95	10.87	10.87	10.86	10.86	10.85	10.85	10.84	10.84	10.84	10.84
CLG	Cloghran	0.991	71	71	71	71	71	71	71	71	71	71
CLE	Clonee	0.998	127.74	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72	134.72
CLO	Cloon	0.996	11.89	11.89	11.88	11.88	11.87	11.86	11.86	11.86	11.85	11.85
CLU	Clutterland	0.998	37.92	47.9	57.88	67.86	77.84	87.82	97.8	106	115.77	115.77
COL (N)	COLERAINE	0.99	11.5	11.52	11.67	12.15	12.43	12.56	12.8	13.04	6.8	13.43
COL	College Park	0.997	21.56	21.55	21.54	21.53	21.52	21.51	21.5	21.49	21.49	21.49
COO	Cookstown	0.998	23.29	23.29	23.27	23.26	23.25	23.24	23.23	23.23	23.22	23.22
CDG	Coolderrig	1	30	36	38	38	38	38	38	38	38	38
CPS	COOLKEERAGH	0.99	29.79	29.81	29.93	30.39	30.56	30.61	30.71	30.78	25.53	31.1
CLR	Coolroe	1	4.75	4.75	4.75	4.74	4.74	4.74	4.74	4.74	4.74	4.74
CDU	Corduff	0.994	11.42	11.42	11.41	11.41	11.4	11.4	11.39	11.39	11.39	11.39
CKG	Corkagh	0.999	124.88	141.86	155.84	155.84	155.84	155.84	155.84	155.84	155.84	155.84
COW	Cow Cross	1	4	4	4	4	3.99	3.99	3.99	3.99	3.99	3.99
CRA	Crane	0.995	11.71	11.71	11.7	11.7	11.69	11.68	11.68	11.68	11.68	11.68
CRG	CREAGH	0.99	16.26	16.58	17.13	18.2	18.89	19.33	19.87	20.36	10.67	20.97
CRE	CREGAGH	0.99	17.98	18.03	18.97	19.65	19.04	19.55	20.46	20.61	10.2	21.22
CRH	CRUISERATH	0.999	66.93	81.92	96.9	111.89	126.87	141.86	156.84	171.83	171.83	171.83
DAL	Dallow	0.973	4.66	4.66	4.66	4.65	4.65	4.65	4.65	4.65	4.65	4.65
DLT	Dalton_A1	0.991	10.91	10.91	10.9	10.9	10.89	10.89	10.88	10.88	10.88	10.88
DTN	Dardistown	0.95	7	7	6.99	6.99	6.99	6.98	6.98	6.98	6.98	6.98
DND	Darndale	0.994	117.29	121	121	121	121	121	121	121	121	121
DON	DONEGALL	0.99	25.92	25.82	25.7	26.59	26.91	26.84	26.98	27.04	14.01	27.85
DRE	Donore	0.981	0	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.15
DOO	Doon	1	10.27	10.27	10.26	10.26	10.25	10.25	10.24	10.24	10.24	10.24
DRU	Drumline	1	9.27	9.27	9.26	9.26	9.26	9.25	9.25	9.24	9.24	9.24
DRU (N)	DRUMNAKELLY	0.99	24.06	23.94	24.15	25.13	25.61	25.89	26.38	26.91	14.06	27.71
DRY	Drybridge	0.967	29.61	27.94	27.93	27.92	27.91	27.89	27.88	27.87	27.87	27.87
DDK	Dundalk	1	18.93	18.92	18.91	18.91	18.9	18.89	18.88	18.88	18.87	18.87
DFR	Dunfirth	1	3.12	3.12	3.12	3.12	3.12	3.11	3.11	3.11	3.11	3.11
DUN	DUNGANNON	0.99	27.85	27.72	27.95	29.04	29.53	29.65	29.94	30.13	15.53	31.03
DGN	Dungarvan	0.989	14.88	14.88	14.87	14.86	14.86	14.85	14.84	14.84	14.84	14.84

Table C-3: Demand Forecasts at Time of Summer Valley

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
DMY	Dunmanway	0.991	12.93	12.93	12.92	12.91	12.91	12.9	12.9	12.89	12.89	12.89
EDE	EDEN	0.99	10.11	10.03	10.2	10.69	10.96	11.1	11.32	11.55	6.04	11.89
ENN	Ennis	1	16.59	16.59	16.58	16.58	16.56	16.55	16.55	16.55	16.54	16.54
ENN (N)	Enniskillen	0.99	15.63	15.76	16.11	16.9	17.35	17.59	17.95	18.32	9.56	18.87
FAS	Fass East	1	19.69	19.68	19.67	19.67	19.66	19.65	19.64	19.64	19.63	19.63
FIN (N)	FINAGHY	0.99	9.17	9.28	8.91	9.33	9.69	9.87	10.08	9.72	5.06	10.01
F_M	Finglas	0.997	65.04	65.01	64.98	64.96	58.34	58.3	58.29	58.27	58.26	58.26
FTT	Fortunestown	0.999	6.09	6.09	6.08	6.08	6.08	6.08	6.08	6.07	6.07	6.07
GAL	Galway	1	27.03	27.02	27.01	27	26.98	26.97	26.96	26.96	26.95	26.95
GIL	Gilra	0.971	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42	11.42
GLS	Glasmore	0.952	27.85	27.83	27.82	27.81	27.8	27.78	27.77	27.76	27.76	27.76
GLE (N)	GLENGORMLEY	0.99	5.3	5.37	5.42	5.65	5.63	5.66	5.87	5.95	3.11	6.13
GLE	Glenlara	0.997	8.06	8.06	8.05	8.05	8.05	8.04	8.04	8.04	8.04	8.04
GWE	Gortawee	0.988	29.37	29.37	29.36	29.36	29.36	29.36	29.35	29.35	29.35	29.35
GRA	Grange	0.994	22.59	22.58	22.57	22.56	22.55	22.54	22.53	22.53	22.52	22.52
GCA	Grange Castle	1	31.88	31.87	31.86	31.84	31.83	31.81	31.8	31.79	31.79	31.78
GI	Great Island	1	6.87	6.87	6.86	6.86	6.86	6.86	6.85	6.85	6.85	6.85
GRI	Griffinrath	0.997	24.15	24.13	24.12	24.11	18.17	18.16	18.16	18.15	18.15	18.15
HX2	Harolds Cross	0.951	6.27	6.27	6.26	6.26	6.26	6.26	6.25	6.25	6.25	6.25
HEU	Heuston Square	0.989	6.3	6.3	6.29	6.29	6.29	6.29	6.28	6.28	6.28	6.28
IKE	Ikerrin	0.958	10.06	10.06	10.05	10.05	10.04	10.04	10.04	10.03	10.03	10.03
F_I	Inchicore	1	56.55	56.52	56.51	56.49	56.46	56.43	56.42	56.39	56.39	56.39
KYT	Kellystown	0.95	114	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85	116.85
KBY	Kilbarry	1	25.59	25.58	23.92	23.91	23.9	23.89	23.88	23.88	23.87	23.87
KCY	Kilcarbery	0.99	0	3.96	7.92	11.88	15.84	19.8	23.76	27.72	31.68	35.64
KKY	Kilkenny	0.998	15.23	15.22	15.22	15.21	15.21	15.2	15.19	15.19	15.18	15.18
KTN	Killoteran	0.996	5.7	5.7	5.7	5.69	5.69	5.69	5.69	5.68	5.68	5.68
KUD	Kilmahud	0.987	29.61	33.56	35	35	35	35	35	35	35	35
KLP	Kilnap	0.981	0	0	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
KIL	Kilteel	0.99	9.66	9.66	9.65	9.65	9.64	9.64	9.64	9.63	9.63	9.63
KIN	Kinnegad	0.973	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
KGE	Kishoge	0.99	0	2.97	4.95	7.92	9.9	12.87	14.85	17.82	19.8	21.78
KNO	KNOCK	0.99	13.35	13.09	13.06	13.34	13.45	13.42	13.49	13.6	7.04	14

Table C-3: Demand Forecasts at Time of Summer Valley

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
KER	Knockearagh	0.971	15.7	15.7	15.69	15.68	15.68	15.67	15.66	15.66	15.65	15.65
KUR	Knockumber	0.907	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66	23.66
LAZ	Lanesboro_A1	1	5.13	5.13	5.13	5.12	5.12	5.12	5.12	5.12	5.11	5.11
LAR	LARNE	0.99	12.66	12.49	12.73	13.39	13.84	14.22	14.42	14.83	7.8	15.27
LET	Letterkenny	0.988	17.68	17.67	17.67	17.66	17.65	17.64	17.64	17.63	17.63	17.63
LIB	Liberty St	0.991	8.47	8.47	8.46	8.46	8.46	8.45	8.45	8.45	8.44	8.44
LIM (N)	LIMAVADY	0.99	6.46	6.48	6.65	6.84	6.88	7.03	7.28	7.25	3.73	7.47
LIM	Limerick	1	33.84	33.82	45.48	45.47	45.46	45.44	45.43	45.42	45.41	45.41
LMR	LISAGHMORE	0.98	11.17	11.01	11.04	11.43	11.59	0	11.73	11.85	6.13	12.2
LIS (N)	LISBURN	0.99	18.85	18.92	19.29	20.22	20.74	21	21.38	21.81	11.39	22.45
LIS	Lisdrum	0.967	11	11	10.99	10.99	10.98	10.98	10.97	10.97	10.97	10.97
LOG	LOGUESTOWN	0.98	11.13	11.1	11.27	11.8	12.09	0	12.46	12.69	6.62	13.07
MCE	Macetown	0.997	14.91	14.91	14.9	14.9	14.9	14.89	14.89	14.88	14.88	14.88
MAC	Macroom	0.896	9.66	9.66	9.65	9.65	9.64	9.64	9.64	9.63	9.63	9.63
MAL	Mallow	1	8.11	8.11	8.1	8.1	8.1	8.09	8.09	8.09	8.09	8.09
MR	Marina	1	4.34	4.34	4.34	4.33	4.33	4.33	4.33	4.33	4.33	4.33
MTH	Meath Hill	0.988	17.36	17.35	17.35	17.34	17.33	17.32	17.32	17.31	17.31	17.31
MTA	Metro Airport	0.95	0	0	0	0	0	23.75	23.75	23.75	23.75	23.75
MTN	Metro North	0.95	0	0	0	0	0	29.45	29.45	29.45	29.45	29.45
MID	Midleton	0.995	24.19	24.19	24.17	24.16	24.16	24.14	24.13	24.13	24.11	24.11
MIL	Milltown	0.981	6.08	6.08	6.08	6.08	6.07	6.06	6.06	6.06	6.06	6.06
MHL	Misery Hill	0.993	7.1	7.1	7.09	7.09	7.09	7.08	7.08	7.08	7.08	7.08
MON	Monread	0.996	7.33	7.33	7.32	7.32	7.32	7.31	7.31	7.31	7.31	7.31
MTN	Mooretown	0.99	0	0	10.89	18.8	26.73	35	43	51	58.41	58.41
MOY	Moy	0.999	13.53	13.53	13.52	13.51	13.51	13.5	13.5	13.49	13.49	13.49
MLN	Mullagharlin	0.978	6.75	6.75	6.75	6.75	6.75	6.75	6.74	6.74	6.74	6.74
MUL	Mullingar	0.995	17.45	17.45	17.44	17.43	17.42	17.41	17.41	17.41	17.39	17.39
MUN	Mungret A	0.871	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
NAN	Nangor	0.973	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11	11.11
NAV	Navan	0.992	17.77	17.76	17.76	17.75	17.74	17.73	17.73	17.72	17.72	17.72
NNA	Nenagh	0.985	11.41	11.41	11.4	11.4	11.39	11.39	11.38	11.38	11.38	11.38
NEW	Newbridge	0.996	15.04	15.04	15.03	15.02	15.02	15.01	15	15	15	14.99
NBY	Newbury	0.982	32	32	32	32	32	32	32	32	32	32
NEW (N)	NEWRY	0.99	21.64	21.48	21.52	22.37	0	0	23.5	23.66	12.29	24.36

Table C-3: Demand Forecasts at Time of Summer Valley

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
NAR	NEWTOWNARDS	0.99	12.03	12.03	12.2	12.76	0	0	13.36	13.57	7.06	13.97
NQS	North Quays	0.996	10.79	10.79	10.78	10.78	10.77	10.77	10.76	10.76	10.76	10.76
ODE	Oldbridge	0.985	12.8	19.7	26.6	34	41	48	48	48	47.28	47.28
OLD	Oldcourt	0.949	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
OMA	OMAGH	0.99	16.6	16.69	0	0	0	0	18.5	18.73	9.72	19.29
OUG	Oughtragh	0.987	10.57	10.57	10.56	10.56	10.55	10.55	10.54	10.54	10.54	10.54
PTN	Pelletstown	0.975	3.5	3.5	3.5	3.5	3.49	3.49	3.49	3.49	3.49	3.49
PLA	Platin	0.95	18	18	18	18	18	18	18	18	18	18
POP	Poppintree	0.998	7.79	7.79	7.78	7.78	7.78	7.77	7.77	7.77	7.77	7.77
PLS	Portlaoise	0.972	15.61	15.6	15.6	15.59	15.58	15.58	15.57	15.57	15.56	15.56
POT	Pottery Road	1	7.29	7.29	7.28	7.28	7.28	7.27	7.27	7.27	7.27	7.27
BNM	Power Station West	0.99	13.52	13.52	13.66	14.25	14.51	14.62	14.86	15	7.83	15.45
RAT (N)	RATHGAEL	0.99	15.3	15.23	0	0	0	0	16.95	17.45	9.16	17.97
RAT	Rathkeale	0.997	19	18.99	18.98	18.98	18.97	18.96	18.95	18.95	18.94	18.94
RIC	Richmond	0.999	10	10	9.99	9.99	9.98	9.98	9.98	9.97	9.97	9.97
RNW	Rinawade	0.988	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13	9.13
BR	Ringsend	1	45.86	45.85	45.82	45.8	45.79	45.76	45.74	45.74	45.72	45.72
ROS	ROSEBANK	0.99	9.92	9.96	0	0	0	0	11.39	11.64	6.1	11.99
RYB	Ryebrook	0.928	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52	104.52
SHL	Salthill	0.978	13.61	13.61	13.6	13.59	13.59	13.58	13.58	13.57	13.57	13.57
SCR	Screeb	0.926	7	7	6.99	6.99	6.99	6.98	6.98	6.98	6.98	6.98
SKL	Shankill	1	19.48	19.47	19.46	19.46	19.45	19.44	19.43	19.43	19.42	19.42
SHE	Shelton Abbey	0.956	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29
SNG	Singland	0.999	4.84	4.84	4.84	4.83	4.83	4.83	4.83	4.83	4.83	4.83
SLI	Sligo	0.998	19.66	19.65	19.64	19.64	19.63	19.62	19.61	19.61	19.6	19.6
Snu	Snugborough	0.998	35.93	40.92	45.9	49.9	52.89	52.89	52.89	52.89	52.89	52.89
SOM	Somerset	1	11	11	10.99	10.99	10.98	10.98	10.97	10.97	10.97	10.97
SPR	SPRINGTOWN	0.99	9.65	9.59	0	0	0	0	10.4	10.5	5.43	10.81
SVN	Stephenstown	0.979	3.5	3.5	3.5	3.5	3.49	3.49	3.49	3.49	3.49	3.49
STR (N)	STRABANE	0.99	11.85	11.86	0	0	0	0	13.15	13.31	6.89	13.7
STR	Stratford	1	5.93	5.93	5.93	5.92	5.92	5.92	5.92	5.91	5.91	5.91
TNY	Taney	0.994	3.5	3.5	3.5	3.5	3.49	3.49	3.49	3.49	3.49	3.49
TNB	Thornsberry	0.974	11.53	11.53	11.52	11.52	11.51	11.5	11.5	11.5	11.5	11.5
THU	Thurles	0.978	10.42	10.42	10.41	10.41	10.4	10.4	10.39	10.39	10.39	10.39

Table C-3: Demand Forecasts at Time of Summer Valley												
Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
TIP	Tipperary	0.993	10.53	10.53	10.52	10.52	10.51	10.51	10.5	10.5	10.5	10.5
TON	Tonroe	0.994	7.09	7.09	7.08	7.08	7.08	7.07	7.07	7.07	7.07	7.07
TBG	Trabeg	1	26.91	26.9	32.46	32.46	32.45	32.44	32.42	32.41	32.41	32.41
TRL	Tralee	0.977	15.1	15.1	15.09	15.08	15.08	15.07	15.06	15.06	15.06	15.05
TRI	Trien	0.991	6.38	6.38	6.37	6.37	6.37	6.37	6.36	6.36	6.36	6.36
TLK	Trillick	0.984	6.29	6.29	6.28	6.28	6.28	6.28	6.27	6.27	6.27	6.27
TRN	Trinity	0.984	5.49	5.49	5.49	5.48	5.48	5.48	5.48	5.47	5.47	5.47
TBR	Tullabrack	0.921	3.8	3.8	3.8	3.8	3.79	3.79	3.79	3.79	3.79	3.79
WLN	Walterstown	0.973	0	0	0	0	22.02	22.01	22.01	22.01	22	22
WAR	WARINGSTOWN	0.99	19.03	19.02	0	0	0	0	20.79	20.98	10.84	21.6
WAT	Waterford	0.999	21	20.99	20.98	20.98	20.97	20.95	20.95	20.94	20.94	20.94
WEX	Wexford	0.999	20.07	20.06	20.06	20.05	20.04	20.02	20.02	20.01	20.01	20.01
WHI	Whitegate	0.87	9	9	9	9	9	9	9	9	9	9
WLT	Wolfe Tone	0.927	9	9	8.99	8.99	8.99	8.98	8.98	8.98	8.97	8.97
YMD	YellowMeadows	0.99	3.96	6.93	9.9	12.87	15.84	18.8	21.78	24.75	27.72	27.72

Demand Forecasts at Time of Autumn Peak – Northern Ireland only

Table C-4: Demand Forecasts at Time of Autumn Peak – Northern Ireland only												
Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
AGH (N)	AGHYOULE	0.99	18.02	17.81	17.85	18.45	18.64	18.59	18.63	18.57	18.97	19.2
AIR	Airport Road	0.99	0	0	20.74	22.16	23.13	24.6	25.36	25.97	26.42	26.74
ANT	Antrim	0.98	0	39.09	39.64	41.4	42.09	42.41	42.93	43.42	44.99	45.54
BMA	BALLYMENA	0.99	55.56	54.28	52.81	53.84	52.85	53.64	56.06	54.88	56.69	57.38
BNH	BALLYNAHINCH	0.99	49.29	49.36	50.21	52.63	54.03	54.77	55.97	57.22	59.89	60.62
BAN (N)	BANBRIDGE	0.99	34.62	34.68	35.21	36.82	37.72	38.18	38.92	39.73	41.52	42.03
CEN	BELFAST CENTRAL	0.99	42.05	41.22	40.86	42.2	42.61	42.43	42.41	42.34	43.38	43.91
BNM	Belfast North	0.99	40.1	40.13	40.54	42.28	43.04	43.38	44.08	44.51	46.45	47.02
CAR	CARNMONEY	0.99	33.55	33.23	33.43	34.67	35.19	35.27	35.55	35.72	36.81	37.26
COL (N)	COLERAINE	0.99	34.13	34.17	34.61	36.05	36.88	37.28	37.98	38.7	40.37	40.86
CPS	COOLKEERAGH	0.99	29.21	29.25	29.62	30.96	31.47	31.63	31.94	32.13	33.1	33.5
CRG	CREAGH	0.99	48.24	49.19	50.81	53.99	56.05	57.36	58.96	60.41	63.3	64.07
CRE	CREGAGH	0.99	53.34	53.49	56.29	58.3	56.5	58	60.69	61.15	60.49	61.23
DON	DONEGALL	0.99	76.91	76.59	76.25	78.86	79.83	79.63	80.04	80.22	83.11	84.11

Table C-4: Demand Forecasts at Time of Autumn Peak – Northern Ireland only

Code	Station	PF	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
DRU (N)	DRUMNAKELLY	0.99	71.39	71.04	71.66	74.57	75.98	76.81	78.26	79.85	83.39	84.41
DUN	DUNGANNON	0.99	82.64	82.24	82.92	86.15	87.61	87.96	88.83	89.39	92.12	93.24
EDE	EDEN	0.99	29.99	29.76	30.26	31.71	32.52	32.94	33.6	34.27	35.85	36.29
ENN (N)	Enniskillen	0.99	46.38	46.76	47.78	50.12	51.48	52.19	53.27	54.36	56.74	57.43
FIN (N)	FINAGHY	0.99	27.21	27.52	26.44	27.67	28.75	29.29	29.9	28.84	30.03	30.4
GLE (N)	GLENGORMLEY	0.99	15.72	15.94	16.07	16.77	16.72	16.81	17.41	17.66	18.43	18.65
KNO	KNOCK	0.99	39.61	38.85	38.74	39.59	39.92	39.81	40.03	40.34	41.78	42.29
LAR	LARNE	0.99	37.55	37.05	37.77	39.73	41.05	42.18	42.79	43.98	46.31	46.87
LIM (N)	LIMAVADY	0.99	19.18	19.23	19.74	20.28	20.41	20.87	21.59	21.52	22.16	22.42
LMR	LISAGHMORE	0.98	33.13	32.67	32.75	33.91	34.39	34.45	34.8	35.14	36.4	36.84
LIS (N)	LISBURN	0.99	55.93	56.13	57.22	60	61.53	62.32	63.43	64.7	67.56	68.38
LOG	LOGUESTOWN	0.98	33.01	32.92	33.43	35.01	35.87	36.28	36.97	37.65	39.28	39.76
NEW (N)	NEWRY	0.99	64.22	63.73	63.83	66.37	67.49	69.57	69.71	70.18	72.9	73.78
NAR	NEWTOWNARDS	0.99	35.68	35.68	36.21	37.85	38.69	39.05	39.63	40.26	41.91	42.42
OMA	OMAGH	0.99	49.24	49.53	50.16	52.35	53.64	54.14	54.9	55.58	57.67	58.37
RAT (N)	RATHGAEL	0.99	45.39	45.18	45.74	47.73	48.78	49.27	50.3	51.77	54.35	55.01
ROS	ROSEBANK	0.99	29.43	29.54	30.15	31.68	32.59	33.09	33.8	34.55	36.18	36.62
SPR	SPRINGTOWN	0.99	28.64	28.44	28.55	29.81	30.35	30.52	30.86	31.14	32.23	32.62
STR (N)	STRABANE	0.99	35.17	35.19	35.69	37.29	38.12	38.46	39.01	39.48	40.9	41.4
WAR	WARINGSTOWN	0.99	56.47	56.42	57.04	59.45	60.57	60.95	61.67	62.23	64.32	65.1

Appendix D:
Generation Capacity Details

D.1 Generation Capacity Details

Table D-1 lists existing and committed future transmission connected generation, their connection details and the Registered Capacity[1] of each unit as at the data freeze date.

All generation capacity figures in Table D-1 are expressed in exported terms. Exported terms are given by the generation unit output less than the unit's own auxiliary load. The units are grouped in these tables on a geographical basis.

Table D-2 lists the existing and committed future wind generation. The wind generation included in this table is wind generation that feeds into each 110 kV transmission station, from the distribution system. The respective MW capacity over the period of the statement is included. Table D-2 is based on the wind farms that had connection agreements with the DSO at the data freeze date.

Table D-3 lists the existing and committed distribution connected generation, excluding wind generation, as at the data freeze date. Their respective MW capacity over the period of the statement is included.

1 The Registered Capacity of future units will not be known until the unit enters the Integrated Single Electricity Market. Therefore, for future units the Maximum Export Capacity of the unit appears in Table D-1.

MEC of Existing and Committed Transmission-Connected Generation

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Border	Croaghonagh Phase 1	1	Croaghonagh	110 kV	Wind	2024	91.2
	Croaghonagh Phase 2	1	Croaghonagh	110 kV	Wind	2024	48
	Erne Cathleens Fall Hydro (3)	3	Cath_Fall	110 kV	Hydro		22.5
	Erne Cathleens Fall Hydro (4)	4	Cath_Fall	110 kV	Hydro		23
	Erne Cliff Hydro (1)	1	Cliff	110 kV	Hydro		10
	Erne Cliff Hydro (2)	2	Cliff	110 kV	Hydro		10
	Garvagh - Glebe (1a)	1	Garvagh	110 kV	Wind		26
	Garvagh - Tullynahaw (1c)	1	Garvagh	110 kV	Wind		22
	Glen Solar	1	Aghaleague	110 kV	solar	2025	40
	Golagh (1) 12 MW wind	1	Golagh	110 kV	Wind		12
	Golagh repower 60 MW wind	3	Golagh	110 kV	Wind	2026	60
	Lenalea	1	Lenalea	110 kV	Wind	2024	30.5
	Meentycat (1)	1	Meentycat	110 kV	Wind		52.9
	Meentycat (1)	2	Meentycat	110 kV	Wind		18.06
	Meentycat (2)	3	Meentycat	110 kV	Wind		14
	Mully Graffy	1	Tievebrack	110 kV	Wind	2025	29.9
	Mulreavy (1)	1	Mulreavy	110 kV	wind		82
	Spaddan (1)	1	Cath_Fall	110 kV	Wind		17.5
	Firlough WF	1	Firlough	110 kV	Wind	2027	48.3
	Firlough Windfarm	2	Firlough	110 kV	Wind	2027	27.3
	Kingsmountain (1)	1	Cunghill	110 kV	Wind		23.75
	Kingsmountain (2)	2	Cunghill	110 kV	Wind		11.05
	Ardagh South Energy Storage Facility	1	Meath Hill	110 kV	Battery	2025	60
	Bellewstown (Platin OCGT)	1	Bellewstown	110 kV	Gas	2026	57
	Monvallet Battery	1	Louth	220 kV	Battery	2026	133.5
	Monvallet Solar	1	Louth	220 kV	Solar	2026	50
	Mountain Lodge (1)	2	Ratrussan	110 kV	Wind		24.8

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Border	Mountain Lodge (3)	3	Ratrussan	110 kV	Wind		5.82
	Oriel (1) offshore	OS	Oriel	220 kV	Wind	2027	210
	Oriel (2) offshore	2	Oriel	220 kV	Wind	2029	160
	Ratrussan (1a)	1	Ratrussan	110 kV	Wind		48
	Border Area Total						**1469.08**
Dublin	Nangor	1	Nangor	110 kV	CHP		5.4
	Nangor	1	Nangor	110 kV	CHP		8
	Poolbeg (1)	1	Poolbeg North	220 kV	Gas/Oil		115
	Poolbeg (2)	2	Poolbeg North	220 kV	Gas/Oil		115
	Poolbeg (3)	3	Poolbeg North	220 kV	Gas/Oil		255
	Dublin Array offshore	1	Dublin Array Jamestown	220 kV	Wind	2027	824
	Kish Battery (Crag)	1	Oaklands	110 kV	Battery	2026	114
	North Arklow Battery 30 MW	2	Killinskyduff	110 kV	Battery	2026	30
	North Arklow Solar 47 MW	1	Killinskyduff	110 kV	Solar	2026	47.11
	Ballymakaily	1	Grange Castle	110 kV	Gas	2024	57.6
	Blundelstown	1	Blundelstown	110 kV	Solar		60
	Cloncreen Battery	2	Kilcumber	110 kV	Battery		25
	Cloncreen Wind farm	1	Kilcumber	110 kV	Wind		75
	Clonfad Solar	1	Clonfad	110 kV	solar	2025	100
	Clonin North Solar Farm	1	Derryiron	110 kV	Solar	2026	47
	Codling 1 offshore	1	Codling 1	220 kV	Wind	2027	483
	Codling 2 offshore	1	Codling 1	220 kV	Wind	2027	483
	Codling 3 offshore	1	Codling 1	220 kV	Wind	2027	483
	Corduff Flex	1	Corduff	220 kV	distillate	2024	63.5
	Cushaling ESPS	2	Philipstown	110 kV	Battery	2024	20
	Cushaling Wind Farm	1	Philipstown	110 kV	Wind	2024	50
	Derrygreenagh 100 MW	1	Derrygreenagh	220 kV	Gas	2029	100
	Dooray Wind Farm	1	Portlaoise	110 kV	Wind	2025	45.001
	Dublin Bay Power	1	Irishtown	220 kV	Gas		422.1

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Dublin	East Laois Solar extension	2	Coolnabacky	380 kV	solar	2025	25
	East West Interconnector	1	Woodland	380 kV	interconnector		500
	Edenderry Peaking	3	Cushaling	110 kV	distillate		58.274
	Edenderry Peaking	5	Cushaling	110 kV	distillate		58.274
	Edenderry Power	1	Cushaling	110 kV	Peat		133.5
	Fieldstown Solar	1	Finglas	220 kV	Solar	2026	75
	Fieldstown Solar extension 1	2	Finglas	220 kV	solar	2026	18.27
	Gallanstown Solar	1	Gallanstown	110 kV	Solar		119
	Garr Battery	1	Derryiron	110 kV	Battery	2026	50
	Garr Solar	1	Derryiron	110 kV	Solar	2026	85
	Glanbia Ballyraggett CHP (1)	1	Ballyragget	110 kV	CHP		7.5
	Greener Ideas	1	Baldonnell	110 kV	Gas Fired Reciprocating Engines	2025	100
	Harlockstown Solar	1	Gallanstown	110 kV	Solar	2025	31.6
	Harristown Solar PV	1	Harristown	110 kV	Solar	2025	42.3
	Huntstown (1)	CT	Huntstown	220 kV	Gas		236.2
	Huntstown (1)	ST	Huntstown	220 kV	Gas		123
	Huntstown (2)	2	Huntstown	220 kV	Gas		412
	Huntstown BES	B1	Huntstown	220 kV	Battery	2026	10
	Huntstown TEG - 110 tail from Finglas	1	Finglas	220 kV	Gas		50
	Kilshane	1	CRUISERATH	220 kV	Gas	2024	293
	Liffey Hydro (1)	1	Pollaphuca	110 kV	Hydro		15
	Liffey Hydro (2)	2	Pollaphuca	110 kV	Hydro		15
	Loughteague	1	Coolnabacky	380 kV	solar	2025	55
	Moanvane	1	Bogtown	110 kV	Wind	2024	56.4
	Mountlucas (1)	1	Mount Lucas	110 kV	Wind		79.2
	NISA Belcamp offshore	1	NISA Belcamp	220 kV	Wind	2027	500
	North Wall TEG	1	North Wall	220 kV	Gas		32.24
	North Wall TEG	2	North Wall	220 kV	Gas		32.24

Table D-1: MEC of Existing and Committed Transmission-Connected Generation							
Area	**Generation station**	**Unit ID**	**Connected at**		**Fuel type**	**Connection year (if future)**	**Maximum export capacity (MW)**
Dublin	North Wall TEG	3	North Wall	220 kV	Gas		32.24
	North Wall TEG	4	North Wall	220 kV	Gas		32.24
	North Wall TEG	5	North Wall	220 kV	Gas		32.24
	North Wall TEG	6	North Wall	220 kV	Gas		32.24
	PBEGG_BESS	1	Poolbeg North	220 kV	Battery		75
	PBEGG_FLEX	1	Poolbeg North	220 kV	distillate		63.5
	Porterstown Battery Storage Facility	1	Kilteel	110 kV	Battery		30
	Porterstown BS Facility Ph.2	2	Kilteel	110 kV	Battery	2025	60
	Rathlockstown Solar will be TG553	1	Gallanstown	110 kV	Solar	2025	18.9
	Rhode PCP (1)	1	Derryiron	110 kV	Distillate		52.1
	Rhode PCP (2)	2	Derryiron	110 kV	Distillate		52.1
	Ringsend Flex at Irishtown	1	Irishtown	220 kV	distillate		63.5
	Shellybanks Combined Cycle	14	Shellybanks	220 kV	Gas/DO		150
	Shellybanks Combined Cycle	15	Shellybanks	220 kV	Gas/DO		150
	Shellybanks Combined Cycle	16	Shellybanks	220 kV	Gas/DO		173.1875
	Southbank Pbeg OCGT T-4 2026-27	1	SOUTHBANK	220 kV	Gas	2026	300
	SouthWall BESS at Irishtown	1	Irishtown	220 kV	Battery		30
	Timahoe North	1	Timahoe	110 kV	solar	2024	70
	Yellow River Wind Farm	1	Derryiron	110 kV	Wind	2026	110.2
	Timahoe North	1	Timahoe	110 kV	solar	2024	70
	Yellow River Wind Farm	1	Derryiron	110 kV	Wind	2026	110.2
	Dublin Area Total						**8883.1565**

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Mid-East	Garballagh 2 Solar	1	Garballagh	110 kV	Solar	2026	48
	Gaskinstown	1	Deenes	110 kV	Solar	2024	85
	Gillinstown Solar	1	Garballagh	110 kV	Solar		95
	Gorman Battery Energy Storage	1	Gorman	110 kV	Battery		50
	Lisdrumdoagh Energy Storage Facility	1	Lisdrum	110 kV	Battery		60
	Manusmore Solar	1	Drumline	110 kV	Solar	2026	60
	Milltown Solar	1	Balruntagh	110 kV	solar	2026	115
	Arklow Banks 2 offshore Glenart	1	Glenart	220 kV	Wind	2027	800
	Raheenleagh (1)	1	Arklow	220 kV	Wind		35.2
	Turlough Hill (1)	1	Turlough Hill	220 kV	Pumped Storage Hydro		73
	Turlough Hill (2)	2	Turlough Hill	220 kV	Pumped Storage Hydro		73
	Turlough Hill (3)	3	Turlough Hill	220 kV	Pumped Storage Hydro		73
	Turlough Hill (4)	4	Turlough Hill	220 kV	Pumped Storage Hydro		73
	Mid-East Area Total						**1640.2**

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Midlands	Lanesboro (2)	2	Lanesboro_A1	110 kV	Peat		40
	Lanesboro (3)	3	Lanesboro_A1	110 kV	Peat		45
	Blackwater Bog Solar 1	1	Derrylahan	110 kV	solar	2025	65
	Cloghan Wind Farm	1	Derrycarney	110 kV	Wind	2024	34
	Clondardis Solar	1	Shanonagh	110 kV	Solar	2026	58.6
	Coole Wind Farm	1	Lickny	110 kV	Wind	2024	88
	Coole Wind Farm extension	2	Lickny	110 kV	Wind	2024	9.5
	Cuilleen OCGT	1	Cuilleen	110 kV	Gas Fired Reciprocating Engines	2025	100
	Derryadd Battery	1	Rappareehill	110 kV	Battery	2026	16
	Derryadd Wind Farm	1	Rappareehill	110 kV	Wind	2026	90
	Drehid	1	Mulgeeth	110 kV	Wind	2026	60
	Lumcloon Batt	1	Derrycarney	110 kV	Battery		100
	Pinewoods Wind Farm	1	Garrintaggart	110 kV	Wind	2026	49.5
	Shannonbridge 1 TEG	1	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 2 TEG	2	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 3 TEG	3	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 4 TEG	4	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 5 TEG	5	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 6 TEG	6	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 7 TEG	7	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge 8 TEG	8	Shannonbridge	220 kV	Gas	2024	38.75
	Shannonbridge ESS	1	Shannonbridge	220 kV	Battery		100
	Shannonbridge ESS	1	Shannonbridge	220 kV	Battery	2024	63.2
	Sliabh Bawn (1)	1	Sliabh Bawn	110 kV	Wind		58
	Stonestown	1	Stonestown	110 kV	Wind	2026	105
	Tynagh	CT	Tynagh	220 kV	Gas		268
	Tynagh	ST	Tynagh	220 kV	Gas		142
	Castlelost	1	Castlelost	220 kV	Gas	2025	55
	Castlelost	2	Castlelost	220 kV	Gas	2025	55

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
Midlands	Castlelost	3	Castlelost	220 kV	Gas	2025	55
	Drumlins Park Wind Farm	1	Lislea	110 kV	Wind	2024	48.9
	Meenwaun	1	Dallow	110 kV	Wind		9.99
	Midlands Area Total						**2025.69**

Mid-West	Bruckana (1)	1	Lisheen	110 kV	Wind		39.6
	Cappagh White B - TG41 - 13.18 MW	1	Cauteen	110 kV	Wind		13.18
	Erkina Solar	1	Timoney	110 kV	Solar	2025	66.56
	Erkina Solar	2	Timoney	110 kV	solar	2025	90
	Kill Hill (1)	1	Kill Hill	110 kV	Wind		36
	Lisheen (1)	1	Lisheen	110 kV	Wind		36
	Lisheen (1a)	2	Lisheen	110 kV	Wind		19
	Lisheen 3	1	Lisheen	110 kV	Wind		28.8
	Ballywater (1)	1	Ballywater	110 kV	Wind		31.5
	Ballywater (2)	2	Ballywater	110 kV	Wind		10.5
	Mid-West Area Total						**371.14**

Northern Ireland	Ballylumford	C	Ballylumford	275 kV	Gas		178
	Ballylumford 10	D	Ballylumford	275 kV	Gas		100
	Ballylumford 31	A	Ballylumford	275 kV	Gas		161
	Ballylumford 32	B	Ballylumford	275 kV	Gas		161
	Ballylumford GT1	7	Ballylumford	275 kV	Gas		58
	Ballylumford GT2	8	Ballylumford	275 kV	Gas		58
	Castlereagh BS Lisnabreeny	CB	CASTLEREAGH	275 kV	Battery		50
	ColinGlen_BES	1		275 kV	battery	2027	75
	Coolkeeragh GT	GT	COOLKEERAGH	275 kV	Gas		260
	Coolkeeragh GT8	8	COOLKEERAGH	275 kV	synchronous compensator		53
	Coolkeeragh ST	ST	COOLKEERAGH	275 kV	Gas		170

Table D-1: MEC of Existing and Committed Transmission-Connected Generation							
Area	**Generation station**	**Unit ID**	**Connected at**		**Fuel type**	**Connection year (if future)**	**Maximum export capacity (MW)**
Northern Ireland	GEN_KILR_G3	3	KILROOT	275 kV	Distillate		42
	GEN_KILR_G4	4	KILROOT	275 kV	Distillate		42
	HERON_BES	1		110 kV	battery	2026	100
	KELLS_BES Connor	KL	KELLS	275 kV	Battery		50
	KIL_OCGT6	6	KILROOT	275 kV	Gas	2024	350
	KIL_OCGT7	7	KILROOT	275 kV	Gas	2024	350
	RENEW_COLE 33.000	DB	COLERAINE	110 kV	Wind		42
	RENEW_DRUMQ 33.000	PT	Curraghamulkin	110 kV	Wind	2026	51.6
	TAMN_BES Drumkee	DK	TAMNAMORE	275 kV	Battery		50
	TAND_BES Mulavilly	MV	TANDRAGEE	275 kV	Battery		50
	TBESS	1		110 kV	battery	2027	50
	WIND_BROCK	BR	BROCKAGHBOY	110 kV	Wind		47.5
	WIND_CORLACKY	CH	GARVAGH NI	110 kV	Wind	2025	47.3
	WIND_CURR 33.00	CM	Curraghamulkin	110 kV	Wind	2026	42
	Northern Ireland Area Total						**2638.4**
South-East South-East	Castlebanny	1	Kilvinoge	110 kV	Wind	2026	136.8
	Garreenleen Solar	1	Kellis	220 kV	Solar	2026	81
	Grahormick Solar Farm	1	Grahomick	110 kV	Solar	2026	54.8
	Great Island CCGT	1	Great Island	220 kV	Gas		464
	GreenLink	1	Loughtown	220 kV	interconnector	2024	504
	Kilmannock 2 Battery	1	Great Island	220 kV	Battery	2026	90
	Rosspile Battery	1	Rosspile	110 kV	Battery	2024	100
	Rosspile Solar Farm	1	Rosspile	110 kV	Solar		95
	Tomsallagh	1	Effernoge	110 kV	Solar	2026	50
	Tracystown Solar Park	1	Dennistown	110 kV	Solar	2026	101.1
	Tullabeg Phase 2	1	Tullabeg	110 kV	Solar	2026	105
	Tullabeg Solar Park	1	Tullabeg	110 kV	Solar		50
	Rathnaskilloge	1	Rathnaskilloge	110 kV	solar	2024	95
	South-East Area Total						**1926.7**

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
South -West	Aghada Peaking	5	Aghada	220 kV	Distillate		52.1
	Tarbert G5 OCGT T-4 2026-27	1	Tarbert	220 kV	Gas	2026	300
	Alumina CHP (1)	3	Aughinish	110 kV	CHP		86
	Alumina CHP (1)	4	Aughinish	110 kV	CHP		86
	Athea (1) - a	1	Athea	110 kV	Wind		34.35
	Ballinknockane Solar Farm	1	Ballinknockane	110 kV	Solar	2025	50
	Ballyroe Solar	1	Charleville	110 kV	Solar	2026	120
	Banemore Solar Farm	1	Clahane	110 kV	Solar	2024	34
	Boggeragh (1)	1	Boggeragh	110 kV	Wind		57
	Boggeragh (2)	1	Boggeragh	110 kV	Wind		65.7
	Castlepook (1)	1	Charleville	110 kV	Wind		10
	Castlepook (2)	2	Charleville	110 kV	Wind		24
	Clahane (1)	1	Clahane	110 kV	Wind		37.8
	Clahane (2)	1	Clahane	110 kV	Wind		13.8
	Coomacheo (1)	1	Garrow	110 kV	Wind		41.225
	Coomagearlahy (1)	1	Coomagearlahy	110 kV	Wind		42.5
	Coomagearlahy (2)	TW	Coomagearlahy	110 kV	Wind		8.5
	Coomagearlahy (3)	TW	Coomagearlahy	110 kV	Wind		30
	Coumaclovane Solar Extension	1	Glanlee	110 kV	Solar	2025	7
	Drombeg Solar Park	1	Drombeg	110 kV	Solar	2025	50
	Glanlee (1)	1	Glanlee	110 kV	Wind		12.8
	Glanlee (1)	2	Glanlee	110 kV	Wind		17
	Grousemount	1	Coomataggart	110 kV	Wind		114.2
	Kelwin Battery	1	Kilpaddoge	220 kV	Battery		27
	Kelwin Wind	1	Kilpaddoge	220 kV	Wind		37
	Knockacummer (1)	TW	Knockacummer	110 kV	Wind		105
	Knockfinglas	1	Glansillagh	220 kV	Gas	2028	600
	Moneypoint (1)	1	Moneypoint	380 kV	Coal		307.9
	Moneypoint (2)	2	Moneypoint	380 kV	Coal		307.9
	Moneypoint (3)	3	Moneypoint	380 kV	Coal		307.9

Table D-1: MEC of Existing and Committed Transmission-Connected Generation							
Area	**Generation station**	**Unit ID**	**Connected at**		**Fuel type**	**Connection year (if future)**	**Maximum export capacity (MW)**
South -West	Moneypoint WF	4	Moneypoint	380 kV	Wind		17.25
	Tarbert 5 TEG	1	Oldpier	220 kV	Distillate	2024	50
	Tarbert 6 TEG	1	Oldpier	220 kV	Distillate	2024	50
	Tarbert 7 TEG	1	Oldpier	220 kV	Distillate	2024	50
	Tobertoreen Battery 11 MW	1	Tobertoreen	110 kV	Battery		11
	Tobertoreen Wind 23.15 MW TG319a and TG319b	1	Tobertoreen	110 kV	Wind		23.15
	Ballinrea Solar Park	1	Castletreasure	110 kV	Solar	2025	55
	Ballyvouskill Battery Storage	1	Ballyvouskill	220 kV	battery	2027	80
	Carbery Milk Products CHP (1)	5	Dunmanway	110 kV	Biogas		6
	Carrigdangan phase 1 54.3 MW	1	Carrigdangan	110 kV	Wind		54.3
	Carrigdangan phase 2 13.5 MW	2	Carrigdangan	110 kV	Wind	2024	13.6
	Knocknamork Solar	2	Coomnaclohy	110 kV	Solar	2026	12
	Knocknamork Wind	1	Coomnaclohy	110 kV	Wind	2026	42
	Lee Carrigadrohid Hydro (1)	3	Carrigadrohid	110 kV	Hydro		8
	Lee Inniscarra Hydro (1)	1	Iniscarra	110 kV	Hydro		15
	AD2	1	Aghada	220 kV	Gas		442.06
	Aghada (11)	11	Aghada	220 kV	Gas/DO		90
	Aghada (12)	12	Aghada	220 kV	Gas/DO		90
	Aghada (14)	14	Aghada	220 kV	Gas/DO		90
	Aghada BESS 1	1	Aghada	220 kV	Battery		19
	Aghada BESS 2	1	Aghada	220 kV	Battery		159
	Ballyvatta Solar extension	1	Ballynabrannagh	110 kV	Solar	2026	16.3
	Celtic Interconnector	1	Celtic	380 kV	Interconnector	2026	700
	Lysaghtstown PH2	1	Lysaghtstown	110 kV	Solar	2026	60
	Lysaghtstown Solar	1	Lysaghtstown	110 kV	Solar	2024	87
	Monatooreen Solar	1	Ballynabrannagh	110 kV	Solar	2026	25.7
	Whitegen	1	Glanagow	220 kV	Gas		449
	South-West Area Total						**5702.035**

Table D-1: MEC of Existing and Committed Transmission-Connected Generation

Area	Generation station	Unit ID	Connected at		Fuel type	Connection year (if future)	Maximum export capacity (MW)
West	Ardderoo Extension	2	Buffy	110 kV	Wind	2024	18
	Ardderoo Wind Farm	1	Buffy	110 kV	Wind		91.2
	Ballymoneen Solar	1	Cashla	220 kV	Solar	2026	100
	Barnacurragh Solar	1	Cloon	110 kV	Solar	2026	50
	Killala (1)	1	Tawnaghmore	110 kV	Wind		19.2
	Killala (2)	2	Tawnaghmore	110 kV	Battery		10.8
	Knockranny (Ferry View)	1	Ferry View	110 kV	Wind	2026	47.3
	Laghtanvack Bellacorick OCGT 1	1	Laghtanvack	110 kV	Gas	2026	57
	Laghtanvack Bellacorick OCGT 1	2	Laghtanvack	110 kV	Gas	2026	57
	Oweninney (1)	1	Bellacorick	110 kV	Wind		89
	Oweninney (2)	2	Bellacorick	110 kV	Wind		83
	Oweninney (3)	5	Bellacorick	110 kV	Wind	2024	50
	Seecon (1)	1	Knockranny	110 kV	Wind		108
	Sheskin 33 MW TG33 and DG186	1	Bellacorick	110 kV	Wind	2025	32.9
	Tawnaghmore Peaking Plant	1	Tawnaghmore	110 kV	Diesel		52.3
	Tawnaghmore Peaking Plant	1	Tawnaghmore	110 kV	Diesel		52.3
	Ardnacrusha Hydro (1)	1	Ardnacrusha	110 kV	Hydro		21
	Ardnacrusha Hydro (2)	2	Ardnacrusha	110 kV	Hydro		22
	Ardnacrusha Hydro (3)	3	Ardnacrusha	110 kV	Hydro		19
	Ardnacrusha Hydro (4)	4	Ardnacrusha	110 kV	Hydro		24
	Booltiagh (1)	1	Booltiagh	110 kV	Wind		19.45
	Booltiagh (2)	1	Booltiagh	110 kV	Wind		12
	Boolynagleragh (1)	1	Booltiagh	110 kV	Wind		36.98
	Carrownagowan Wind Farm	1	Caherhurly	110 kV	Wind	2026	91.2
	Derrybrien (1)	1	Derrybrien	110 kV	Wind		59.5

Table D-1: MEC of Existing and Committed Transmission-Connected Generation							
Area	**Generation station**	**Unit ID**	**Connected at**		**Fuel type**	**Connection year (if future)**	**Maximum export capacity (MW)**
West	Knockalassa	TW	Ennis	110 kV	Wind		26.875
	Skerd Rocks offshore	1	Moneypoint	380 kV	Wind	2027	450
	Sorrell Island	1	Booltiagh	110 kV	Wind		24
	West Area Total						**1724.005**

Existing and Committed Distribution-Connected Wind Farm Capacity

Table D-2: Existing and Committed Distribution-Connected Wind Farm Capacity

Area	110 kV Station	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Border	Ardnagappary	22.94	22.94	22.94	22.94	22.94	22.94	22.94	22.94	22.94	22.94
	Arigna	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
	Binbane	58.9	70.2	77.4	77.4	77.4	77.4	77.4	77.4	77.4	77.4
	Cath_Fall	29.4	29.4	66.9	66.9	66.9	66.9	66.9	66.9	66.9	66.9
	Corderry	63.253	63.253	79.603	79.603	79.603	79.603	79.603	79.603	79.603	79.603
	Garvagh	34	34	34	34	34	34	34	34	34	34
	Gortawee	3	3	8	8	8	8	8	8	8	8
	Letterkenny	40.27	60.27	60.27	60.27	60.27	60.27	60.27	60.27	60.27	60.27
	Sorne Hill	63.25	63.25	63.25	63.25	63.25	63.25	63.25	63.25	63.25	63.25
	Trillick	44.69	44.69	44.69	44.69	44.69	44.69	44.69	44.69	44.69	44.69
	Bellacorick	42.9	75.8	80.79	80.79	80.79	80.79	80.79	80.79	80.79	80.79
	Castlebar	50.44	50.44	50.44	50.44	50.44	50.44	50.44	50.44	50.44	50.44
	Cloon	4.25	4.25	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23
	Dalton_A1	43.35	43.35	43.35	43.35	43.35	43.35	43.35	43.35	43.35	43.35
	Glenree	77.3	77.3	77.3	77.3	77.3	77.3	77.3	77.3	77.3	77.3
	Moy	6	6	6	6	6	6	6	6	6	6
	Salthill	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1
	Screeb	3	3	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99
	Sligo	13.65	13.65	17.73	17.73	17.73	17.73	17.73	17.73	17.73	17.73
	Tawnaghmore	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
	Tonroe	12.04	12.04	17.03	17.03	17.03	17.03	17.03	17.03	17.03	17.03
G	Drybridge	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
G	Dundalk	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
G	Lisdrum	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1
G	Meath Hill	68.698	68.698	68.698	68.698	68.698	68.698	68.698	68.698	68.698	68.698
G	Shankill	28.017	28.017	28.017	28.017	28.017	28.017	28.017	28.017	28.017	28.017
Midlands	Athlone			5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
	Lanesboro_A1	4.6	9.55	9.55	9.55	9.55	9.55	9.55	9.55	9.55	9.55
	Richmond			4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
	Somerset	7.65	7.65	7.65	7.65	7.65	7.65	7.65	7.65	7.65	7.65
West	Ardnacrusha	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16	8.16
	Booltiagh	93.369	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77	122.77
	Tullabrack	31	31	31	31	31	31	31	31	31	31

Table D-2: Existing and Committed Distribution-Connected Wind Farm Capacity

Area	110 kV Station	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
South-West	Boggeragh	43.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35
	Charleville	70.699	70.699	70.699	70.699	70.699	70.699	70.699	70.699	70.699	70.699
	Cloghboola	54.549	54.549	54.549	54.549	54.549	54.549	54.549	54.549	54.549	54.549
	Coomataggart	42.64	42.64	42.64	42.64	42.64	42.64	42.64	42.64	42.64	42.64
	Cordal	57.75	57.75	57.75	57.75	57.75	57.75	57.75	57.75	57.75	57.75
	Drombeg		25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2
	Garrow	14.99	14.99	14.99	14.99	14.99	14.99	14.99	14.99	14.99	14.99
	Glenlara	66.8	66.8	66.8	66.8	66.8	66.8	66.8	66.8	66.8	66.8
	Kilpaddoge	18	18	18	18	18	18	18	18	18	18
	Knockearagh	13.85	13.85	13.85	13.85	13.85	13.85	13.85	13.85	13.85	13.85
	Oughtragh	9	9	9	9	9	9	9	9	9	9
	Rathkeale	32.49	32.49	32.49	32.49	32.49	32.49	32.49	32.49	32.49	32.49
	Reamore	83.15	83.15	83.15	83.15	83.15	83.15	83.15	83.15	83.15	83.15
	Tralee	47.56	47.56	47.56	47.56	47.56	47.56	47.56	47.56	47.56	47.56
	Trien	72.8	72.8	72.8	72.8	72.8	72.8	72.8	72.8	72.8	72.8
	Ballylickey	59.77	59.77	59.77	59.77	59.77	59.77	59.77	59.77	59.77	59.77
	Bandon	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
	Dunmanway	56.06	56.06	57.06	57.06	57.06	57.06	57.06	57.06	57.06	57.06
	Macroom	24	24	24	24	24	24	24	24	24	24
Midlands	Barrymore	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4
	Cauteen	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16	174.16
	Dallow	21.04	21.04	26.03	26.03	26.03	26.03	26.03	26.03	26.03	26.03
	Ikerrin	35.95	35.95	35.95	35.95	35.95	35.95	35.95	35.95	35.95	35.95
	Lisheen	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6
	Nenagh	13.99	13.99	14.69	14.69	14.69	14.69	14.69	14.69	14.69	14.69
	Thurles	41.8	41.8	41.8	41.8	41.8	41.8	41.8	41.8	41.8	41.8
	Tipperary	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
	Upperchurch		84	84	84	84	84	84	84	84	84

Table D-2: Existing and Committed Distribution-Connected Wind Farm Capacity

Area	110 kV Station	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
East	Arklow	53.2	53.2	93.19	93.19	93.19	93.19	93.19	93.19	93.19	93.19
	Ballyragget			45	45	45	45	45	45	45	45
	Carlow	34.74	34.74	55.74	55.74	55.74	55.74	55.74	55.74	55.74	55.74
	Crane	7.49	7.49	7.49	7.49	7.49	7.49	7.49	7.49	7.49	7.49
	Lodgewood	60.162	60.162	60.162	60.162	60.162	60.162	60.162	60.162	60.162	60.162
	Waterford	18.53	18.53	18.53	18.53	18.53	18.53	18.53	18.53	18.53	18.53
	Wexford	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9
South	Barnahely	2	2	2	2	2	2	2	2	2	2
	Kilbarry	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
	Midleton	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	Butlerstown	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	Dungarvan	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
Dublin	Glasmore	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Portlaoise	9.2	54.201	54.201	54.201	54.201	54.201	54.201	54.201	54.201	54.201

Table D-2: Existing and Committed Distribution-Connected Wind Farm Capacity											
Area	**110 kV Station**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Northern Ireland	AGHYOULE	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5
	Antrim	1.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7
	BALLYMENA	53.75	53.75	53.8	53.75	64.35	64.35	64.35	64.35	64.35	64.35
	BROCKAGHBOY	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
	Cam								81.1	81.1	81.1
	CARNMONEY	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
	COLERAINE	108	108	108	108	108	108	108	108	108	108
	COOLKEERAGH	12	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2	49.2
	CREAGH	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98
	Curraghamulkin	67.9	67.9	67.9	161.5	161.5	161.5	161.5	161.5	161.5	161.5
	DRUMNAKELLY	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	DUNGANNON	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
	EDEN	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	Enniskillen	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9	31.9
	GARVAGH NI	73.9	90	137	137.3	137.3	137.3	137.3	137.3	137.3	137.3
	GORT	67.5	119.1	119	119.1	119.1	119.1	119.1	119.1	119.1	119.1
	KELLS				23.1	23.1	23.1	23.1	23.1	23.1	23.1
	KILLYMALLAGHT	35.7	35.7	35.7	35.7	88.7	88.7	88.7	88.7	88.7	88.7
	LARNE	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1
	LIMAVADY	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7
	LISAGHMORE	15	15	15	15	15	15	15	15	15	15
	LOGUESTOWN	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
	MAGHERAKEEL	119.2	138	138	138	138	138	138	138	138	138
	NEWRY		16	16	16	16	16	16	16	16	16
	OMAGH	125.7	125.7	126	125.7	125.7	125.7	125.7	125.7	125.7	126
	RASHARKIN	54.8	54.8	54.8	54.8	76.3	76.3	76.3	76.3	76.3	76.3
	SLIEVE KIRK	73.6	73.6	73.6	73.6	73.6	73.6	73.6	73.6	73.6	73.6
	STRABANE	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
	TREMOGUE	77.15	77.15	77.2	77.15	77.15	77.15	77.15	77.15	77.15	77.15

Existing and Committed Distribution-Connected Generation (excluding wind)

Table D-3: Existing and Committed Distribution-Connected Generation (excluding wind)

Station	type	area	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Binbane	Hydro	Border	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Bellacorick	Wave			10	10	10	10	10	10	10	10	10
Cloon	Solar			24	28.99	28.99	28.99	28.99	28.99	28.99	28.99	28.99
Dalton_A1	Battery		12	12	12	12	12	12	12	12	12	12
Dalton_A1	Solar				4	4	4	4	4	4	4	4
Tawnaghmore	Battery		10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
Tawnaghmore	Biomass		49	49	49	49	49	49	49	49	49	49
Tonroe	Biogas / AD		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Drybridge	Biomass		20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22
Drybridge	LFG		6.224	6.224	6.224	6.224	6.224	6.224	6.224	6.224	6.224	6.224
Drybridge	Solar			15.98	15.98	15.98	15.98	15.98	15.98	15.98	15.98	15.98
Dundalk	Solar				3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99
Meath Hill	Biogas		3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Meath Hill	CHP		1	1	1	1	1	1	1	1	1	1
Navan	Biomass		13	13	13	13	13	13	13	13	13	13
Navan	Solar		4	13	16.45	16.45	16.45	16.45	16.45	16.45	16.45	16.45
Shankill	LFG		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Shankill	Solar			4	11	11	11	11	11	11	11	11
Drybridge	Biomass		20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22	20.22
Athlone	LFG	Midalnds	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Athlone	Solar				8	8	8	8	8	8	8	8
Carrick on Shannon	Solar			4	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Lanesboro_A1	Solar			4	4	4	4	4	4	4	4	4
Mullingar	Solar		4	12	33.84	33.84	33.84	33.84	33.84	33.84	33.84	33.84
Richmond	Solar		8	12	12	12	12	12	12	12	12	12
Somerset	Solar			4	8	8	8	8	8	8	8	8
Baltrasna	Solar		10	10	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14
Ardnacrusha	Solar	West			4	4	4	4	4	4	4	4
Drumline	Solar		12	12	12	12	12	12	12	12	12	12
Ennis	Solar				19	19	19	19	19	19	19	19
Glenlara	Solar	South-West		4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Knockearagh	Biomass		3	3	3	3	3	3	3	3	3	3

Table D-3: Existing and Committed Distribution-Connected Generation (excluding wind)

Station	type	area	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Knockearagh	Solar		8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99	8.99
Limerick	Solar			4	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Mallow	Solar				9.94	9.94	9.94	9.94	9.94	9.94	9.94	9.94
Oughtragh	Solar			4	4	4	4	4	4	4	4	4
Rathkeale	Biogas		0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Rathkeale	CHP		6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Rathkeale	LFG		3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Tralee	Solar			13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9
Trien	Solar		4	4	4	4	4	4	4	4	4	4
Bandon	Solar			20.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Dunmanway	Biogas		6	6	6	6	6	6	6	6	6	6
Macroom	Solar		4	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
Ahane	Solar				8	8	8	8	8	8	8	8
Ballydine	Solar			5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Barrymore	Solar			15	15	15	15	15	15	15	15	15
Cahir	Solar			31	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3
Doon	Hydro			0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865
Doon	Solar		8	8	12.99	12.99	12.99	12.99	12.99	12.99	12.99	12.99
Nenagh	Solar				4	4	4	4	4	4	4	4
Tipperary	Solar				4	4	4	4	4	4	4	4
Arklow	Biomass	East	1	1	1	1	1	1	1	1	1	1
Arklow	Offshore Wind		25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2
Arklow	Solar		10	10	42	42	42	42	42	42	42	42
Ballybeg	LFG		4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
Ballybeg	Solar		8	8	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
Ballyragget	Solar				39.99	39.99	39.99	39.99	39.99	39.99	39.99	39.99
Banoge	Battery		9	9	9	9	9	9	9	9	9	9
Banoge	Solar		4	8	8	8	8	8	8	8	8	8
Carlow	Solar				13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Crane	Battery		16	16	16	16	16	16	16	16	16	16
Crane	Solar		5	5	5	5	5	5	5	5	5	5
Great Island	Battery				30	30	30	30	30	30	30	30
Great Island	Solar		4.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99
Kilkenny	Solar			8	62	62	62	62	62	62	62	62

Table D-3: Existing and Committed Distribution-Connected Generation (excluding wind)

Station	type	area	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Lodgewood	Solar			20	20	20	20	20	20	20	20	20
Waterford	Solar		9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99
Wexford	Biogas / AD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Wexford	Solar		12.93	12.93	12.93	12.93	12.93	12.93	12.93	12.93	12.93	12.93
Barnahely	Solar	South			7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45
Castleview	Biogas / AD			4	4	4	4	4	4	4	4	4
Castleview	CHP		2	2	2	2	2	2	2	2	2	2
Coolroe	Solar			10	10	10	10	10	10	10	10	10
Cow Cross	Solar			4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Kilbarry	Solar		4.95	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Midleton	Solar		3.94	3.94	14.89	14.89	14.89	14.89	14.89	14.89	14.89	14.89
Trabeg	Solar			4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Athy	Solar	Dublin			4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
Ballyragget	CHP		7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Blackrock	CHP		0.554	0.554	0.554	0.554	0.554	0.554	0.554	0.554	0.554	0.554
Blake	LFG		4.999	4.999	4.999	4.999	4.999	4.999	4.999	4.999	4.999	4.999
Derryiron	Battery				37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5
Dunfirth	Solar		14	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5	31.5
Fin_rural	CHP		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Finglas	Gas Engines + Battery				25	25	25	25	25	25	25	25
Finglas	Solar			8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42	8.42
Glasmore	CHP		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Glasmore	Solar			4	43.99	43.99	43.99	43.99	43.99	43.99	43.99	43.99
Grange Castle	OCGT		115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2
Griffinrath	Hydro		4	4	4	4	4	4	4	4	4	4
Griffinrath	Solar			34.5	59.8	59.8	59.8	59.8	59.8	59.8	59.8	59.8
Inchicore	Battery		30	30	30	30	30	30	30	30	30	30
Kilteel	LFG + Diesel		9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.77
Kilteel	Solar			15	15	15	15	15	15	15	15	15
Monread	Solar			8	8	8	8	8	8	8	8	8
Newbridge	Solar			12	12	12	12	12	12	12	12	12
Poppintree	Biogas		4	4	4	4	4	4	4	4	4	4
Portlaoise	Biogas		1.065	1.065	1.065	1.065	1.065	1.065	1.065	1.065	1.065	1.065
Portlaoise	Solar			4	4	4	4	4	4	4	4	4

Table D-3: Existing and Committed Distribution-Connected Generation (excluding wind)

Station	type	area	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Ringsend	CHP		74.5	74.5	74.5	74.5	74.5	74.5	74.5	74.5	74.5	74.5
Stephenstown	Battery		8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Thornsberry	Biomass			9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Thornsberry	Solar			5.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Butlerstown	Solar	South-East		3.95	36.65	36.65	36.65	36.65	36.65	36.65	36.65	36.65
Dungarvan	Solar			3.99	51.93	51.93	51.93	51.93	51.93	51.93	51.93	51.93
Antrim	solar	Northern Ireland	12.615	12.615	32.615	27.62	34.672	34.672	34.672	34.672	34.672	12.615
Ballylumford	Gas		716	716	716	716	716	716	716	716	716	716
BALLYMENA	Solar		6	6	6	6	6	6	6	6	6	6
BALLYNAHINCH	Battery			12	12	12	12	12	12	12	12	
BALLYVALLAGH	battery						50	50	50	50	50	
BANBRIDGE	Battery			12.224	12.224	12.224	12.224	12.224	12.224	12.224	12.224	
CASTLEREAGH	Battery		50	50	50	50	50	50	50	50	50	50
COLERAINE	synchronous compensator						-3.5	-3.5	-3.5	-3.5	-3.5	
COOLKEERAGH	Bio		17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
COOLKEERAGH	Gas		430	430	430	430	430	430	430	430	430	430
COOLKEERAGH	synchronous compensator		53	53	53	53	49.75	49.75	49.75	49.75	49.75	53
GARVAGH NI	CHP				3.6	3.6	3.6	3.6	3.6	3.6	3.6	
HANNAHSTOWN	battery						75	75	75	75	75	
KELLS	Battery		50	50	50	50	50	50	50	50	50	50
KILROOT	Distillate		84	84	84	84	84	84	84	84	84	84
KILROOT	Gas		58	758	758	758	758	758	758	758	758	58
LISBURN	Solar		58.85	58.85	58.85	58.85	58.85	58.85	58.85	58.85	58.85	58.85
NEWTOWNARDS	Solar		4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
RASHARKIN	Solar		35.019	35.019	35.019	35.019	35.019	35.019	35.019	35.019	35.019	35.019
Rosebank	Bio		9.98	9.98	9.98	9.98	9.98	9.98	9.98	9.98	9.98	9.98
SCOTLAND	interconnector		500	500	500	500	500	500	500	500	500	500
TAMNAMORE	Battery		50	50	50	150	150	150	150	150	150	50
TANDRAGEE	Battery		50	50	50	50	50	50	50	50	50	50
TREMOGUE	Solar				12.85	12.85	12.85	12.85	12.85	12.85	12.85	
Waringstown	Solar		9	9	9	9	9	9	9	9	9	9

Appendix E: Short Circuit Currents

E.1 Background of Short Circuit Currents

The main driver for calculating short circuit current levels is safety. All transmission system equipment must be capable of carrying very high currents. These high currents typically occur in the event of a short circuit fault. In particular, circuit breakers must be capable of closing onto a fault and opening to isolate a fault.

Their correct operation minimises risk to human life and prevents damage to transmission system equipment. It is also crucial for maintaining transmission system stability, security and quality of supply.

Short circuit current levels also give an indication of the electrical strength of the transmission system at each station. This provides an indication of the suitability of a station for connection of 'voltage sensitive' equipment.

A station with a high short circuit current level will be more attractive to these types of load. This is due to strong generation infeeds minimising distortions in voltage and frequency caused by transmission system disturbances. Similarly, generators will have less difficulty to ride through faults and maintain stability when connected to stations with high short circuit current levels.

Short circuit current levels vary across the transmission system. They are affected by the transmission system topology, system impedance and the available short circuit contribution from rotating machines (i.e. generators and large motors). Changes in the transmission system topology or the addition/retirement of generation units can bring about an increase/reduction in the short circuit current levels on the transmission system. Similarly, seasonal variations in generation dispatches and demand levels combined with possible transmission system sectionalising or plant outages will result in variations of short circuit current levels at different locations. To ensure safe and reliable operation of the transmission system and customer's equipment at all times, two types of short circuit current level calculations are carried out:

- Maximum short circuit current levels are required for the specification of transmission system equipment and for connections to the transmission system. Plant in substations is typically subjected to the most onerous short circuit currents. The high capital costs of HV equipment means that it is important to predict the maximum short circuit current the equipment may see in its lifetime, and this must be specified to a rating above the maximum expected short circuit current level. Also, for customers, the design and specification of equipment at lower voltage levels will depend on the short circuit level at the transmission connection point.
- Minimum short circuit current levels are required to guarantee reliable and coordinated operation of protection systems or to assess the suitability of a station for the connection of 'voltage sensitive' equipment. Minimum short circuit current levels are also required at the design stage of generation plants to ensure fault ride through capabilities are in accordance with Grid Code requirements.

The Nature of Short Circuit Currents

The plot in Figure E-1 shows a typical short circuit current waveform. Short circuit current is normally made up of a symmetrical AC component, with a decay rate, and a DC offset component, which has a much faster decay rate. The combination of AC and DC components results in an asymmetrical current waveform.

While the AC component is always present in the short circuit current, the DC offset is dependent on the instant that the fault occurs within the voltage waveform. For the purposes of this document, it is assumed that the fault occurs at the instant of maximum DC offset in the short circuit current.

The DC component of a short circuit current decays exponentially. Its rate of decay is influenced by the individual ratios of the reactance (X) to the resistance (R) of the paths back to the generators feeding power to the fault (the X/R ratio). Transmission nodes where large generators can have high X/R ratios, may have a slower decay time for the DC component of the short circuit current.

The AC component of a short circuit current also decays with time. This is due to the changes in the synchronous generators internal reactance and, thus, the AC reduction effect is more pronounced in the vicinity of large generation plants.

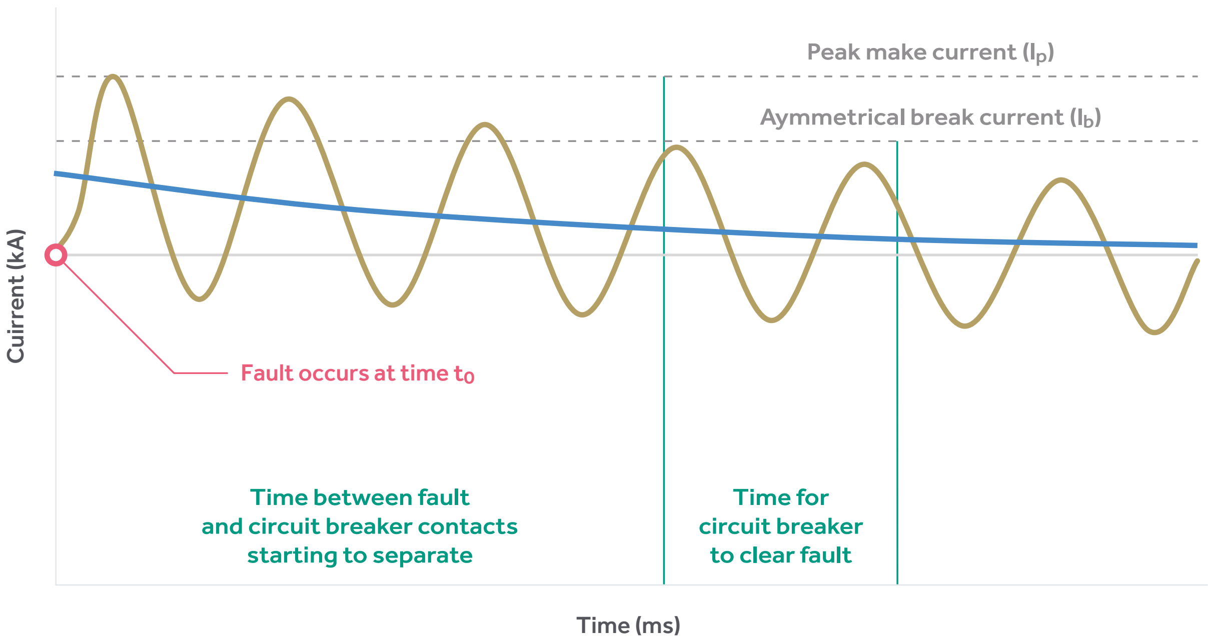


Figure E-1: Typical Short Circuit Current

The internal impedance of a synchronous generator is not constant after the start of the fault. It increases progressively and the short circuit current contribution becomes weaker, passing through three characteristic stages:

- Subtransient: (approx. 0.01 to 0.1 sec). Short-circuit current (RMS value of the AC component) is high: 5 to 10 times permanent rated current. This is called sub-transient short-circuit current, Ik''.
- Transient: (between 0.1 and 1 sec). Short-circuit current (RMS value of the AC component) drops to between 2 and 6 times rated current. This is called transient short-circuit current, Ik'.
- Continuous: Short-circuit current (RMS value of the AC component) drops to between 0.5 and 2 times rated current. This is called steady-state short-circuit current, Ik.

Duty of Circuit Breakers

Over the duration of a fault the switchgear has to be able to withstand two events, namely the fault initiation and then the fault clearance. The short circuit currents at these two instances are referred to as the make current and the break current respectively.

(i) The make current (Ip) is the maximum instantaneous current that the circuit breaker is called to withstand. The initiation of a fault causes an instantaneous peak current which results in the generation of electromechanical forces along the busbars and transmission lines. An example of such a fault initiation would be a circuit breaker energising a line that is still earthed following maintenance, hence the term make current.

Make current is expressed in peak values and is comprised of an AC and a DC component. Essentially, the make current is the maximum instantaneous peak of the short circuit current waveform. This will occur at approximately 10 milliseconds (ms) after the instant of fault (see Figure E-1), whether the fault is energised through a circuit breaker or it spontaneously occurs on the transmission system. Circuit breakers are typically rated approximately 2.5 times higher for make duty than for break duty, as per IEC 62271-100 standard.

(ii) After the fault initiation, there is a time period during which the protection scheme will identify the fault, make a decision and then instruct the relevant circuit breaker to open to interrupt the fault. This could take anything from 10 ms in modern fast protection systems to 60 ms in older systems. At this point the circuit breaker begins to open and it takes a certain time period before the contacts actually separate, normally around two cycles or 40 ms in modern switchgear equipment. The total time from the start of the fault until the breaker opening or fault clearance time can vary from 50 ms to 120 ms, depending on the protection system. In some cases, if main protection fails and back-up main protection is not installed, clearance times can be considerably longer than 120 ms.

At the point of physical separation, the short circuit current forms an arc and the thermal energy generated by this arc has to be dissipated as the short circuit current is interrupted. The short circuit current when this interruption occurs is referred to as the break current, Ib.

This value is expressed in RMS (root mean square) terms and is comprised of an AC component and a DC component. Circuit breakers designed and tested in accordance with the IEC 62271-100 standard can interrupt any short circuit current up to its rated breaking current containing any AC component up to the rated value and, associated with it, any percentage DC component up to that specified (typically 30%).

The duty of the circuit breaker is calculated from the make and break current as a percentage of the circuit breaker rating.

E.2 Short Circuit Current Calculation Methodology

Engineering Recommendation G74 has been applied to all short circuit studies reported in this document. Some of the general assumptions applied include:

- Short circuit level contribution from loads has been considered following G74 recommendations. The demand at each node is assumed to contribute 1 MVA of induction motor fault infeed per MW of load. A constant X/R ratio of 2.76 is assumed for all of the loads; and
- A break time of 50 ms is assumed typical for the circuit breakers at 110 kV, 220 kV, 275 kV and 400 kV. A break time of 80 ms is used for the circuit breakers at 110 kV stations in Ireland.

Winter Peak study results give an indication of the maximum prospective short circuit current levels on the transmission system. For winter peak studies, all generators have been included in the calculations. A merit order economic dispatch has been initially used, and to enable maximum short circuit current level to be calculated, any generators that were not dispatched have been switched in with 0 MW output, thus contributing to short circuit current levels.

Summer Night Valley study results give an indication of the minimum short circuit current levels to be expected on the transmission system under normal transmission system operating conditions (i.e. maintenance outages are not considered in this section[1]). For summer night valley studies, only generators dispatched on a merit order are considered in the model.

E.3 Short Circuit Currents in Ireland

Methodology used in Ireland

Short circuit current levels are calculated in accordance with the UK Engineering Recommendation G74, which is a computer based analysis, based on the International Standard IEC60909. Compliance with G74 includes:

- Short circuit contributions from rotating plant, including induction motors embedded in the general load;
- Comprehensive plant parameters including impedances, transformer winding and earthing configurations;
- Pre-fault voltage levels at each node which should be obtained from a credible, pre-fault load flow study; and
- Pre-fault transformer tap settings should also be obtained from the load flow study.

The short circuit current level network model includes the following component parameters:

- Transformer impedance variation with tap position;
- Zero sequence mutual coupling effect;
- Saturated generator reactance values; and
- Power station auxiliaries short circuit current level contributions.

The calculation of the X/R ratios, used by EirGrid, is undertaken in accordance with IEC60909-0 Method B. Method B is currently considered to be the most appropriate general purpose method for calculating DC short circuit currents in the transmission system of Ireland.

The transmission system of Ireland is designed and operated to maintain RMS break short circuit levels in accordance with EirGrid Grid Code CC.8.6. A summary of these requirements is set out in Table E-1. In designing the system, a 10% safety margin is applied.

It should be noted that the EirGrid Grid Code stipulates that short circuit current levels at designated stations in Ireland may be allowed to increase to 31.5 kA. If necessary, the equipment at these stations is to be modified or replaced in order to comply with this new rating.

Circuit breakers with a higher rating than the current levels may be necessary for a number of reasons, including, but not limited to the need to provide an adequate safety margin or to cater for a high DC component in the short circuit current.

1 Minimum fault levels including maintenance outages are currently provided to generator applicants wishing to connect to the transmission system as part of the connection offer process to allow developers to design the plant in accordance with the Grid Code requirements.

Table E-1: Ireland Short Circuit Current Levels Specified in the Grid Code		
Voltage Level		**Short Circuit Current Levels (kA)**
400		50
220		40
110	Countrywide	25
	Designated sites	31.5

Analysis

The total RMS break current at a busbar is an indication of the short circuit current level that one could expect at that point in the transmission system. However, they do not necessarily represent the short circuit current that could flow through each individual breaker, which may be lower.

Ireland Short Circuit Current Level

Tables E-2 to E-4 list subtransient (Ik''), transient (Ik') currents and X/R ratios for single-phase to earth and balanced three-phase faults for transmission system busbars of Ireland. These are presented for maximum winter peak and minimum summer valley intact system demand conditions for 2024, 2027 and 2030. From these values, the relevant currents required to assess circuit breaker duty can be derived using the following equations:

- Peak make current (Ip)

$$I_p = \sqrt{2} \cdot \left[1.02 + 0.98 \cdot e^{-3 \cdot \frac{R}{X}} \right] \cdot I_k''$$

- AC component (IRMS_AC_b) of short-circuit current at a selected time of break (tb)

$$I_{RMS\_AC\_b} = I_k' + \left(I_k'' - I_k' \right) \cdot e^{-\frac{t_b}{40ms}}$$

- DC component (IDC_b) of short-circuit current at a selected time of break (tb)

$$I_{DC\_b} = \sqrt{2} \cdot I_k'' \cdot e^{-2 \cdot \pi \cdot 50 \cdot t_b \cdot \frac{R}{X}}$$

- Break current (Ib) at a selected time of break (tb)

$$I_b = \sqrt{I_{DC\_b}^2 + I_{RMS\_AC\_b}^2}$$

Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Adamstown 110 kV	13.96	12.49	11.34	10.49	16.45	15.76	14.26	17.08	15.27	9.94	21.67	20.63
Agannygal 110 kV	3.03	5.69	5.09	4.26	4.52	4.39	2.93	6.29	5.70	4.20	4.90	4.77
Aghada 110 kV	4.81	8.53	8.02	5.78	9.98	9.74	4.75	9.97	9.46	5.79	11.34	11.12
Aghada A 220 kV	10.67	12.34	11.01	11.82	16.63	15.76	14.77	20.23	17.89	16.02	24.86	23.56
Aghada B 220 kV	10.67	12.34	11.01	11.82	16.63	15.76	14.77	20.23	17.89	16.02	24.86	23.56
Aghada C 220 kV	10.44	12.02	10.75	10.66	16.17	15.34	13.88	19.42	17.24	12.97	23.88	22.67
Aghada D 220 kV	10.67	12.34	11.01	11.82	16.63	15.76	14.77	20.23	17.89	16.02	24.86	23.56
Ahane 110 kV	4.99	12.61	11.40	5.81	10.07	9.80	4.93	14.60	13.43	5.81	11.05	10.82
Anner 110 kV	3.99	6.51	6.05	4.54	4.70	4.62	3.91	7.17	6.65	4.50	4.95	4.87
Ardnacrusha 110 kV	5.46	14.24	12.54	6.75	15.16	14.46	6.02	18.10	16.04	7.59	17.85	17.13
Ardnagappary 110 kV	3.04	2.25	2.13	4.30	1.31	1.30	3.02	2.41	2.26	4.29	1.37	1.35
Arigna 110 kV	4.67	7.66	7.00	5.79	5.89	5.76	4.54	8.33	7.66	5.72	6.27	6.14
Arklow 110 kV	10.92	8.71	8.17	11.60	10.54	10.27	11.04	9.79	9.20	11.84	11.74	11.45
Arklow 220 kV	9.24	7.55	7.16	10.47	6.94	6.83	9.09	8.77	8.43	10.57	7.80	7.71
Artane 110 kV	13.57	10.82	10.12	6.05	12.91	12.57	13.22	13.53	12.41	5.56	15.79	15.25
Arva 110 kV	4.04	9.69	8.80	5.21	7.23	7.07	3.94	10.41	9.52	5.15	7.61	7.45
Athea 110 kV	12.23	8.97	7.80	12.42	8.58	8.19	12.36	9.74	8.66	12.48	9.06	8.72
Athlone 110 kV	3.92	6.90	6.54	5.33	5.27	5.21	4.12	8.27	7.71	5.53	5.90	5.80
Athy 110 kV	3.31	5.94	5.69	4.51	4.82	4.77	3.14	6.38	6.05	4.39	5.03	4.96
Aughinish 110 kV	8.25	10.19	9.05	10.21	10.88	10.41	8.07	10.72	9.69	10.06	11.14	10.74
Aungierstown 110 kV	15.14	18.25	16.22	13.53	25.30	23.92	15.59	20.93	19.14	12.92	28.75	27.56
Ballyadam 110 kV	3.67	8.98	8.38	4.68	9.01	8.80	3.51	10.39	9.76	4.58	10.04	9.84
Ballybeg 110 kV	9.79	6.39	6.13	9.94	7.50	7.39	9.99	7.19	6.87	10.13	8.32	8.17
Ballydine 110 kV	4.01	7.13	6.67	3.77	5.58	5.49	3.90	7.93	7.42	3.69	5.96	5.86
Ballylickey 110 kV	3.07	3.71	3.37	4.12	2.13	2.09	3.01	3.98	3.63	4.10	2.24	2.20
Ballynahulla 110 kV	15.99	10.88	9.33	15.49	12.47	11.72	17.19	12.30	10.92	16.14	13.73	13.10
Ballynahulla 220 kV	9.57	9.80	8.67	10.20	10.78	10.28	9.51	11.55	10.58	10.17	12.20	11.81
Ballyragget 110 kV	4.42	3.03	2.92	5.87	2.14	2.13	4.63	3.54	3.31	6.13	2.33	2.29

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Ballyvouskill 110 kV	14.02	11.41	9.82	14.62	13.49	12.68	15.03	12.99	11.53	15.37	15.02	14.31
Ballyvouskill 220 kV	9.44	9.91	8.74	10.41	11.95	11.32	9.39	11.73	10.70	10.43	13.70	13.19
Ballywater 110 kV	5.55	6.34	6.07	3.12	6.20	6.11	5.67	6.97	6.66	3.09	6.78	6.67
Baltrasna 110 kV	6.19	10.55	10.02	7.20	8.77	8.65	6.01	11.63	11.09	7.12	9.39	9.27
Bancroft 110 kV	12.24	11.66	10.84	6.82	13.56	13.18	12.38	13.41	12.53	6.63	15.31	14.91
Bandon 110 kV	3.17	6.59	6.03	4.30	6.28	6.10	3.05	7.43	6.79	4.21	6.81	6.62
Banoge 110 kV	6.52	6.24	5.99	7.18	6.06	5.98	6.54	6.81	6.54	7.23	6.48	6.40
Barnageeragh 110 kV	8.71	19.23	17.32	8.62	24.88	23.77	8.78	23.24	21.04	8.74	29.36	28.12
Barnahealy A 110 kV	4.62	11.47	10.49	5.34	11.98	11.60	4.53	13.91	12.83	5.31	13.84	13.47
Barnahealy B 110 kV	6.17	11.31	10.37	6.84	11.63	11.28	6.25	13.59	12.56	6.94	13.35	13.00
Barnakyle 110 kV	14.64	18.00	16.02	13.45	24.43	23.14	15.24	20.72	18.96	13.88	28.03	26.90
Baroda 110 kV	4.11	8.62	8.16	4.94	9.80	9.60	3.96	10.00	9.35	4.83	10.94	10.67
Barrymore 110 kV	3.78	7.62	7.06	4.89	4.47	4.41	3.67	8.50	7.93	4.84	4.78	4.72
Belcamp 110 kV	36.16	7.30	6.64	28.89	9.18	8.82	39.57	7.99	7.36	31.07	10.50	10.12
Belcamp 220 kV	12.40	19.05	16.74	9.96	22.69	21.49	11.89	26.33	23.49	9.32	30.13	28.77
Belgard 110 kV	11.77	12.25	11.28	6.56	15.09	14.58	11.86	14.17	13.07	6.36	17.19	16.62
Bellacorick 110 kV	4.09	4.48	4.23	5.11	6.49	6.32	5.16	6.01	5.66	6.28	8.61	8.37
Binbane 110 kV	4.95	5.03	4.56	6.81	4.43	4.31	5.11	5.57	5.05	7.05	4.69	4.56
Blackrock 110 kV	9.94	12.38	11.41	2.45	11.81	11.51	9.82	14.44	13.08	2.34	13.10	12.72
Blake 110 kV	4.04	7.92	7.53	5.05	5.32	5.26	3.88	8.96	8.46	4.98	5.75	5.68
Blundelstown 110 kV	4.14	8.13	7.83	5.20	8.63	8.53	3.99	8.97	8.68	5.10	9.25	9.15
Boggeragh 110 kV	6.85	8.64	7.36	8.07	8.31	7.86	6.68	9.41	8.17	7.95	8.86	8.45
Bogtown 110 kV	3.99	6.10	5.87	4.37	7.11	7.00	3.85	7.08	6.75	4.27	8.02	7.87
Booltiagh 110 kV	6.76	8.08	7.18	8.55	6.44	6.24	6.60	8.73	7.90	8.46	6.72	6.55
Bracetown 220 kV	12.78	18.71	16.58	8.85	19.67	18.81	12.20	24.71	22.41	8.17	24.49	23.67
Brinny A 110 kV	3.04	5.87	5.42	4.15	5.14	5.02	2.94	6.57	6.06	4.08	5.54	5.42
Brinny B 110 kV	3.04	5.89	5.45	4.15	5.17	5.05	2.94	6.60	6.09	4.08	5.58	5.46
Butlerstown 110 kV	6.28	10.34	9.65	6.44	10.29	10.05	6.43	12.43	11.56	6.64	11.95	11.67
Cabra 110 kV	12.52	10.45	9.79	4.91	11.59	11.31	12.08	13.00	11.94	4.51	13.94	13.51

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Cahir 110 kV	4.39	8.94	8.03	5.63	7.01	6.82	4.30	9.77	8.81	5.58	7.20	7.01
Carlow 110 kV	5.60	7.99	7.47	6.30	8.44	8.24	5.70	9.44	8.69	6.46	9.58	9.31
Carrickalangan 110 kV	4.91	8.18	6.99	5.80	9.68	9.07	5.12	9.17	7.89	6.10	10.60	9.98
Carrickmines 220 kV	13.60	17.87	15.86	7.93	21.82	20.73	14.76	24.51	22.12	7.33	28.52	27.35
Carrickmines A 110 kV	29.07	11.38	10.69	21.20	12.48	12.20	34.28	13.31	12.41	22.74	14.16	13.80
Carrickmines B 110 kV	23.67	12.94	11.98	18.86	15.45	14.99	27.01	15.03	13.99	20.22	17.64	17.14
Carrick-on-Shannon 110 kV	4.35	11.37	10.38	5.12	12.13	11.75	4.20	12.65	11.59	5.01	13.21	12.81
Carrigadrohid 110 kV	6.75	13.32	11.76	6.97	12.30	11.81	6.62	15.57	14.00	6.88	13.71	13.27
Carrigdangan 110 kV	3.65	5.44	5.04	5.04	6.01	5.84	3.54	5.91	5.52	4.94	6.38	6.23
Carrowbeg 110 kV	2.77	2.87	2.70	3.78	2.57	2.52	2.74	3.19	2.98	3.76	2.73	2.68
Cashla 110 kV	7.48	16.19	14.45	7.63	20.60	19.61	7.38	19.54	17.52	7.61	24.02	22.93
Cashla 220 kV	8.76	9.48	8.80	9.68	9.88	9.62	8.54	12.26	11.50	9.71	11.80	11.56
Castlebagot 110 kV	15.44	18.35	16.30	15.09	25.66	24.24	16.25	21.16	19.33	15.91	29.56	28.31
Castlebagot 220 kV	8.60	18.44	16.25	8.58	21.66	20.56	8.06	24.05	21.83	8.16	27.09	26.08
Castlebar 110 kV	3.43	5.13	4.68	4.03	5.09	4.94	3.42	5.99	5.46	3.99	5.50	5.34
Castledockrill 110 kV	7.65	7.77	7.38	4.20	8.51	8.35	7.95	8.61	8.20	4.18	9.35	9.18
Castlefarm A 110 kV	7.43	9.80	8.74	8.89	10.10	9.70	7.26	10.31	9.34	8.76	10.37	10.02
Castlefarm B 110 kV	7.44	9.78	8.73	8.90	10.09	9.69	7.27	10.29	9.33	8.77	10.35	10.01
Castleview 110 kV	3.92	11.51	10.55	4.51	8.62	8.43	3.75	13.77	12.74	4.43	9.65	9.47
Cathaleen's Fall 110 kV	4.84	9.74	8.47	5.72	9.93	9.46	5.56	12.13	10.38	6.42	11.35	10.78
Cauteen 110 kV	5.87	8.39	7.28	6.74	4.77	4.63	5.79	9.13	8.00	6.71	5.03	4.91
Central Park 110 kV	14.26	10.42	9.83	7.48	11.20	10.97	14.61	12.08	11.32	7.33	12.60	12.31
Charleville 110 kV	4.81	6.80	6.19	6.52	5.97	5.81	4.72	7.40	6.75	6.47	6.26	6.10
Cherrywood 110 kV	10.28	9.63	9.12	7.34	9.83	9.65	10.22	11.10	10.44	7.21	10.97	10.75
City West 110 kV	5.93	7.63	7.11	6.38	6.49	6.36	5.28	9.53	8.70	5.99	7.51	7.32
CKM Country 110 kV	23.67	12.94	11.98	18.86	15.45	14.99	27.01	15.03	13.99	20.22	17.64	17.14
Clahane 110 kV	4.21	7.70	7.07	5.23	6.74	6.58	4.20	8.66	8.04	4.17	8.96	8.73
Clashavoon 220 kV	9.33	10.18	9.03	10.08	11.54	11.00	9.24	12.30	11.25	10.05	13.40	12.95
Clashavoon A 110 kV	8.13	16.24	13.90	8.44	19.94	18.65	7.96	19.12	16.76	8.28	22.98	21.74

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						**Winter**					
	Three phase			**Single phase**			**Three phase**			**Single phase**		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Clashavoon B 110 kV	8.13	16.24	13.90	8.44	19.94	18.65	7.96	19.12	16.76	8.28	22.98	21.74
Cliff 110 kV	4.27	7.18	6.47	5.52	6.61	6.41	4.76	8.80	7.82	6.06	7.37	7.12
Cloghboola 110 kV	7.31	7.38	6.81	10.56	7.82	7.60	7.22	7.95	7.47	10.53	8.01	7.84
Cloghboola 110 kV	7.31	7.38	6.81	10.56	7.82	7.60	7.22	7.95	7.47	10.53	8.01	7.84
Clogher 110 kV	4.86	9.24	7.72	5.65	9.95	9.30	5.06	10.41	8.77	5.89	10.73	10.08
Cloghran 110 kV	8.94	19.97	17.93	8.84	25.77	24.58	9.06	24.28	21.90	9.02	30.55	29.22
Cloncreen 110 kV	6.06	10.09	9.31	6.99	12.31	11.91	6.79	12.93	11.66	7.89	14.69	14.11
Clonee 220 kV	13.17	18.98	16.80	9.67	20.12	19.22	12.66	25.17	22.79	9.02	25.15	24.29
Clonkeen A 110 kV	5.64	6.11	5.72	6.78	4.29	4.23	5.58	6.67	6.30	6.75	4.58	4.52
Clonkeen B 110 kV	4.86	9.63	8.23	3.60	10.79	10.14	4.61	10.76	9.45	3.44	11.82	11.24
Cloon 110 kV	4.32	7.47	7.00	5.74	6.39	6.28	4.19	8.45	7.92	5.68	6.97	6.85
Clutterland 110 kV	14.90	18.23	16.20	13.02	25.14	23.78	15.58	21.01	19.20	13.36	28.91	27.71
College Park 110 kV	8.61	18.80	17.02	5.47	23.53	22.55	8.65	22.67	20.62	5.22	27.74	26.66
Cookstown 110 kV	7.22	8.23	7.80	5.87	6.96	6.86	7.06	9.24	8.78	5.77	7.61	7.50
Cookstown A 110 kV	4.88	6.50	6.10	5.40	5.09	5.01	4.39	7.99	7.32	5.12	5.79	5.67
Coolderrig 110 kV	17.61	12.20	11.08	12.66	15.18	14.58	20.74	16.77	14.99	12.84	19.77	18.88
Coolnabacky 110 kV							3.26	7.45	7.10	4.50	5.23	5.17
Coolnanoonag 110 kV	11.29	16.95	15.12	11.03	21.02	20.02	12.00	19.89	18.20	11.43	24.15	23.27
Coolroe 110 kV	3.52	9.49	8.76	4.77	8.98	8.75	3.50	11.22	10.37	4.87	10.04	9.80
Coomagearlahy 110 kV	5.37	7.77	6.50	5.69	8.52	7.94	5.16	8.54	7.32	5.53	9.23	8.70
Coomataggart 110 kV	9.60	6.84	6.28	9.47	5.48	5.35	9.61	7.47	7.00	9.45	5.81	5.71
Cordal 110 kV	12.40	9.12	8.00	7.75	10.39	9.87	12.66	10.15	9.18	7.64	11.30	10.87
Corderry 110 kV	4.36	8.50	7.50	5.57	8.30	7.96	4.20	9.27	8.25	5.46	8.79	8.47
Corduff 110 kV	9.93	22.28	19.85	9.87	28.57	27.17	10.35	27.65	24.70	10.37	34.57	32.93
Corduff 220 kV	16.33	22.18	19.25	14.94	27.56	25.89	17.63	31.69	27.93	16.01	38.24	36.23
Corkagh 110 kV	14.93	18.08	16.08	13.82	24.68	23.36	15.61	20.82	19.03	14.31	28.32	27.16
Corraclassy 110 kV	4.33	6.92	6.39	5.55	5.13	5.04	4.32	7.32	6.78	5.54	5.35	5.25
Cow Cross 110 kV	4.27	11.51	10.57	4.74	9.88	9.63	4.12	13.94	12.88	4.67	11.22	10.98
Crane 110 kV	8.09	8.81	8.28	7.52	9.36	9.16	8.78	9.89	9.25	8.04	10.43	10.18

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Croaghaun 110 kV							5.22	5.42	5.14	6.48	7.27	7.10
Cromcastle A 110 kV	12.00	10.66	9.80	7.27	11.73	11.37	11.76	12.58	11.32	7.00	13.38	12.88
Cromcastle B 110 kV	12.00	10.66	9.80	7.27	11.73	11.37	11.76	12.58	11.32	7.00	13.38	12.88
Crory 110 kV	9.83	8.91	8.40	9.69	10.62	10.38	10.65	9.98	9.42	10.53	11.85	11.58
Cruiserath 220 kV	15.73	21.60	18.80	13.92	26.88	25.28	16.87	30.74	27.18	14.73	37.20	35.29
Cullenagh 110 kV	7.50	12.41	11.47	7.83	14.01	13.60	8.01	15.23	14.15	8.47	17.00	16.53
Cullenagh 220 kV	8.26	8.14	7.70	8.23	8.13	7.98	8.57	10.66	10.24	8.71	10.12	9.99
Cunghill 110 kV	3.27	5.52	5.09	3.84	5.09	4.96	3.21	6.48	6.01	3.81	5.57	5.45
Cushaling 110 kV	6.11	10.22	9.42	7.14	12.69	12.27	6.90	13.14	11.83	8.18	15.23	14.61
Dallow 110 kV	3.51	5.10	4.85	4.49	3.54	3.50	3.50	5.83	5.55	4.49	3.86	3.82
Dalton 110 kV	3.35	4.53	4.10	4.57	3.63	3.54	3.32	5.13	4.62	4.58	3.90	3.79
Dardistown 110 kV	15.46	10.81	9.93	11.98	12.19	11.80	15.46	12.78	11.50	11.81	13.96	13.42
Darndale 110 kV	33.91	7.21	6.56	28.56	9.19	8.83	36.72	7.89	7.26	32.17	10.62	10.22
Deenes 110 kV	5.90	10.91	10.36	7.09	10.73	10.56	5.70	11.89	11.33	6.97	11.45	11.28
Derrybrien 110 kV	3.02	4.59	4.05	4.45	4.15	3.99	2.94	5.02	4.48	4.38	4.49	4.34
Derryiron 110 kV	4.68	7.74	7.45	5.81	7.92	7.82	5.54	10.51	9.90	6.76	9.83	9.64
Doon 110 kV	4.31	7.16	6.61	4.73	5.31	5.20	4.23	7.92	7.30	4.67	5.58	5.47
Dromada 110 kV	10.90	8.24	7.21	6.52	7.78	7.44	10.93	8.92	7.97	6.45	8.20	7.91
Drumkeen 110 kV	4.13	8.18	7.06	5.09	6.93	6.64	4.04	8.72	7.56	5.04	7.16	6.87
Drumline 110 kV	3.35	8.30	7.59	4.60	6.79	6.63	3.26	9.47	8.71	4.60	7.28	7.13
Drybridge 110 kV	5.48	14.22	13.20	6.09	14.47	14.12	5.25	15.82	14.72	5.93	15.63	15.26
Dundalk 110 kV	3.50	8.82	8.26	4.49	8.03	7.88	3.41	9.59	8.97	4.42	8.47	8.31
Dunfirth 110 kV	4.81	6.23	6.05	6.31	4.87	4.83	4.77	6.96	6.75	6.34	5.24	5.20
Dungarvan 110 kV	5.98	6.24	5.75	7.48	5.56	5.43	6.22	7.32	6.77	6.62	7.86	7.64
Dunmanway 110 kV	4.39	8.90	7.83	5.54	8.42	8.08	4.22	9.97	8.87	5.42	9.10	8.77
Dunstown 220 kV	11.48	18.39	16.57	11.21	19.04	18.34	10.55	22.79	21.24	10.59	22.49	21.97
Dunstown 400 kV	16.40	6.92	6.48	16.54	6.76	6.62	16.02	8.19	7.89	16.35	7.68	7.59
Ennis 110 kV	4.65	11.87	10.23	5.98	10.50	10.03	4.41	13.61	11.86	5.83	11.49	11.04
Fassaroe East 110 kV	5.18	7.69	7.32	5.31	5.88	5.81	5.01	8.63	8.21	5.22	6.39	6.31

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Fassaroe West 110 kV	5.32	7.85	7.47	5.40	6.07	6.00	5.15	8.82	8.38	5.31	6.61	6.53
Finglas 220 kV	16.75	21.37	18.55	15.11	26.29	24.72	18.35	30.71	26.99	16.12	36.32	34.40
Finglas A 110 kV	32.21	12.49	11.37	29.00	13.83	13.35	36.57	15.05	13.38	31.71	16.05	15.37
Finglas B 110 kV	33.24	12.15	11.29	29.61	15.14	14.68	41.13	15.49	14.11	35.87	19.05	18.32
Flagford 110 kV	4.62	11.85	10.80	5.46	14.13	13.62	4.46	13.22	12.11	5.33	15.49	14.96
Flagford 220 kV	7.51	7.18	6.76	9.70	6.61	6.49	7.28	8.03	7.66	9.58	7.17	7.08
Fortunestown 110 kV	5.55	7.52	7.01	5.97	6.41	6.28	4.94	9.37	8.55	5.60	7.41	7.23
Francis Street A 110 kV	10.42	12.38	11.41	5.11	14.67	14.20	10.31	14.42	13.07	4.93	16.65	16.01
Francis Street B 110 kV	12.38	12.24	11.31	6.41	15.03	14.55	12.55	14.20	13.12	6.20	17.15	16.60
Galway 110 kV	5.54	12.93	11.55	4.69	15.68	14.97	5.27	15.24	13.54	4.51	17.80	16.97
Garballagh 110 kV	4.27	11.30	10.70	5.15	11.24	11.05	4.08	12.26	11.65	5.01	11.90	11.71
Garrow 110 kV	10.52	11.07	9.49	10.18	13.03	12.23	10.61	12.54	11.08	10.18	14.46	13.76
Garvagh 110 kV	4.71	6.83	6.02	6.12	6.25	6.01	4.57	7.37	6.56	6.02	6.57	6.34
Gilra 110 kV	3.10	6.32	5.98	3.99	4.80	4.74	3.03	6.83	6.48	3.95	5.13	5.07
Glanagow 220 kV	10.47	11.88	10.63	10.96	15.97	15.16	14.51	19.57	17.35	14.10	23.99	22.77
Glanlee 110 kV	5.18	7.66	6.42	5.19	8.36	7.81	4.98	8.41	7.22	5.05	9.05	8.54
Glasmore A 110 kV	4.78	6.67	6.24	5.25	4.69	4.62	4.63	7.67	6.99	5.18	5.08	4.97
Glenlara A 110 kV	3.32	3.21	3.01	4.81	2.60	2.55	3.28	3.38	3.17	4.78	2.73	2.68
Glenlara B 110 kV	9.65	8.42	7.05	5.60	9.47	8.82	9.51	9.19	7.93	5.47	10.16	9.60
Glenree 110 kV	3.52	4.45	4.21	4.59	4.25	4.18	3.86	6.01	5.66	4.88	5.05	4.97
Golagh 110 kV	4.01	7.41	6.39	4.71	6.47	6.19	4.04	8.19	7.12	4.77	6.88	6.61
Gorman 110 kV	6.40	15.25	14.15	7.30	18.42	17.88	6.12	17.08	15.89	7.05	20.21	19.64
Gorman 220 kV	8.91	11.37	10.68	10.05	9.61	9.45	8.50	12.87	12.34	9.80	10.47	10.36
Gorman ESS 110 kV	6.30	14.99	13.93	7.06	18.01	17.49	6.02	16.76	15.62	6.82	19.72	19.18
Gortawee 110 kV	4.49	6.56	6.05	6.11	5.20	5.10	4.46	6.94	6.42	6.10	5.37	5.26
Grange 110 kV	12.96	10.92	10.01	4.37	11.18	10.85	12.75	12.96	11.61	4.16	12.69	12.23
Grange Castle 110 kV	18.95	12.54	11.37	13.73	16.35	15.66	23.50	17.39	15.49	14.32	21.68	20.63
Great Island 110 kV	7.92	12.45	11.59	8.37	15.10	14.67	8.75	15.27	14.21	9.55	18.35	17.82
Great Island 220 kV	9.56	9.53	9.00	9.30	11.27	11.02	12.39	14.47	13.80	12.69	16.54	16.23

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Greenlink 150 kV	10.84	12.68	11.95	33.45	4.82	4.78	14.58	18.88	18.03	62.30	5.36	5.33
Griffinrath A 110 kV	6.84	10.09	9.63	7.23	10.12	9.97	6.59	11.74	11.17	7.03	11.41	11.23
Griffinrath B 110 kV	7.36	10.44	9.95	7.38	10.11	9.96	7.10	12.18	11.58	7.18	11.40	11.22
Harolds Cross 110 kV	10.60	12.42	11.45	4.83	14.63	14.16	10.50	14.47	13.11	4.65	16.58	15.95
Heuston 110 kV	13.36	12.49	11.52	7.69	15.51	15.00	13.67	14.51	13.39	7.51	17.74	17.16
Huntstown A 220 kV	16.28	20.73	18.06	13.19	25.44	23.96	17.10	29.25	25.84	13.06	34.62	32.86
Huntstown B 220 kV	16.42	20.50	17.99	11.10	25.37	23.96	17.34	28.14	25.15	10.44	33.95	32.36
Ikerrin 110 kV	5.19	5.20	4.61	6.27	3.65	3.55	5.33	5.70	5.08	6.35	3.92	3.81
Inchicore 220 kV	12.42	21.96	18.99	9.81	27.34	25.63	13.26	31.79	28.04	9.53	37.49	35.57
Inchicore A 110 kV	26.71	13.79	12.64	24.58	17.60	16.95	31.70	16.18	14.83	28.10	20.36	19.61
Inchicore B 110 kV	38.58	13.54	12.25	30.26	18.06	17.26	49.62	18.63	16.58	33.66	24.03	22.81
Inniscarra 110 kV	3.49	9.27	8.56	4.66	8.55	8.34	3.52	11.00	10.16	4.81	9.53	9.31
Irishtown 220 kV	13.84	19.81	17.35	10.36	25.01	23.57	15.67	28.92	25.68	10.17	34.55	32.84
Kellis 110 kV	6.75	8.51	7.98	7.67	9.92	9.68	6.87	10.04	9.30	7.94	11.40	11.06
Kellis 220 kV	7.86	7.44	7.10	9.43	6.35	6.27	7.86	8.75	8.44	9.68	7.13	7.07
Kellystown 220 kV	9.81	17.31	15.57	9.15	17.71	17.05	8.73	21.38	19.87	8.15	21.33	20.80
Kilbarry 110 kV	6.33	17.73	15.49	7.13	18.57	17.68	6.29	22.72	19.87	7.16	22.18	21.18
Kildonan 110 kV	6.20	12.76	11.91	4.12	11.34	11.12	6.02	14.68	13.79	3.98	12.56	12.34
Kilgarvan 110 kV	9.60	6.84	6.28	9.47	5.48	5.35	9.61	7.47	7.00	9.45	5.81	5.71
Kilkenny 110 kV	4.04	5.09	4.84	5.48	4.57	4.51	4.10	5.95	5.50	5.67	4.99	4.88
Kill Hill 110 kV	4.84	6.44	5.78	6.41	5.56	5.39	4.85	6.94	6.27	6.42	5.85	5.68
Killonan 110 kV	6.57	18.15	15.76	7.95	19.33	18.35	6.75	22.07	19.54	8.30	22.33	21.39
Killonan 220 kV	7.74	10.21	9.33	9.92	9.55	9.28	7.73	12.15	11.44	10.08	10.77	10.58
Killoteran 110 kV	6.96	11.26	10.47	7.06	12.17	11.85	7.30	13.69	12.68	7.44	14.38	13.99
Kilmahud 110 kV	14.70	18.02	16.04	13.20	24.38	23.09	15.32	20.75	18.98	13.57	27.96	26.83
Kilmore 110 kV	14.93	11.16	10.21	9.43	12.34	11.94	14.89	13.26	11.87	9.17	14.15	13.59
Kilpaddoge 110 kV	11.54	17.16	15.29	11.95	21.73	20.67	12.33	20.17	18.44	12.56	25.08	24.14
Kilpaddoge 220 kV	12.48	15.64	13.81	11.85	19.32	18.30	14.91	22.28	20.24	13.55	26.18	25.17
Kilpaddoge 400 kV	12.48	15.64	13.81	11.85	19.32	18.30	14.91	22.28	20.24	13.55	26.18	25.17

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Kilteel 110 kV	4.43	7.67	7.34	5.51	8.00	7.88	4.36	8.90	8.39	5.51	8.84	8.67
Kinnegad 110 kV	4.46	7.76	7.45	5.02	7.10	7.02	4.63	9.31	8.88	5.18	8.01	7.90
Kishoge 110 kV							14.74	20.31	18.61	12.35	26.72	25.69
Knockacummer 110 kV	8.60	7.40	6.15	6.67	7.16	6.72	8.42	7.96	6.82	6.56	7.46	7.08
Knockalough 110 kV	4.57	4.81	4.62	4.40	6.24	6.14	4.46	5.32	5.08	4.32	6.57	6.44
Knockanure 220 kV	12.04	13.53	12.01	8.30	16.49	15.67	13.19	17.73	16.25	7.96	20.77	20.04
Knockanure A 110 kV	22.81	12.23	10.75	17.03	13.45	12.81	26.38	13.63	12.31	17.91	14.69	14.15
Knockanure B 110 kV	4.80	8.53	7.86	5.83	6.84	6.69	4.72	9.54	8.90	5.47	7.63	7.49
Knockearagh 110 kV	5.48	5.71	5.29	7.34	4.69	4.59	5.46	6.34	5.86	7.34	5.09	4.99
Knocknamona 110 kV							5.97	7.13	6.59	5.82	10.61	10.19
Knockraha A 110 kV	7.62	18.80	16.49	8.29	19.31	18.42	7.91	24.18	21.45	8.51	23.24	22.32
Knockraha A 220 kV	9.73	13.18	11.69	9.98	14.88	14.19	10.96	19.43	17.41	10.70	19.75	18.98
Knockraha B 110 kV	7.62	18.80	16.49	8.29	19.31	18.42	7.91	24.18	21.45	8.51	23.24	22.32
Knockraha B 220 kV	9.73	13.18	11.69	9.98	14.88	14.19	10.96	19.43	17.41	10.70	19.75	18.98
Knockranny 110 kV	6.58	8.42	7.47	5.40	10.64	10.11	6.38	9.40	8.37	5.27	11.65	11.09
Knockranny A 110 kV	4.41	5.51	5.26	5.14	7.21	7.07	4.29	6.13	5.81	5.04	7.57	7.40
Knockranny B 110 kV	6.58	8.42	7.47	5.40	10.64	10.11	6.38	9.40	8.37	5.27	11.65	11.09
Knockumber 110 kV	3.64	8.58	8.14	4.45	6.47	6.39	3.59	9.30	8.83	4.46	6.85	6.76
Lanesboro 110 kV	3.06	8.61	8.17	4.20	7.34	7.24	2.99	9.83	9.22	4.20	8.01	7.88
Lenalea 110 kV	4.19	6.42	5.75	5.17	6.94	6.67	4.12	6.88	6.17	5.13	7.28	7.00
Letterkenny110 kV	4.59	9.73	8.22	5.44	9.15	8.66	4.47	10.51	8.88	5.37	9.65	9.13
Liberty A 110 kV	5.26	14.96	13.31	4.72	16.36	15.65	5.11	18.71	16.66	4.55	19.29	18.50
Liberty B 110 kV	5.18	14.95	13.31	4.58	16.32	15.62	5.03	18.68	16.65	4.41	19.23	18.45
Lickny 110 kV	3.16	4.81	4.70	3.27	5.53	5.48	3.12	5.21	5.04	3.24	5.89	5.82
Limerick 110 kV	5.03	15.54	13.64	5.94	14.21	13.64	5.06	18.63	16.57	6.04	16.00	15.45
Lisdrum 110 kV	3.04	5.49	5.24	3.52	7.76	7.60	3.05	6.01	5.68	3.53	8.49	8.27
Lisdrumdoagh 110 kV	3.04	5.48	5.23	3.54	7.78	7.62	3.05	5.99	5.67	3.56	8.51	8.29
Lisheen 110 kV	3.86	4.95	4.08	4.53	7.89	7.08	3.88	5.24	4.37	4.52	8.31	7.50
Lislea 110 kV	3.15	6.07	5.69	4.01	4.70	4.63	3.11	6.46	6.05	3.99	4.94	4.86

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Lodgewood 110 kV	9.83	8.91	8.40	9.69	10.62	10.38	10.65	9.98	9.42	10.53	11.85	11.58
Lodgewood 220 kV	9.09	7.12	6.78	9.85	6.76	6.66	9.21	8.51	8.20	10.27	7.80	7.71
Longpoint 220 kV	10.64	12.25	10.93	10.47	16.29	15.44	14.18	19.85	17.59	12.35	23.99	22.77
Loughtown 220 kV	9.42	9.48	8.96	8.93	11.17	10.92	11.91	14.35	13.69	11.66	16.31	16.02
Louth 220 kV	9.45	16.52	15.01	10.61	18.61	17.94	9.23	19.77	18.46	10.43	21.23	20.72
Louth A 110 kV	6.60	12.96	12.05	7.54	15.50	15.06	6.45	14.17	13.32	7.42	16.73	16.34
Louth A 275 kV	11.11	9.69	8.96	11.03	11.43	11.08	11.07	11.75	11.12	10.79	13.32	13.05
Louth B 110 kV	6.97	14.05	13.10	7.74	17.36	16.88	6.85	15.54	14.62	7.63	18.92	18.47
Louth B 275 kV	10.46	9.69	8.96	9.74	11.54	11.19	10.40	11.76	11.13	9.45	13.52	13.25
Lysaghtstown 110 kV	4.03	11.14	10.25	4.95	11.58	11.25	3.82	13.10	12.17	4.81	12.97	12.65
Macetown 110 kV	7.42	17.44	15.88	6.68	18.35	17.75	7.28	20.83	19.06	6.56	21.02	20.38
Macroom 110 kV	7.08	15.32	13.25	6.98	16.03	15.20	6.90	18.09	15.97	6.83	18.20	17.42
Mallow 110 kV	5.22	6.66	6.22	7.02	5.65	5.55	5.14	7.37	6.88	6.99	6.06	5.94
Marina 110 kV	6.04	16.52	14.54	6.94	18.17	17.30	6.00	21.06	18.53	6.99	21.73	20.74
Maynooth A 110 kV	10.57	12.67	11.98	11.19	15.42	15.08	10.43	15.06	14.22	11.01	18.00	17.59
Maynooth A 220 kV	9.04	19.60	17.41	7.42	19.66	18.85	7.92	24.88	22.90	6.67	23.58	22.95
Maynooth B 110 kV	7.96	16.80	15.52	9.30	16.12	15.72	7.49	19.24	18.14	9.01	17.88	17.55
Maynooth B 220 kV	10.01	17.14	15.50	9.70	16.04	15.53	9.30	21.21	19.75	9.23	18.71	18.32
McDermott 110 kV	16.22	11.14	10.39	6.14	12.98	12.63	16.21	14.02	12.80	5.64	15.90	15.35
Meath Hill 110 kV	3.93	9.24	8.72	5.20	7.37	7.27	3.83	10.01	9.45	5.13	7.77	7.66
Meentycat 110 kV	3.84	6.78	5.95	5.10	5.71	5.50	3.74	7.11	6.29	5.05	5.75	5.56
Midleton 110 kV	3.76	9.91	9.17	4.71	10.13	9.86	3.58	11.55	10.77	4.59	11.31	11.04
Milltown A 110 kV	14.53	13.46	12.35	6.66	16.17	15.61	14.82	15.80	14.24	6.45	18.49	17.73
Milltown B 110 kV	8.67	11.02	10.25	3.99	13.26	12.88	8.52	12.70	11.78	3.81	15.01	14.56
Misery Hill 110 kV	13.02	13.13	12.05	7.34	15.92	15.37	13.12	15.37	13.87	7.15	18.20	17.45
Moneteen 110 kV	5.31	11.04	10.00	6.24	8.11	7.92	5.28	12.39	11.40	6.26	8.73	8.56
Moneypoint 110 kV	14.34	9.31	8.70	17.25	9.12	8.92	15.05	10.32	9.82	18.01	9.92	9.76
Moneypoint 220 kV	12.68	15.57	13.78	12.68	19.29	18.29	15.26	22.18	20.20	14.19	26.12	25.13
Moneypoint G1 400 kV	15.75	8.78	7.97	16.96	10.49	10.08	20.99	13.97	12.95	21.56	15.09	14.67

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Moneypoint G2 400 kV	15.75	8.78	7.97	16.96	10.49	10.08	20.99	13.97	12.95	21.56	15.09	14.67
Moneypoint G3 400 kV	15.75	8.78	7.97	16.96	10.49	10.08	20.99	13.97	12.95	21.56	15.09	14.67
Monread 110 kV	4.13	7.66	7.31	4.97	7.81	7.69	4.01	8.84	8.32	4.91	8.60	8.43
Mount Lucas 110 kV	4.71	7.37	7.03	4.88	8.19	8.05	4.61	8.77	8.27	4.81	9.37	9.17
Moy 110 kV	3.75	4.27	4.03	5.01	5.20	5.09	5.46	6.76	6.25	6.93	7.26	7.06
Mullagharlin 110 kV	3.56	8.90	8.38	4.60	9.06	8.89	3.47	9.62	9.09	4.53	9.54	9.36
Mullingar 110 kV	3.64	7.15	6.87	3.83	7.67	7.57	3.64	8.06	7.65	3.83	8.40	8.25
Mulreavy 110 kV	4.98	8.29	6.92	5.72	9.14	8.52	5.15	9.19	7.76	5.92	9.73	9.13
Mungret A 110 kV	4.98	10.46	9.52	5.93	7.53	7.36	4.94	11.69	10.80	5.94	8.08	7.93
Mungret B 110 kV	4.97	10.48	9.53	5.93	7.54	7.37	4.93	11.72	10.82	5.93	8.09	7.94
Nangor 110 kV	16.29	12.24	11.12	10.27	15.85	15.20	18.37	16.85	15.06	9.84	20.86	19.88
Navan 110 kV	5.47	13.36	12.45	6.15	13.73	13.41	5.50	14.97	13.94	6.32	15.06	14.71
Nenagh 110 kV	2.68	3.63	3.40	3.87	2.02	2.00	2.64	3.92	3.67	3.86	2.12	2.09
Newbridge 110 kV	4.33	9.89	9.28	5.06	9.47	9.28	4.15	11.66	10.78	4.96	10.64	10.38
Newbury 110 kV	14.02	11.06	10.13	7.03	11.96	11.59	13.90	13.13	11.76	6.76	13.67	13.14
North Quays 110 kV	17.85	13.75	12.59	6.20	16.19	15.64	18.70	16.17	14.55	6.00	18.50	17.75
North Wall 220 kV	14.59	18.84	16.63	8.40	20.78	19.80	15.76	27.02	24.13	7.61	27.58	26.46
Oldbridge 110 kV	4.95	13.27	12.37	5.76	14.91	14.54	4.74	14.63	13.69	5.60	16.06	15.67
Oldcourt A 110 kV	3.78	9.71	9.03	4.41	7.56	7.42	3.64	11.49	10.76	4.35	8.44	8.30
Oldcourt B 110 kV	3.82	9.77	9.08	4.44	7.63	7.49	3.67	11.57	10.83	4.37	8.52	8.38
Oldstreet 220 kV	12.91	7.82	7.46	11.67	9.20	9.03	15.51	12.01	11.34	12.84	12.71	12.45
Oldstreet 400 kV	12.09	6.87	6.44	9.91	6.70	6.56	13.02	9.23	8.84	9.96	8.19	8.08
Oughtragh 110 kV	3.70	4.67	4.33	4.82	2.94	2.90	3.65	5.09	4.71	4.73	3.14	3.09
Pelletstown 110 kV	14.05	10.55	9.88	7.91	11.36	11.10	13.75	13.13	12.07	7.46	13.64	13.24
Philipstown 110 kV	5.83	9.72	9.01	6.54	11.13	10.81	6.31	12.24	11.12	7.06	13.05	12.60
Platin 110 kV	4.90	13.01	12.17	5.44	12.76	12.50	4.68	14.30	13.43	5.30	13.65	13.38
Pollaphuca 110 kV	2.75	2.47	2.42	3.99	2.26	2.25	3.33	3.12	2.99	4.75	2.57	2.54
Poolbeg A 110 kV	25.99	14.37	13.14	21.35	17.86	17.20	29.36	16.96	15.26	22.97	20.64	19.74
Poolbeg A 220 kV	15.36	18.93	16.71	7.36	19.57	18.70	16.67	27.10	24.20	6.52	25.56	24.60

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Poolbeg B 110 kV	25.96	14.35	13.12	21.33	17.84	17.18	29.31	16.94	15.24	22.95	20.61	19.72
Poolbeg B 220 kV	12.48	20.54	17.93	9.97	24.06	22.74	13.10	29.21	26.04	9.70	31.95	30.56
Poppintree 110 kV	15.87	11.48	10.51	9.62	12.67	12.26	16.00	13.69	12.25	9.37	14.58	13.99
Portan 260 kV	20.41	10.60	9.96	92.19	3.10	3.08	20.94	13.07	12.59	108.83	3.22	3.21
Portan 400 kV	16.46	8.74	8.09	24.52	7.89	7.71	16.27	11.06	10.53	26.52	9.04	8.92
Portlaoise 110 kV	3.98	8.19	7.79	5.37	6.70	6.61	3.83	9.26	8.72	5.32	7.18	7.07
Pottery 110 kV	17.10	10.77	10.15	5.55	10.99	10.77	17.96	12.53	11.73	5.38	12.34	12.06
Prospect 220 kV	10.61	13.06	11.78	8.12	13.71	13.20	11.28	17.58	16.32	8.11	17.27	16.83
Raffeen 220 kV	10.15	11.76	10.52	9.64	15.27	14.52	13.12	18.38	16.41	10.94	21.82	20.80
Raffeen A 110 kV	5.51	13.25	12.00	6.32	15.79	15.16	5.55	16.45	15.01	6.43	18.83	18.17
Raffeen B 110 kV	7.42	13.10	11.86	8.28	15.54	14.92	7.83	16.06	14.65	8.71	18.32	17.67
Rathkeale 110 kV	3.54	7.46	6.85	4.81	5.75	5.62	3.51	8.31	7.66	4.85	6.10	5.98
Rathnaskillo 110 kV							6.49	8.34	7.88	7.62	8.64	8.47
Ratrussan 110 kV	3.78	7.87	6.76	4.95	8.41	7.96	3.69	8.31	7.20	4.85	8.69	8.26
Reamore 110 kV	3.86	8.85	7.89	4.28	7.35	7.12	3.78	9.97	8.97	4.03	8.31	8.06
Richmond A 110 kV	2.76	6.07	5.83	4.05	5.22	5.17	2.72	6.86	6.47	4.10	5.73	5.64
Richmond B 110 kV	2.76	6.07	5.83	4.05	5.22	5.17	2.72	6.86	6.47	4.10	5.73	5.64
Rinawade 110 kV	6.06	10.74	10.18	6.57	7.91	7.81	5.82	11.98	11.51	6.45	8.55	8.47
Ringaskiddy 110 kV	5.47	10.97	10.09	5.90	10.77	10.47	5.44	13.13	12.17	5.90	12.31	12.01
Ringsend 110 kV	26.40	14.49	13.21	22.49	18.00	17.32	29.89	17.15	15.36	24.38	20.85	19.90
Ryebrook 110 kV	5.31	14.15	12.91	6.19	12.55	12.22	5.00	15.94	14.80	6.01	13.57	13.29
Salthill 110 kV	4.87	12.36	11.11	3.78	14.74	14.11	4.62	14.48	12.94	3.62	16.61	15.88
Screeb 110 kV	3.88	2.60	2.52	4.95	1.82	1.81	3.83	2.89	2.76	4.93	1.96	1.94
Seal Rock A 110 kV	7.93	10.01	8.92	9.60	10.73	10.28	7.75	10.53	9.53	9.44	10.99	10.60
Seal Rock B 110 kV	7.96	10.02	8.92	9.62	10.73	10.28	7.78	10.54	9.53	9.46	10.99	10.60
Shankill 110 kV	4.02	9.11	8.06	5.13	8.04	7.76	3.92	9.80	8.69	5.05	8.48	8.18
Shannonbridge 110 kV	4.94	12.89	11.86	6.08	14.39	13.95	6.43	18.79	17.24	7.39	23.01	22.20
Shannonbridge 220 kV	6.74	6.84	6.52	8.75	6.81	6.71	7.66	8.10	7.87	9.69	8.85	8.76
Shellybanks A 220 kV	15.05	18.89	16.68	7.22	22.35	21.22	16.24	27.04	24.15	6.27	30.41	29.06

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Shellybanks B 220 kV	13.15	18.95	16.68	8.98	23.52	22.24	14.85	27.63	24.62	8.54	32.27	30.76
Shelton Abbey 110 kV	7.58	7.69	7.26	7.54	7.99	7.84	7.49	8.56	8.10	7.49	8.76	8.59
Singland 110 kV	5.99	14.78	13.07	7.08	14.23	13.67	6.31	17.99	16.14	7.48	16.22	15.68
Sliabh Bawn 110 kV	3.06	8.00	7.62	4.29	7.67	7.56	2.97	8.89	8.44	4.25	8.13	8.00
Slievecallan 110 kV	7.71	6.69	5.68	9.95	6.71	6.34	7.58	7.22	6.23	9.89	7.01	6.66
Sligo 110 kV	3.78	9.28	8.41	4.48	8.56	8.31	3.65	10.59	9.61	4.41	9.32	9.06
Snughborough 110 kV	10.04	20.22	18.17	8.53	21.49	20.68	10.44	24.66	22.25	8.63	24.83	23.96
Somerset 110 kV	2.95	6.95	6.59	3.95	4.58	4.53	2.88	8.26	7.87	3.88	5.21	5.15
Sorne Hill 110 kV	3.57	3.72	3.10	4.57	3.49	3.29	3.52	3.85	3.22	4.53	3.59	3.39
Srahnakilly 110 kV	4.16	4.37	4.14	5.32	6.56	6.38	5.21	5.81	5.48	6.49	8.47	8.24
Srananagh 110 kV	4.78	10.94	9.77	5.59	11.69	11.23	4.65	12.46	11.19	5.52	12.90	12.42
Srananagh 220 kV	7.35	4.60	4.37	9.61	3.67	3.62	7.30	5.05	4.84	9.62	3.92	3.88
Stevenstown 110 kV	4.64	5.58	5.30	5.10	3.70	3.66	4.49	6.25	5.83	5.03	3.96	3.90
Stratford 110 kV	3.15	3.84	3.70	4.15	3.03	3.01	3.41	4.61	4.34	4.41	3.35	3.30
Taney 110 kV	8.80	9.33	8.85	3.22	9.22	9.07	8.66	10.70	10.09	3.10	10.23	10.04
Tarbert 110 kV	29.60	7.30	7.03	34.29	5.36	5.32	36.07	8.16	7.98	41.79	5.85	5.82
Tarbert 220 kV	11.90	14.93	13.26	10.74	17.42	16.59	14.07	21.22	19.35	12.55	23.74	22.90
Tawnaghmore A 110 kV	3.38	3.48	3.33	4.62	3.82	3.76	4.53	5.31	5.00	5.94	4.94	4.85
Tawnaghmore B 110 kV	3.35	3.41	3.26	4.47	3.87	3.81	5.19	5.60	5.20	6.67	5.85	5.70
Thornsberry 110 kV	3.97	6.34	6.09	4.95	5.97	5.90	3.86	7.67	7.24	4.93	6.91	6.79
Thurles 110 kV	4.83	6.11	5.15	5.89	7.12	6.64	4.96	6.63	5.63	6.02	7.59	7.10
Tievebrack 110 kV	4.24	4.53	4.16	5.47	3.24	3.18	4.25	4.92	4.51	5.50	3.41	3.34
Tipperary 110 kV	5.21	7.50	6.74	6.31	4.61	4.51	5.13	8.18	7.38	6.28	4.85	4.75
Tonroe 110 kV	2.75	3.39	3.18	3.85	2.01	1.99	2.72	3.65	3.42	3.84	2.12	2.10
Trabeg 110 kV	5.96	16.44	14.48	6.85	18.10	17.24	5.92	20.97	18.46	6.90	21.66	20.68
Tralee 110 kV	5.27	9.43	8.38	6.24	7.85	7.59	5.20	10.71	9.59	5.85	8.94	8.66
Trien A 110 kV	4.61	8.06	7.41	5.87	6.93	6.76	4.54	9.03	8.38	5.28	7.93	7.76
Trien B 110 kV	13.32	9.77	8.76	9.35	7.73	7.51	13.70	10.68	9.80	9.36	8.01	7.84
Trillick 110 kV	3.64	4.04	3.36	4.65	3.48	3.30	3.58	4.20	3.50	4.60	3.60	3.40

Table E-2: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2024												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Trinity 110 kV	11.51	12.75	11.73	6.13	15.32	14.81	11.48	14.89	13.47	5.94	17.45	16.76
Tullabeg 110 kV	6.59	6.77	6.48	7.25	8.21	8.07	6.70	7.41	7.09	7.41	8.88	8.72
Tullabrack 110 kV	6.66	7.18	6.72	7.35	5.36	5.28	6.56	7.81	7.41	7.29	5.71	5.63
Turlough 220 kV	11.02	12.17	11.16	12.36	10.81	10.53	10.27	13.58	12.74	11.86	11.53	11.32
Tynagh 220 kV	11.12	7.56	7.21	11.98	9.40	9.22	15.89	12.90	11.98	16.99	13.99	13.61
Uggool 110 kV	6.71	8.10	7.17	5.84	10.25	9.72	6.52	8.99	8.00	5.71	11.18	10.63
Waterford 110 kV	7.13	11.77	10.92	7.42	12.63	12.29	7.53	14.40	13.31	7.92	14.99	14.58
Wexford 110 kV	6.07	7.20	6.66	7.22	6.81	6.64	7.06	8.01	7.35	8.16	7.47	7.27
Whitebank 110 kV	23.51	14.44	13.17	19.52	17.91	17.23	25.81	17.08	15.30	20.62	20.72	19.79
Whitegate 110 kV	4.48	9.16	8.55	5.21	9.56	9.33	4.38	10.75	10.14	5.16	10.77	10.56
Wolfe Tone 110 kV	14.40	10.91	10.18	5.61	12.57	12.24	14.14	13.68	12.51	5.15	15.32	14.80
Woodhouse 110 kV	6.05	6.27	5.75	7.36	5.62	5.47	6.29	7.35	6.77	5.47	10.71	10.28
Woodland 220 kV	12.89	21.33	18.92	11.79	23.73	22.65	11.84	27.73	25.40	10.91	29.83	28.87
Woodland 400 kV	17.67	8.79	8.13	17.76	8.53	8.31	17.78	11.13	10.59	17.99	10.42	10.26
Yellowmeadow 110 kV	25.43	12.71	11.54	21.11	16.42	15.75	30.32	17.36	15.53	22.75	21.48	20.48

Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Adamstown 110 kV	2.35	12.22	11.10	2.11	16.10	15.28	4.74	17.60	15.83	4.00	21.83	21.07
Agannygal 110 kV	2.22	5.73	5.15	2.86	4.56	4.43	2.65	6.40	5.83	3.70	4.97	4.85
Aghada 110 kV	3.45	8.64	8.19	3.91	10.03	9.82	4.31	10.18	9.77	5.17	11.50	11.31
Aghada A 220 kV	6.15	13.33	12.10	6.19	17.29	16.57	12.44	21.66	19.52	12.67	25.96	24.83
Aghada B 220 kV	6.15	13.33	12.10	6.19	17.29	16.57	12.44	21.66	19.52	12.67	25.96	24.83
Aghada C 220 kV	6.06	12.95	11.79	5.83	16.78	16.11	11.74	20.73	18.76	10.59	24.89	23.86
Aghada D 220 kV	6.15	13.33	12.10	6.19	17.29	16.57	12.44	21.66	19.52	12.67	25.96	24.83
Ahane 110 kV	3.24	13.05	11.96	3.41	10.96	10.68	4.20	15.24	14.28	4.57	12.20	11.98
Anner 110 kV	2.78	6.57	6.13	3.06	4.73	4.65	3.54	7.37	6.92	4.01	5.02	4.95
Ardnacrusha 110 kV	3.53	14.94	13.39	3.84	16.96	16.20	5.14	19.22	17.36	5.88	20.39	19.63
Ardnagappary 110 kV	2.65	2.31	2.19	3.60	1.33	1.32	2.92	2.46	2.31	4.11	1.39	1.37
Arigna 110 kV	3.43	7.85	7.23	3.82	6.12	5.99	4.37	8.66	8.05	5.10	6.57	6.45
Arklow 110 kV	3.12	9.40	8.88	3.12	12.84	12.50	5.52	11.32	10.87	5.52	15.38	15.04
Arklow 220 kV	2.63	7.66	7.33	2.54	9.25	9.08	4.39	9.43	9.20	4.35	11.17	11.05
Artane 110 kV	2.90	11.14	10.40	2.13	13.56	13.20	5.26	14.55	13.49	3.18	17.04	16.50
Arva 110 kV	3.17	9.54	8.68	3.58	7.29	7.12	4.19	10.56	9.74	4.98	7.81	7.65
Athea 110 kV	4.52	9.07	7.94	4.48	8.63	8.24	7.08	9.98	8.96	7.05	9.13	8.81
Athlone 110 kV	2.70	7.16	6.82	2.99	8.00	7.86	4.50	10.13	9.47	5.18	9.91	9.69
Athy 110 kV	2.05	6.94	6.74	2.43	5.64	5.59	2.68	7.95	7.67	3.43	6.19	6.14
Aughinish 110 kV	4.66	10.31	9.22	4.88	12.04	11.50	6.40	11.10	10.12	6.91	12.71	12.25
Aungierstown 110 kV	2.88	20.01	17.50	2.30	27.38	25.80	5.32	26.41	23.63	4.57	35.70	33.90
Baldonnell 110 kV	2.67	18.83	16.61	2.13	24.90	23.57	4.79	24.91	22.36	3.89	32.12	30.74
Ballinknocka 110 kV	4.32	9.60	8.75	4.29	12.22	11.72	5.96	10.49	9.73	5.96	13.13	12.72
Ballyadam 110 kV	2.72	8.95	8.41	3.19	9.29	9.09	3.27	10.73	10.21	4.07	10.63	10.45
Ballybeg 110 kV	2.62	6.45	6.22	2.64	7.76	7.64	4.43	7.61	7.35	4.39	8.89	8.76
Ballydine 110 kV	2.72	7.22	6.79	2.60	5.63	5.54	3.46	8.17	7.74	3.30	6.06	5.97
Ballylickey 110 kV	2.54	3.75	3.42	3.23	2.14	2.10	2.93	4.04	3.71	3.88	2.26	2.22
Ballymoneen 110 kV	3.22	15.55	14.19	2.96	19.70	18.96	4.34	19.18	17.63	3.94	23.40	22.57

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Ballynadride 110 kV	3.37	6.48	5.95	3.85	7.39	7.15	4.57	7.69	7.13	5.77	8.71	8.46
Ballynahulla 110 kV	6.24	11.09	9.61	6.07	12.60	11.88	10.64	12.56	11.26	10.12	13.92	13.34
Ballynahulla 220 kV	4.88	10.13	9.08	4.55	11.05	10.60	6.73	12.10	11.25	6.86	12.58	12.28
Ballyragget 110 kV	3.00	6.90	6.70	3.24	5.49	5.45	4.57	7.98	7.75	5.11	5.96	5.92
Ballyvouskill 110 kV	6.70	12.03	10.51	6.17	15.05	14.16	10.99	13.79	12.43	9.58	16.94	16.19
Ballyvouskill 220 kV	5.04	10.34	9.26	4.93	12.52	11.95	7.06	12.32	11.42	7.40	14.44	14.00
Ballywater 110 kV	2.84	6.24	5.97	1.91	6.22	6.13	4.13	7.43	7.18	2.42	7.13	7.05
Balruntagh 110 kV	2.93	4.51	4.38	3.41	4.00	3.96	4.70	5.51	5.40	6.00	4.57	4.54
Baltrasna 110 kV	2.59	10.16	9.57	2.77	8.57	8.43	4.25	12.48	11.96	4.74	9.77	9.65
Bancroft 110 kV	2.28	11.58	10.84	1.90	13.21	12.98	3.93	13.98	13.22	2.95	15.73	15.38
Bandon 110 kV	2.99	6.84	6.30	3.71	6.50	6.33	5.23	8.24	7.61	6.51	7.52	7.34
Banoge 110 kV	2.82	6.19	6.00	2.90	6.23	6.15	4.40	7.38	7.17	4.62	7.09	7.02
Barnageeragh 110 kV	3.01	20.43	18.21	2.74	26.60	25.40	5.28	27.51	25.06	5.18	34.13	33.00
Barnahealy A 110 kV	3.36	11.76	10.92	3.70	12.14	11.81	4.12	14.39	13.46	4.78	14.15	13.84
Barnahealy B 110 kV	4.28	11.66	10.84	4.45	12.15	11.82	6.03	14.28	13.39	6.38	14.19	13.88
Barnakyle 110 kV	2.85	19.72	17.26	2.34	26.48	25.00	5.27	26.06	23.32	4.75	34.42	32.72
Baroda 110 kV	2.30	9.16	8.71	2.54	10.27	10.08	3.19	10.82	10.29	3.74	11.61	11.40
Barrymore 110 kV	2.83	7.70	7.18	3.43	4.54	4.47	3.38	8.69	8.21	4.38	4.87	4.81
Belcamp 110 kV	3.30	12.72	11.52	3.01	17.09	16.36	6.36	14.62	13.72	5.90	19.48	19.08
Belcamp 220 kV	4.98	21.36	18.65	2.81	26.58	25.12	6.94	33.49	30.22	4.74	39.42	37.83
Belgard 110 kV	2.28	12.18	11.24	1.87	14.99	14.36	3.98	14.64	13.61	2.96	17.29	16.99
Bellacorick 110 kV	3.96	5.16	4.93	4.53	8.34	8.14	7.42	8.89	8.11	8.21	12.08	11.57
Bellewstown 110 kV	2.78	12.48	11.52	2.85	14.52	14.07	5.89	20.12	18.27	5.94	20.17	19.50
Bendinstown 110 kV	2.77	8.61	8.19	2.75	10.42	10.21	4.24	10.54	10.03	4.31	12.65	12.40
Binbane 110 kV	4.09	5.32	4.84	5.30	4.64	4.52	4.94	5.82	5.27	6.75	4.86	4.73
Blackrock 110 kV	2.34	12.31	11.40	1.21	11.61	11.46	3.82	14.87	13.59	1.57	13.15	12.76
Blake 110 kV	2.17	8.05	7.79	2.48	5.41	5.36	3.02	9.37	8.96	3.67	5.89	5.83
Blundelstown 110 kV	2.07	7.86	7.55	2.33	8.39	8.26	3.01	9.31	9.01	3.64	9.51	9.40
Boggeragh 110 kV	4.58	8.74	7.53	5.08	8.35	7.93	5.86	9.55	8.37	6.81	8.94	8.56

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Bogtown 110 kV	2.59	6.32	6.10	2.71	7.32	7.22	3.51	7.58	7.34	3.81	8.44	8.34
Booltiagh 110 kV	3.77	8.23	7.41	4.26	6.54	6.35	5.14	8.91	8.17	6.19	6.83	6.67
Bracetown 220 kV	4.22	19.75	17.48	2.33	20.62	19.80	6.11	28.26	26.05	3.79	26.96	26.38
Bracklone 110 kV	2.59	7.86	7.63	2.93	7.04	6.97	3.68	8.95	8.70	4.48	7.60	7.54
Bracklone 110 kV	2.59	7.86	7.63	2.93	7.04	6.97	3.68	8.95	8.70	4.48	7.60	7.54
Brinny A 110 kV	2.82	6.07	5.64	3.50	5.29	5.17	4.49	7.21	6.73	5.49	6.02	5.90
Brinny B 110 kV	2.82	6.10	5.66	3.50	5.32	5.21	4.50	7.25	6.76	5.51	6.07	5.95
Buffy 110 kV	3.12	5.76	5.52	3.49	7.82	7.68	3.93	6.36	6.07	4.58	8.25	8.08
Butlerstown 110 kV	3.51	10.86	10.26	3.53	10.73	10.52	5.24	13.34	12.63	5.38	12.62	12.40
Cabra 110 kV	2.84	10.75	10.05	1.95	12.05	11.81	5.05	13.94	12.95	2.77	14.91	14.49
Caherhurly 110 kV	3.46	9.24	8.63	3.61	11.04	10.73	4.76	10.84	10.23	5.08	12.54	12.26
Cahir 110 kV	3.09	9.01	8.15	3.69	7.06	6.87	3.97	10.18	9.32	4.98	7.38	7.22
Carlow 110 kV	2.70	8.64	8.16	2.83	9.25	9.06	4.05	10.65	10.03	4.45	10.98	10.75
Carrickalangan 110 kV	4.09	8.61	7.54	4.71	10.25	9.71	4.83	9.32	8.14	5.74	10.90	10.31
Carrickmines 220 kV	3.94	16.63	14.99	1.94	21.21	20.27	6.01	26.83	24.67	3.28	31.90	31.00
Carrickmines A 110 kV	2.48	11.23	10.63	2.37	12.14	12.00	4.73	13.80	13.00	4.32	14.34	14.15
Carrickmines B 110 kV	2.53	12.82	11.95	2.36	15.22	14.81	4.82	15.73	14.83	4.39	18.18	17.74
Carrick-on-Shannon 110 kV	3.48	11.95	10.96	3.71	12.66	12.29	4.60	13.53	12.54	5.12	13.94	13.57
Carrigadrohid 110 kV	4.36	13.65	12.23	4.40	12.41	11.98	5.74	16.03	14.65	5.92	13.93	13.56
Carrigdangan 110 kV	2.94	5.52	5.15	3.77	6.07	5.92	3.54	6.05	5.70	4.79	6.50	6.36
Carrowbeg 110 kV	2.37	2.99	2.83	2.97	2.64	2.59	2.70	3.38	3.18	3.63	2.80	2.75
Cashla 110 kV	3.94	16.70	15.10	3.84	21.45	20.58	5.89	20.84	19.00	5.82	25.72	24.73
Cashla 220 kV	3.98	9.69	9.07	3.93	10.08	9.89	6.16	12.85	12.21	6.57	12.28	12.07
Castlebagot 110 kV	2.91	20.23	17.67	2.39	28.28	26.54	5.43	26.78	23.93	5.00	36.97	35.05
Castlebagot 220 kV	3.97	21.14	18.47	1.99	25.47	24.12	4.93	33.63	30.54	3.34	37.33	36.05
Castlebar 110 kV	3.14	5.51	5.08	3.31	5.42	5.28	3.67	6.72	6.16	4.09	5.90	5.75
Castledockrill 110 kV	3.28	7.67	7.29	2.33	8.47	8.32	5.22	9.17	8.84	3.14	9.87	9.74
Castlefarm A 110 kV	4.37	9.91	8.90	4.54	11.10	10.64	5.85	10.66	9.74	6.23	11.71	11.31
Castlefarm B 110 kV	4.38	9.89	8.88	4.54	11.09	10.62	5.86	10.64	9.73	6.24	11.69	11.30

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Castlelost 220 kV	2.59	6.67	6.45	2.75	7.18	7.08	5.02	9.80	9.70	5.51	9.47	9.43
Castletreasu 110 kV	3.88	12.65	11.69	3.90	15.39	14.87	5.26	15.73	14.66	5.32	18.51	17.99
Castleview 110 kV	2.91	11.74	10.93	3.46	11.42	11.14	3.39	14.28	13.42	4.40	13.23	12.98
Cathaleen's Fall 110 kV	3.82	10.22	9.07	4.32	10.32	9.90	5.18	12.49	10.85	5.90	11.63	11.10
Cauteen 110 kV	3.88	8.45	7.37	4.21	4.83	4.70	5.07	9.29	8.22	5.69	5.12	5.00
Celtic 380 kV	7.63	5.12	4.87	8.36	4.90	4.82	14.79	6.10	5.88	18.59	5.64	5.57
Central Park 110 kV	2.26	10.29	9.78	1.93	11.06	10.80	3.95	12.50	11.83	3.01	12.74	12.59
Charleville 110 kV	3.36	6.79	6.21	3.84	7.57	7.32	4.53	8.04	7.43	5.67	8.89	8.63
Cherrywood 110 kV	2.11	9.51	9.08	1.94	9.72	9.54	3.51	11.46	10.87	3.00	11.07	10.85
City West 110 kV	1.88	7.49	6.99	1.98	6.39	6.25	2.96	9.68	8.89	3.19	7.48	7.30
CKM Country 110 kV	2.53	12.82	11.95	2.36	15.22	14.81	4.82	15.73	14.83	4.39	18.18	17.74
Clahane 110 kV	2.74	7.84	7.26	2.70	8.40	8.16	3.44	8.79	8.24	3.43	9.05	8.84
Clashavoon 220 kV	5.11	10.65	9.62	5.12	11.82	11.40	7.27	12.87	11.98	7.65	13.81	13.44
Clashavoon A 110 kV	4.94	16.73	14.56	4.96	20.26	19.07	6.82	19.81	17.70	6.99	23.60	22.51
Clashavoon B 110 kV	4.94	16.73	14.56	4.96	20.26	19.07	6.82	19.81	17.70	6.99	23.60	22.51
Cliff 110 kV	3.41	7.43	6.81	4.17	6.78	6.60	4.45	8.98	8.07	5.56	7.48	7.25
Cloghboola 110 kV	3.57	7.47	6.93	4.21	7.84	7.62	4.97	8.10	7.67	6.40	8.14	7.98
Cloghboola 110 kV	3.57	7.47	6.93	4.21	7.84	7.62	4.97	8.10	7.67	6.40	8.14	7.98
Clogher 110 kV	4.05	9.70	8.35	4.58	10.41	9.84	4.78	10.61	9.08	5.55	11.04	10.43
Cloghran 110 kV	3.01	20.56	18.31	2.71	26.67	25.46	5.25	27.73	25.24	5.07	34.25	33.11
Cloncreen 110 kV	3.21	10.36	9.64	3.43	12.60	12.21	5.67	14.36	13.26	6.40	15.90	15.42
Clonee 220 kV	4.30	20.06	17.72	2.40	21.13	20.27	6.25	28.84	26.56	3.99	27.76	27.19
Clonfad 110 kV	2.69	7.60	7.39	2.59	8.33	8.23	4.22	9.52	9.25	3.97	9.82	9.72
Clonkeen A 110 kV	3.68	6.16	5.83	4.14	4.32	4.26	4.74	6.74	6.41	5.58	4.60	4.55
Clonkeen B 110 kV	3.40	10.03	8.69	2.45	11.47	10.82	3.94	11.26	10.01	2.73	12.65	12.08
Cloon 110 kV	3.12	7.79	7.35	3.56	8.53	8.35	4.20	9.15	8.69	5.14	9.60	9.43
Clutterland 110 kV	2.88	20.09	17.55	2.32	27.55	25.95	5.32	26.54	23.73	4.63	35.95	34.12
Codling 1 220 kV	3.91	10.87	10.18	2.09	13.00	12.61	6.46	14.25	13.66	3.18	16.26	15.99
Codling 2 220 kV	3.65	10.64	9.93	1.72	13.37	13.00	5.24	14.07	13.50	2.64	17.02	16.75

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Codling 3 220 kV	3.65	10.64	9.93	1.72	13.37	13.00	5.24	14.07	13.50	2.64	17.02	16.75
College Park 110 kV	2.86	18.84	16.98	2.24	23.50	22.57	4.91	24.92	22.93	3.47	29.64	28.82
Cookstown 110 kV	1.99	8.14	7.78	1.91	6.93	6.82	3.13	9.53	9.15	2.82	7.66	7.56
Cookstown A 110 kV	1.75	6.39	6.01	1.88	5.03	4.94	2.64	8.10	7.43	2.91	5.77	5.64
Coolderrig 110 kV	2.44	11.93	10.87	2.23	14.88	14.15	5.35	17.28	15.53	4.47	19.91	19.26
Coolnabacky 110 kV	3.24	13.40	12.84	3.27	17.23	16.86	5.23	16.30	15.75	5.39	20.40	20.12
Coolnabacky 400 kV	3.13	7.17	6.77	2.77	7.62	7.48	3.36	9.37	9.14	3.38	9.58	9.49
Coolnanoonag 110 kV	4.89	17.42	15.77	4.18	21.97	21.06	7.51	21.11	19.62	6.82	25.66	24.89
Coolroe 110 kV	2.70	9.28	8.69	3.40	8.77	8.57	3.26	11.10	10.39	4.44	9.88	9.68
Coolshamroge 110 kV	2.44	8.66	7.94	2.95	8.60	8.35	3.02	10.15	9.42	3.90	9.44	9.22
Coomagearlahy 110 kV	3.74	7.97	6.77	3.79	8.74	8.18	4.43	8.82	7.64	4.59	9.53	9.02
Coomataggart 110 kV	5.50	7.03	6.54	5.33	5.65	5.54	7.65	7.71	7.29	7.35	5.95	5.86
Coomataggart 110 kV	5.50	7.03	6.54	5.33	5.65	5.54	7.65	7.71	7.29	7.35	5.95	5.86
Coomnaclohy 110 kV	3.92	8.89	8.04	3.35	11.02	10.54	4.99	10.04	9.29	4.08	12.21	11.83
Corbetstown 110 kV	2.91	8.81	8.56	2.89	11.80	11.63	5.24	12.63	12.12	5.10	16.03	15.74
Cordal 110 kV	5.64	9.27	8.21	4.36	10.48	9.98	8.72	10.30	9.41	5.94	11.42	11.02
Corderry 110 kV	3.27	8.72	7.78	3.70	9.25	8.87	4.04	9.75	8.79	4.78	10.04	9.68
Corduff 110 kV	3.14	22.05	19.55	2.76	28.26	26.94	5.49	30.38	27.52	5.33	37.07	35.70
Corduff 220 kV	5.39	23.55	20.34	3.03	29.78	28.00	7.93	37.48	33.55	5.56	45.05	43.06
Corkagh 110 kV	2.87	19.92	17.41	2.36	27.15	25.59	5.31	26.24	23.47	4.81	35.27	33.50
Corraclassy 110 kV	3.25	6.95	6.46	3.85	5.14	5.05	3.99	7.39	6.88	4.95	5.37	5.28
Cow Cross 110 kV	3.14	11.77	10.96	3.42	10.51	10.28	3.75	14.42	13.53	4.31	12.07	11.85
Crane 110 kV	3.40	8.60	8.09	3.28	9.51	9.30	5.77	10.84	10.30	5.42	11.51	11.29
Croaghaun 110 kV	3.99	4.70	4.51	4.63	6.92	6.78	6.97	7.62	7.05	7.75	9.32	9.02
Cromcastle A 110 kV	2.83	10.97	10.14	2.34	11.89	11.61	4.84	13.20	12.19	3.66	13.75	13.33
Cromcastle B 110 kV	2.83	10.97	10.14	2.34	11.89	11.61	4.84	13.20	12.19	3.66	13.75	13.33
Crory 110 kV	3.63	8.72	8.29	3.58	10.59	10.35	6.39	10.73	10.28	6.33	12.72	12.51
Cruiserath 220 kV	5.13	22.92	19.86	2.95	28.99	27.30	7.57	36.18	32.50	5.30	43.60	41.73
Cuilleen 110 kV	2.62	6.82	6.51	2.98	7.75	7.62	4.36	9.66	9.05	5.31	9.64	9.43

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Cullenagh 110 kV	3.94	13.00	12.18	3.99	14.79	14.41	6.27	16.22	15.35	6.57	17.91	17.54
Cullenagh 220 kV	3.92	8.44	8.09	3.86	8.37	8.24	6.48	11.10	10.79	6.52	10.43	10.33
Cunghill 110 kV	2.70	5.82	5.42	3.00	5.40	5.28	3.14	6.78	6.34	3.60	5.87	5.76
Cureeny 110 kV	3.57	6.00	5.71	3.52	5.00	4.93	4.68	6.57	6.32	4.62	5.26	5.20
Cureeny T 110 kV	3.53	7.40	6.98	4.01	5.64	5.55	4.63	8.21	7.81	5.54	5.96	5.89
Cushaling 110 kV	3.23	10.50	9.76	3.47	13.02	12.60	5.76	14.61	13.47	6.62	16.50	15.99
Dallow 110 kV	2.41	5.32	5.08	2.81	3.75	3.71	3.15	6.11	5.86	3.90	4.07	4.03
Dalton 110 kV	2.66	4.73	4.31	3.31	3.72	3.63	3.10	5.36	4.87	4.18	3.96	3.87
Dardistown 110 kV	3.00	11.14	10.28	2.74	12.35	12.05	5.41	13.42	12.37	4.75	14.34	13.89
Darndale 110 kV	3.25	12.44	11.26	2.97	16.54	15.84	6.19	14.26	13.30	5.74	18.76	18.38
Deenes 110 kV	2.63	10.28	9.73	2.84	10.35	10.14	4.43	13.26	12.63	5.05	12.30	12.12
Dennistown 110 kV	2.83	5.83	5.46	2.78	7.65	7.43	4.43	7.46	7.05	4.30	9.59	9.35
Derrybrien 110 kV	2.24	4.61	4.08	2.98	4.17	4.02	2.68	5.09	4.56	3.87	4.56	4.41
Derryiron 110 kV	2.92	9.01	8.75	2.94	12.11	11.93	5.29	13.01	12.46	5.33	16.54	16.23
Derrylahan 110 kV	3.06	12.07	11.38	3.23	13.80	13.44	5.58	17.99	16.95	5.89	18.50	18.12
Donore 110 kV	2.78	11.09	10.32	2.87	13.70	13.28	5.12	15.61	14.48	5.45	17.73	17.22
Doon 110 kV	2.95	7.23	6.71	3.14	5.34	5.24	3.81	8.17	7.63	4.15	5.67	5.58
Dromada 110 kV	4.34	8.33	7.33	3.34	7.81	7.48	6.59	9.11	8.22	4.57	8.25	7.98
Drombeg 110 kV	3.75	8.78	8.26	3.96	9.14	8.94	5.42	9.96	9.52	5.91	10.06	9.90
Drumkeen 110 kV	3.48	8.41	7.39	4.14	7.12	6.85	3.84	8.85	7.76	4.74	7.28	7.01
Drumline 110 kV	2.41	8.45	7.80	2.93	7.69	7.50	2.95	9.88	9.21	3.85	8.43	8.26
Drybridge 110 kV	2.73	13.79	12.64	2.82	14.68	14.22	4.77	19.66	18.15	5.04	18.67	18.16
Dublin Array 220 kV	3.56	14.95	13.59	1.76	18.70	17.98	5.00	22.90	21.32	2.89	26.80	26.18
Dundalk 110 kV	2.16	8.91	8.37	2.53	8.08	7.93	2.72	9.97	9.38	3.40	8.68	8.52
Dunfirth 110 kV	2.49	6.56	6.41	2.73	6.46	6.40	3.19	6.83	6.67	3.82	6.62	6.57
Dungarvan 110 kV	3.79	6.39	5.94	3.93	7.08	6.89	5.44	7.56	7.08	5.71	8.04	7.85
Dunmanway 110 kV	3.50	9.14	8.15	4.12	8.63	8.30	4.59	10.40	9.35	5.60	9.44	9.13
Dunstown 220 kV	4.54	18.67	16.87	2.54	20.65	19.94	4.57	25.64	24.31	4.21	26.71	26.24
Dunstown 400 kV	3.27	7.54	7.08	2.98	8.70	8.52	3.73	9.65	9.39	4.11	10.93	10.89

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Effernoge 110 kV	3.45	8.56	8.07	3.39	9.51	9.30	5.92	10.70	10.21	5.76	11.42	11.23
Ennis 110 kV	3.06	12.10	10.56	3.53	11.07	10.59	3.81	14.18	12.57	4.75	12.31	11.86
Fassaroe East 110 kV	1.76	7.61	7.29	1.84	5.85	5.78	2.61	8.90	8.53	2.68	6.42	6.35
Fassaroe West 110 kV	1.78	7.77	7.44	1.86	6.04	5.97	2.65	9.10	8.72	2.70	6.64	6.56
Ferry View 110 kV	3.15	5.64	5.41	3.50	7.67	7.53	3.98	6.22	5.94	4.61	8.09	7.93
Finglas 220 kV	5.54	23.19	20.05	3.07	29.43	27.67	8.33	37.13	33.18	5.61	44.81	42.79
Finglas A 110 kV	3.39	12.94	11.84	3.20	14.13	13.69	6.90	15.91	14.61	6.48	16.55	15.97
Finglas B 110 kV	3.39	12.54	11.65	3.17	16.06	15.58	7.45	16.79	15.56	7.00	20.90	20.44
Firlough 110 kV	3.42	4.91	4.71	3.98	6.33	6.22	4.91	6.77	6.41	5.81	7.86	7.69
Flagford 110 kV	3.65	12.48	11.47	3.95	14.85	14.35	4.92	14.18	13.14	5.60	16.49	15.99
Flagford 220 kV	3.99	7.30	6.95	4.40	6.71	6.60	5.93	8.25	7.94	7.06	7.32	7.24
Fortunestown 110 kV	1.83	7.37	6.89	1.94	6.31	6.17	2.84	9.51	8.75	3.06	7.39	7.20
Francis Street A 110 kV	2.37	12.31	11.40	1.81	14.62	14.18	3.90	14.85	13.57	2.64	16.77	16.39
Francis Street B 110 kV	2.31	12.17	11.27	1.85	14.93	14.33	4.06	14.68	13.67	2.92	17.26	16.97
Gallanstown 110 kV	2.61	11.25	10.52	2.79	11.40	11.15	4.54	14.45	13.91	5.16	13.69	13.49
Galway 110 kV	3.41	13.35	12.09	3.00	16.08	15.39	4.48	15.98	14.40	3.86	18.46	17.70
Garballagh 110 kV	2.83	11.05	10.36	2.97	12.77	12.45	5.31	15.86	14.85	5.74	16.42	16.05
Garrintaggar 110 kV	3.09	8.19	7.98	3.34	8.50	8.42	4.73	9.37	9.15	5.40	9.37	9.29
Garrow 110 kV	5.72	11.63	10.12	5.05	14.40	13.54	8.22	13.26	11.88	6.90	16.15	15.41
Garvagh 110 kV	3.46	6.97	6.20	3.90	8.02	7.66	4.37	7.76	6.99	5.14	8.75	8.40
Gilra 110 kV	2.40	6.50	6.18	2.82	4.88	4.82	2.92	7.09	6.78	3.61	5.23	5.17
Glanagow 220 kV	6.07	12.80	11.65	5.92	16.59	15.93	12.25	20.90	18.88	11.43	25.04	23.98
Glanlee 110 kV	3.64	7.86	6.68	3.55	8.57	8.03	4.30	8.68	7.53	4.24	9.34	8.85
Glasmore A 110 kV	2.02	6.79	6.42	2.12	4.73	4.66	2.98	8.08	7.52	3.18	5.18	5.09
Glen 110 kV	3.45	6.95	6.18	3.89	8.00	7.65	4.36	7.74	6.97	5.13	8.74	8.39
Glenart 220 kV	2.63	7.29	7.01	2.55	9.06	8.90	4.38	8.92	8.70	4.34	10.81	10.75
Glencloosagh 220 kV	4.65	15.99	14.39	3.77	8.70	8.53	7.14	26.33	24.26	6.54	10.26	10.14
Glenlara A 110 kV	2.57	3.20	3.01	3.31	2.68	2.64	3.05	3.51	3.31	4.19	2.93	2.88
Glenlara B 110 kV	5.10	8.55	7.21	3.63	9.54	8.91	7.17	9.30	8.09	4.56	10.26	9.72

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Glenree 110 kV	3.30	4.94	4.73	3.71	5.98	5.88	4.59	6.59	6.26	5.10	7.20	7.06
Golagh 110 kV	3.39	7.73	6.86	3.93	6.75	6.51	3.84	8.36	7.39	4.58	7.11	6.85
Gorman 110 kV	3.00	14.73	13.62	3.08	17.98	17.40	4.73	19.17	17.90	5.16	22.21	21.62
Gorman 220 kV	3.12	11.45	10.81	3.02	9.65	9.49	4.94	13.64	13.23	5.04	10.81	10.71
Gorman ESS 110 kV	2.97	14.49	13.41	3.03	17.58	17.02	4.66	18.77	17.56	5.01	21.62	21.06
Gortawee 110 kV	3.30	6.57	6.10	4.03	5.21	5.11	4.15	7.01	6.52	5.39	5.38	5.28
Grahomick110 kV	2.56	5.06	4.78	2.49	6.64	6.48	3.78	6.35	6.06	3.61	8.17	8.00
Grange 110 kV	2.89	11.27	10.39	1.87	11.42	11.16	5.05	13.64	12.54	2.64	13.15	12.75
Grange Castle 110 kV	2.46	12.26	11.12	2.24	16.00	15.17	5.52	17.93	16.06	4.63	21.85	21.06
Great Island 110 kV	4.05	13.67	12.91	4.09	16.96	16.53	6.96	17.36	16.52	7.36	21.21	20.78
Great Island 220 kV	3.91	9.92	9.48	3.78	11.68	11.45	8.14	15.31	14.84	8.21	17.38	17.15
Greenlink 150 kV	4.18	13.08	12.51	5.74	4.86	4.83	9.13	19.74	19.17	17.16	5.40	5.39
Griffinrath A 110 kV	2.55	10.39	9.98	2.61	10.38	10.22	3.97	12.31	11.98	4.15	11.84	11.71
Griffinrath B 110 kV	2.62	10.76	10.33	2.63	10.39	10.23	4.16	12.79	12.49	4.19	11.85	11.72
Harolds Cross 110 kV	2.38	12.35	11.44	1.76	14.57	14.14	3.92	14.90	13.62	2.54	16.70	16.33
Harristown 110 kV	2.58	7.42	7.22	2.78	8.39	8.30	3.77	8.99	8.76	4.33	9.73	9.64
Heuston 110 kV	2.34	12.42	11.48	1.96	15.41	14.77	4.18	15.00	13.96	3.20	17.86	17.55
Huntstown A 220 kV	5.36	23.18	20.06	3.09	14.07	13.63	7.56	36.37	32.60	6.65	14.47	14.27
Huntstown B 220 kV	5.35	23.17	20.05	2.30	15.38	14.82	7.53	36.36	32.60	3.70	16.85	16.56
Ikerrin 110 kV	3.51	5.20	4.61	3.86	6.34	6.03	5.38	6.43	5.83	6.06	7.47	7.18
Inchicore 220 kV	4.39	20.46	17.91	2.13	26.18	24.70	6.18	35.30	31.70	3.54	41.97	40.19
Inchicore A 110 kV	2.64	13.70	12.62	2.43	17.49	16.72	5.12	16.78	15.59	4.80	20.86	20.17
Inchicore B 110 kV	2.66	13.26	11.99	2.46	17.69	16.76	6.25	19.26	17.31	5.64	24.58	23.53
Inniscarra 110 kV	2.68	9.15	8.57	3.34	8.43	8.25	3.27	10.98	10.26	4.38	9.47	9.28
Irishtown 220 kV	4.03	17.53	15.70	1.99	22.93	21.81	6.47	31.56	28.58	3.59	38.25	36.73
Kellis 110 kV	2.94	9.27	8.75	3.08	11.21	10.96	4.64	11.40	10.81	5.19	13.69	13.39
Kellis 220 kV	3.01	7.66	7.36	3.24	6.66	6.58	4.96	9.24	9.07	5.69	7.64	7.58
Kellystown 220 kV	4.06	18.16	16.34	2.36	18.73	18.14	4.63	24.23	22.93	3.94	23.23	22.91
Kilbarry 110 kV	3.94	15.26	13.78	4.30	14.96	14.45	5.13	19.42	17.60	5.95	17.77	17.22

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Kilcarbery 110 kV	2.86	19.76	17.30	2.35	26.57	25.08	5.29	26.06	23.34	4.76	34.46	32.77
Kildonan 110 kV	2.52	14.61	13.44	2.15	13.63	13.24	4.02	18.32	17.25	3.22	15.94	15.62
Kilkenny 110 kV	2.76	7.45	7.18	3.14	6.66	6.59	3.98	8.79	8.43	4.87	7.36	7.28
Kill Hill 110 kV	3.40	6.46	5.82	4.14	5.60	5.43	4.50	7.18	6.58	5.74	5.99	5.84
Killinskyduf 110 kV	2.99	9.27	8.77	2.96	12.60	12.26	5.13	11.15	10.64	4.99	15.05	14.73
Killonan 110 kV	3.95	19.11	16.90	4.03	23.08	22.00	5.59	23.61	21.37	5.87	27.56	26.47
Killonan 220 kV	4.09	10.55	9.78	4.37	10.02	9.82	5.82	12.69	12.14	7.15	11.44	11.28
Killoteran 110 kV	3.75	11.92	11.18	3.73	12.84	12.55	5.85	14.84	14.00	5.90	15.41	15.09
Kilmahud 110 kV	2.86	19.84	17.36	2.34	26.63	25.13	5.27	26.12	23.40	4.68	34.48	32.80
Kilmore 110 kV	2.98	11.50	10.59	2.56	12.51	12.20	5.34	13.93	12.80	4.22	14.55	14.08
Kilnap 110 kV	3.96	16.13	14.53	4.30	15.53	14.99	5.08	20.31	18.51	5.88	18.24	17.72
Kilpaddoge 110 kV	4.96	17.65	15.95	4.32	22.79	21.80	7.67	21.43	19.90	7.25	26.77	25.94
Kilpaddoge 220 kV	4.76	16.09	14.47	4.09	21.62	20.57	7.60	26.60	24.49	6.61	32.97	31.79
Kilpaddoge 400 kV	3.80	8.46	7.80	3.15	10.49	10.14	4.24	13.77	13.00	4.00	15.62	15.26
Kilteel 110 kV	2.30	8.14	7.79	2.59	8.29	8.18	3.31	9.52	9.10	3.97	9.25	9.11
Kilvinoge 110 kV	3.35	7.22	7.02	3.63	7.77	7.70	4.91	8.16	7.99	5.62	8.54	8.47
Kinnegad 110 kV	2.70	8.43	8.17	2.80	9.18	9.07	4.19	10.70	10.36	4.47	10.92	10.80
Kishoge 110 kV	2.82	19.38	17.04	2.30	25.42	24.05	5.15	25.43	22.85	4.49	32.45	31.08
Knockacummer 110 kV	4.85	7.47	6.27	4.13	7.21	6.77	6.57	8.04	6.93	5.36	7.50	7.14
Knockalough 110 kV	3.19	5.02	4.84	3.02	6.71	6.60	4.06	5.51	5.29	3.82	7.07	6.95
Knockanure 220 kV	4.63	13.88	12.53	3.30	17.97	17.19	7.62	20.01	18.69	4.47	24.14	23.42
Knockanure A 110 kV	5.60	12.43	11.06	4.71	13.91	13.29	10.06	14.12	12.90	8.14	15.22	14.70
Knockanure B 110 kV	2.93	8.70	8.09	3.17	7.17	7.02	3.74	9.76	9.19	4.23	7.72	7.59
Knockearagh 110 kV	3.51	5.75	5.38	4.20	4.74	4.65	4.55	6.40	5.95	5.83	5.13	5.03
Knocknamona 110 kV	3.80	6.32	5.85	3.73	9.44	9.07	5.24	7.30	6.82	5.10	10.84	10.48
Knockraha 380 kV	7.74	5.13	4.88	8.32	5.21	5.12	15.33	6.12	5.89	18.71	6.04	5.96
Knockraha A 110 kV	4.73	19.48	17.43	4.86	21.53	20.59	6.87	25.84	23.47	7.32	26.87	25.94
Knockraha A 220 kV	5.72	14.79	13.36	5.46	17.56	16.87	9.52	21.61	19.79	9.07	24.16	23.34
Knockraha B 110 kV	4.73	19.48	17.43	4.86	21.53	20.59	6.87	25.84	23.47	7.32	26.87	25.94

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Knockraha B 220 kV	5.72	14.79	13.36	5.46	17.56	16.87	9.52	21.61	19.79	9.07	24.16	23.34
Knockranny 110 kV	3.92	8.55	7.66	3.40	10.78	10.26	5.34	9.56	8.59	4.48	11.78	11.25
Knockranny A 110 kV	3.12	5.79	5.56	3.48	7.86	7.72	3.93	6.40	6.11	4.58	8.30	8.13
Knockranny B 110 kV	3.92	8.55	7.66	3.40	10.78	10.26	5.34	9.56	8.59	4.48	11.78	11.25
Knockumber 110 kV	2.17	8.34	7.92	2.41	6.40	6.31	2.90	9.87	9.41	3.47	7.09	7.01
Laghtanvack 110 kV	3.95	5.12	4.90	4.49	8.23	8.04	7.61	8.95	8.16	8.27	12.03	11.53
Lanesboro 110 kV	2.93	9.66	9.22	3.32	9.85	9.70	3.86	11.34	10.78	4.70	10.99	10.81
Lenalea 110 kV	3.53	6.62	6.01	4.24	7.21	6.95	3.94	7.03	6.35	4.89	7.49	7.22
Letterkenny110 kV	3.82	10.07	8.67	4.39	9.50	9.04	4.25	10.73	9.18	5.07	9.90	9.41
Liberty A 110 kV	3.75	15.54	14.02	3.36	17.03	16.36	4.73	19.75	17.91	4.13	20.48	19.77
Liberty B 110 kV	3.71	15.53	14.01	3.29	16.99	16.33	4.65	19.72	17.89	4.01	20.42	19.71
Lickny 110 kV	2.21	4.99	4.87	2.09	5.84	5.79	3.00	5.57	5.44	2.81	6.36	6.31
Limerick 110 kV	3.27	16.20	14.46	3.48	15.16	14.57	4.28	19.67	17.81	4.74	17.35	16.82
Lisdrum 110 kV	2.15	5.68	5.44	2.38	8.08	7.92	2.62	6.09	5.78	2.97	8.58	8.37
Lisdrumdoagh 110 kV	2.15	5.67	5.43	2.39	8.10	7.94	2.62	6.08	5.77	3.00	8.61	8.40
Lisheen 110 kV	2.99	4.94	4.08	3.39	7.88	7.07	3.67	5.43	4.59	4.22	8.60	7.83
Lislea 110 kV	2.31	6.17	5.80	2.70	4.75	4.68	2.81	6.59	6.21	3.45	4.99	4.91
Lodgewood 110 kV	3.63	8.72	8.29	3.58	10.59	10.35	6.39	10.73	10.28	6.33	12.72	12.51
Lodgewood 220 kV	3.10	7.19	6.93	3.15	6.96	6.86	5.31	9.07	8.86	5.50	8.31	8.24
Longpoint 220 kV	6.15	13.33	12.10	6.19	17.29	16.57	12.44	21.66	19.52	12.67	25.96	24.83
Loughtown 220 kV	3.88	9.86	9.44	3.71	11.57	11.34	7.91	15.17	14.71	7.73	17.13	16.91
Louth 220 kV	3.84	17.04	15.65	3.55	19.38	18.69	5.94	20.93	19.90	5.85	22.51	22.06
Louth A 110 kV	3.49	13.74	12.78	3.53	17.42	16.81	5.31	15.70	14.88	5.63	19.53	19.09
Louth A 275 kV	4.30	10.19	9.55	3.81	11.86	11.59	7.04	12.32	11.87	6.25	13.85	13.63
Louth B 110 kV	3.29	14.37	13.45	3.28	17.73	17.16	4.69	16.25	15.44	4.89	19.72	19.31
Louth B 275 kV	4.20	10.19	9.55	3.62	12.08	11.81	6.75	12.32	11.88	5.70	14.21	13.98
Lumcloon 110 kV	3.34	8.17	7.86	3.61	9.68	9.54	5.13	9.57	9.30	5.82	10.83	10.72
Lysaghtstown 110 kV	2.87	11.01	10.26	3.14	13.04	12.66	3.58	13.75	12.96	4.08	15.48	15.13
Macetown 110 kV	2.59	16.30	14.89	2.39	16.80	16.28	4.22	20.87	19.45	3.85	20.11	19.59

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Macroom 110 kV	4.53	15.76	13.85	4.42	16.24	15.48	6.03	18.75	16.86	5.92	18.63	17.94
Mallow 110 kV	3.58	6.57	6.18	4.28	5.77	5.67	4.71	7.55	7.13	6.10	6.43	6.32
Marina 110 kV	4.18	17.22	15.38	4.48	19.00	18.18	5.56	22.40	20.08	6.31	23.27	22.36
Maynooth A 110 kV	2.97	13.19	12.56	2.96	16.08	15.85	5.16	16.14	15.55	5.24	19.13	18.82
Maynooth A 220 kV	4.21	20.40	18.12	2.07	20.63	19.92	4.55	29.55	27.67	3.30	26.88	26.41
Maynooth B 110 kV	2.70	17.10	15.95	2.81	16.34	15.91	4.22	20.34	19.40	4.68	18.59	18.28
Maynooth B 220 kV	3.73	17.97	16.16	2.06	17.69	17.14	4.03	24.81	23.38	3.21	22.14	21.77
McDermott 110 kV	3.01	11.48	10.69	2.15	13.64	13.27	5.71	15.10	13.95	3.21	17.17	16.61
Meath Hill 110 kV	2.36	9.45	8.97	2.74	9.44	9.26	3.09	10.69	10.15	3.85	10.22	10.05
Meentycat 110 kV	3.26	6.92	6.17	4.17	5.82	5.63	3.57	7.20	6.42	4.76	5.83	5.64
Midleton 110 kV	2.75	9.83	9.20	3.13	10.95	10.66	3.35	12.03	11.35	4.01	12.70	12.44
Milltown A 110 kV	2.56	13.38	12.30	1.99	16.11	15.44	4.43	16.30	14.83	3.05	18.94	18.23
Milltown B 110 kV	2.12	10.95	10.24	1.53	13.17	12.82	3.49	13.09	12.24	2.20	15.07	14.63
Misery Hill 110 kV	2.50	13.05	12.01	2.06	15.87	15.21	4.26	15.86	14.44	3.22	18.36	17.91
Monatooreen 110 kV	3.79	18.19	16.39	3.81	20.00	19.18	4.79	23.74	21.71	4.97	24.64	23.86
Moneteen 110 kV	3.40	11.29	10.34	3.70	8.35	8.17	4.44	12.79	11.93	5.02	9.07	8.91
Moneypoint 110 kV	4.56	9.47	8.93	4.75	9.37	9.18	7.76	10.55	10.14	8.37	10.16	10.03
Moneypoint 220 kV	4.79	15.84	14.28	4.05	21.30	20.30	7.60	25.90	23.93	6.47	32.23	31.12
Moneypoint G1 400 kV	4.26	8.56	7.89	3.72	11.32	10.89	5.34	14.05	13.25	5.39	17.30	16.93
Moneypoint G2 400 kV	4.26	8.56	7.89	3.72	11.32	10.89	5.34	14.05	13.25	5.39	17.30	16.93
Moneypoint G3 400 kV	4.26	8.56	7.89	3.72	11.32	10.89	5.34	14.05	13.25	5.39	17.30	16.93
Monread 110 kV	2.25	8.04	7.76	2.49	8.09	7.97	3.14	9.44	9.01	3.70	8.97	8.83
Mooretown 220 kV	5.49	23.34	20.18	3.02	29.50	27.74	8.12	36.79	32.94	5.35	44.32	42.35
Mount Lucas 110 kV	2.94	7.70	7.36	2.93	8.49	8.36	4.31	9.56	9.17	4.35	9.96	9.82
Moy 110 kV	3.69	4.72	4.52	4.28	6.08	5.96	6.43	7.80	7.22	7.32	8.32	8.09
Mulgeeth 110 kV	2.55	6.56	6.38	2.79	7.34	7.27	3.38	7.02	6.87	3.97	7.75	7.68
Mullagharlin 110 kV	2.20	9.05	8.58	2.58	9.18	9.01	2.79	10.09	9.59	3.49	9.87	9.71
Mullingar 110 kV	2.62	7.54	7.26	2.68	8.76	8.63	3.96	9.03	8.68	4.10	10.02	9.87
Mulreavy 110 kV	4.13	8.65	7.43	4.62	9.48	8.94	4.86	9.34	8.00	5.56	9.98	9.41

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Mungret A 110 kV	3.26	10.69	9.83	3.58	7.74	7.57	4.19	12.04	11.25	4.81	8.37	8.24
Mungret B 110 kV	3.25	10.71	9.84	3.58	7.74	7.58	4.18	12.07	11.27	4.80	8.38	8.25
Nangor 110 kV	2.41	11.96	10.90	2.11	15.50	14.72	5.17	17.36	15.60	4.01	21.01	20.28
Navan 110 kV	2.80	12.85	11.94	2.92	13.52	13.17	4.27	16.39	15.35	4.67	16.09	15.74
Nenagh 110 kV	2.46	3.91	3.68	3.08	2.35	2.32	2.97	4.24	4.01	3.92	2.46	2.44
Newbridge 110 kV	2.43	10.63	10.04	2.63	10.13	9.95	3.42	12.90	12.15	3.90	11.56	11.35
Newbury 110 kV	3.21	12.30	11.16	2.77	16.18	15.51	6.07	14.10	13.18	5.01	18.38	18.02
NISA Belcamp 220 kV	4.01	13.23	12.16	2.19	16.60	15.94	6.41	17.52	16.59	3.17	21.17	20.80
North Quays 110 kV	2.67	13.67	12.55	1.94	16.13	15.46	4.74	16.70	15.23	2.94	18.95	18.25
North Wall 220 kV	4.71	20.29	17.86	2.36	23.13	22.05	7.09	32.48	29.46	3.69	33.69	32.60
Oaklands 110 kV	3.03	8.16	7.79	3.03	9.46	9.29	5.02	9.63	9.28	4.98	10.78	10.62
Oldbridge 110 kV	2.76	13.03	11.96	2.86	15.57	15.03	5.18	19.35	17.71	5.55	20.80	20.12
Oldcourt A 110 kV	2.85	9.90	9.32	3.23	7.92	7.79	3.34	11.81	11.20	4.01	8.90	8.78
Oldcourt B 110 kV	2.87	9.96	9.37	3.24	8.01	7.87	3.37	11.89	11.28	4.03	9.00	8.87
Oldstreet 220 kV	4.05	8.01	7.68	3.79	9.33	9.21	7.27	12.98	12.38	7.18	13.57	13.33
Oldstreet 400 kV	3.93	7.17	6.77	3.24	6.95	6.83	4.16	10.46	10.13	3.95	9.13	9.03
Oriel 220 kV	3.59	12.36	11.66	2.91	12.09	11.90	5.50	14.50	14.07	4.38	13.52	13.37
Oriel Offshore 220 kV	3.59	8.33	8.01	2.94	9.19	9.04	5.44	9.35	9.21	4.34	10.07	9.99
Oriel Onshore 220 kV	3.75	8.99	8.62	2.98	9.71	9.54	5.86	10.20	10.00	4.48	10.69	10.59
Oughtragh 110 kV	2.58	4.70	4.37	3.09	3.00	2.95	3.14	5.14	4.78	3.95	3.16	3.11
Pelletstown 110 kV	2.92	10.85	10.15	2.40	11.81	11.59	5.35	14.08	13.10	3.85	14.59	14.19
Philipstown 110 kV	3.13	10.01	9.35	3.31	11.42	11.11	5.30	13.63	12.66	5.78	14.12	13.75
Platin 110 kV	2.79	12.74	11.75	2.87	14.86	14.39	5.81	20.32	18.53	5.93	20.55	19.87
Pollahoney 110 kV	3.05	8.79	8.33	3.07	12.09	11.78	5.27	10.49	10.04	5.30	14.31	14.02
Pollaphuca 110 kV	1.74	2.54	2.49	2.26	2.30	2.29	2.70	3.22	3.11	3.70	2.63	2.61
Poolbeg A 110 kV	2.86	14.27	13.09	2.58	17.82	17.05	5.23	17.54	16.02	4.80	21.20	20.36
Poolbeg A 220 kV	4.88	20.39	17.95	2.32	22.46	21.44	7.27	32.97	29.86	3.60	32.52	31.52
Poolbeg B 110 kV	2.85	14.25	13.07	2.58	17.80	17.03	5.23	17.52	15.99	4.80	21.17	20.34
Poolbeg B 220 kV	4.63	19.43	17.14	2.16	24.48	23.21	6.38	32.27	29.29	3.71	37.59	36.22

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Poppintree 110 kV	3.01	11.85	10.91	2.57	12.86	12.53	5.47	14.42	13.23	4.26	15.00	14.51
Portan 260 kV	4.47	12.22	11.46	4.85	3.26	3.24	6.24	16.16	15.72	11.09	3.39	3.38
Portan 400 kV	4.72	10.71	9.85	3.78	9.20	8.97	5.53	14.58	14.01	7.32	10.88	10.83
Portlaoise 110 kV	3.01	12.39	11.84	3.19	11.40	11.23	4.47	14.74	14.20	5.00	12.72	12.58
Pottery 110 kV	2.33	10.64	10.09	1.73	10.85	10.60	4.18	12.98	12.26	2.58	12.47	12.33
Prospect 220 kV	4.21	13.35	12.24	3.18	14.96	14.45	6.64	20.08	18.95	4.54	19.80	19.39
Raffeen 220 kV	5.92	12.69	11.55	5.49	15.90	15.28	11.23	19.70	17.91	9.29	22.87	22.00
Raffeen A 110 kV	3.85	13.68	12.56	4.16	16.09	15.54	4.98	17.12	15.88	5.68	19.44	18.87
Raffeen B 110 kV	4.91	13.60	12.48	5.09	16.54	15.94	7.76	17.03	15.79	8.26	20.06	19.45
Rappareehill 110 kV	3.06	7.48	7.23	3.48	8.16	8.07	4.10	8.47	8.16	5.00	8.96	8.84
Rathkeale 110 kV	2.43	7.56	6.99	3.01	5.79	5.67	2.99	8.43	7.83	3.96	6.18	6.06
Rathnaskillo 110 kV	3.65	7.10	6.72	3.98	7.70	7.55	5.46	8.58	8.21	6.26	8.81	8.67
Ratrussan 110 kV	3.11	8.14	6.99	3.60	8.71	8.23	4.04	8.76	7.64	4.96	9.13	8.69
Reamore 110 kV	2.62	9.05	8.14	2.70	7.86	7.61	3.16	10.10	9.19	3.35	8.42	8.19
Richmond A 110 kV	2.39	6.61	6.38	2.93	5.98	5.92	3.02	7.58	7.23	4.02	6.60	6.51
Richmond B 110 kV	2.39	6.61	6.38	2.93	5.98	5.92	3.02	7.58	7.23	4.02	6.60	6.51
Rinawade 110 kV	2.49	10.95	10.44	2.58	8.22	8.11	3.62	12.36	11.84	3.99	9.41	9.30
Ringaskiddy 110 kV	3.90	11.30	10.54	4.01	11.25	10.97	5.22	13.78	12.95	5.43	13.06	12.80
Ringsend 110 kV	2.87	14.39	13.16	2.61	17.97	17.17	5.27	17.74	16.12	4.87	21.42	20.54
Rosspile 110 kV	3.51	7.74	7.34	3.61	8.53	8.36	5.63	9.62	9.24	5.95	9.97	9.83
Ryebrook 110 kV	2.28	14.22	12.98	2.43	12.55	12.19	3.31	16.55	15.61	3.77	13.83	13.56
Salthill 110 kV	3.17	12.77	11.59	2.60	15.12	14.52	4.04	15.17	13.74	3.20	17.22	16.55
Screeb 110 kV	2.79	2.67	2.60	3.30	1.86	1.85	3.48	2.94	2.81	4.33	1.98	1.96
Seal Rock A 110 kV	4.55	10.13	9.08	4.64	11.83	11.31	6.18	10.89	9.94	6.42	12.47	12.03
Seal Rock B 110 kV	4.56	10.14	9.08	4.65	11.84	11.31	6.20	10.90	9.94	6.43	12.48	12.03
Shankill 110 kV	3.04	9.22	8.15	3.44	8.13	7.84	3.94	10.13	9.06	4.70	8.69	8.41
Shannonbridge 110 kV	3.07	13.46	12.54	3.24	17.74	17.15	5.87	20.86	19.48	6.50	25.65	24.92
Shannonbridge 220 kV	3.26	7.10	6.82	3.55	8.11	7.98	5.83	8.84	8.67	6.79	9.56	9.50
Shanonagh 110 kV	2.67	7.06	6.83	2.86	8.17	8.07	4.05	8.39	8.11	4.50	9.26	9.14

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Shellybanks A 220 kV	4.84	20.36	17.92	2.38	22.99	21.93	7.12	32.89	29.78	3.77	33.51	32.43
Shellybanks B 220 kV	3.94	16.82	15.12	1.83	21.65	20.65	6.32	29.99	27.25	3.21	35.36	34.07
Shelton Abbey 110 kV	3.03	8.60	8.16	3.01	11.41	11.14	5.18	10.24	9.81	5.10	13.42	13.16
Singland 110 kV	3.72	15.44	13.91	3.91	15.54	14.96	5.28	19.01	17.39	5.70	18.00	17.47
Skerd Rock 220 kV	3.74	8.62	8.11	2.30	11.69	11.37	4.58	10.98	10.59	2.64	14.45	14.22
Sliabh Bawn 110 kV	3.18	8.89	8.50	3.65	8.81	8.68	4.25	10.10	9.69	5.24	9.39	9.27
Slievecallan 110 kV	4.43	6.73	5.75	5.09	6.75	6.39	6.24	7.34	6.39	7.71	7.10	6.77
Sligo 110 kV	2.92	9.69	8.89	3.25	8.89	8.66	3.45	11.10	10.20	4.02	9.70	9.45
Snughborough 110 kV	3.05	20.59	18.34	2.70	26.46	25.27	5.42	27.77	25.29	5.02	33.92	32.81
Somerset 110 kV	2.09	7.08	6.74	2.54	4.77	4.72	2.60	8.55	8.24	3.45	5.29	5.25
Sorne Hill 110 kV	3.13	3.73	3.13	3.90	3.52	3.32	3.39	3.87	3.25	4.32	3.62	3.41
Srahnakilly 110 kV	4.00	5.01	4.80	4.59	8.03	7.85	7.21	8.40	7.71	8.03	11.35	10.91
Srananagh 110 kV	3.48	11.33	10.26	3.81	12.07	11.64	4.30	12.99	11.84	4.94	13.37	12.93
Srananagh 220 kV	4.19	4.68	4.47	4.72	3.71	3.67	6.06	5.16	4.98	7.31	3.98	3.94
Stevenstown 110 kV	2.00	5.67	5.40	2.11	3.73	3.69	2.88	6.43	6.16	3.10	4.02	3.97
Stonestown 110 kV	3.33	8.69	8.31	3.59	9.92	9.75	5.20	10.40	10.05	5.85	11.36	11.22
Stratford 110 kV	1.90	3.99	3.86	2.30	3.12	3.10	2.70	4.84	4.62	3.41	3.47	3.43
Taney 110 kV	2.03	9.21	8.80	1.35	9.12	8.96	3.29	11.04	10.51	1.84	10.31	10.12
Tarbert 110 kV	4.77	7.45	7.23	4.91	5.56	5.52	9.82	8.36	8.22	10.12	5.97	5.94
Tarbert 220 kV	4.58	15.35	13.87	3.95	19.80	18.92	7.46	25.47	23.50	6.50	29.70	28.72
Tawnaghmore A 110 kV	3.16	3.78	3.65	3.82	4.17	4.12	4.65	5.91	5.57	5.76	5.33	5.24
Tawnaghmore B 110 kV	3.13	3.70	3.58	3.71	4.55	4.49	5.36	6.19	5.77	6.52	6.23	6.08
Thornsberry 110 kV	2.83	6.88	6.63	3.09	6.59	6.52	4.44	8.82	8.46	5.10	7.86	7.76
Thurles 110 kV	3.48	6.11	5.16	4.00	7.31	6.80	4.74	7.00	6.04	5.58	8.10	7.63
Tievebrack 110 kV	3.64	4.79	4.43	4.52	3.38	3.32	4.17	5.15	4.74	5.37	3.54	3.47
Timahoe 110 kV	2.74	7.82	7.60	2.50	8.03	7.95	4.48	9.56	9.36	3.83	9.26	9.19
Timoney 110 kV	3.51	5.21	4.63	3.88	6.50	6.18	5.43	6.48	5.89	6.17	7.73	7.43
Tipperary 110 kV	3.54	7.55	6.81	4.02	4.65	4.55	4.60	8.35	7.63	5.45	4.92	4.83
Tonroe 110 kV	2.14	3.47	3.26	2.84	3.24	3.17	2.56	3.76	3.52	3.61	3.46	3.39

Table E-3: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2027

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Trabeg 110 kV	4.14	17.14	15.32	4.43	18.93	18.11	5.49	22.29	19.99	6.23	23.18	22.28
Tralee 110 kV	3.24	9.64	8.64	3.44	8.42	8.14	4.16	10.88	9.85	4.60	9.07	8.81
Trien A 110 kV	2.87	8.22	7.61	3.13	7.44	7.26	3.65	9.22	8.63	4.14	8.02	7.86
Trien B 110 kV	4.58	9.91	8.95	3.96	7.75	7.53	7.42	10.97	10.16	5.90	8.14	7.97
Trillick 110 kV	3.18	4.06	3.40	3.95	3.51	3.33	3.45	4.22	3.53	4.39	3.62	3.43
Trinity 110 kV	2.43	12.68	11.72	1.94	15.27	14.80	4.06	15.35	14.00	2.93	17.59	17.18
Tullabeg 110 kV	2.90	6.56	6.33	2.95	8.67	8.51	4.70	8.14	7.88	4.89	10.56	10.42
Tullabrack 110 kV	3.43	7.29	6.88	3.58	5.45	5.37	4.73	7.92	7.59	5.09	5.75	5.69
Turlough 220 kV	3.13	12.35	11.36	3.07	10.96	10.62	4.84	14.51	13.79	5.18	11.91	11.72
Tynagh 220 kV	3.92	7.74	7.40	3.92	9.50	9.38	8.49	13.78	12.93	9.07	14.67	14.32
Uggool 110 kV	3.99	8.22	7.34	3.60	10.36	9.85	5.45	9.13	8.18	4.82	11.29	10.77
Walterstown 110 kV							3.18	9.65	9.24	3.83	7.68	7.59
Waterford 110 kV	3.81	12.51	11.75	3.84	13.37	13.06	6.02	15.69	14.78	6.23	16.11	15.78
Wexford 110 kV	3.39	7.06	6.54	2.86	8.62	8.35	5.65	9.07	8.46	4.19	10.69	10.39
Whitebank 110 kV	2.83	14.34	13.12	2.56	17.87	17.08	5.12	17.66	16.05	4.69	21.28	20.41
Whitegate 110 kV	3.25	9.27	8.73	3.61	9.62	9.42	3.99	11.01	10.51	4.65	10.95	10.78
Wolfe Tone 110 kV	2.94	11.23	10.47	2.07	13.19	12.84	5.41	14.71	13.61	3.03	16.50	15.97
Woodhouse 110 kV	3.92	6.50	6.00	3.58	9.53	9.15	5.50	7.52	7.02	4.82	10.96	10.58
Woodland 220 kV	4.96	23.09	20.43	2.64	25.90	24.79	5.94	32.89	30.63	4.45	34.57	33.84
Woodland 400 kV	4.85	10.78	9.91	3.33	10.26	9.99	5.76	14.71	14.13	5.19	13.26	13.09
Yellowmeadow 110 kV	2.56	12.45	11.31	2.40	16.11	15.29	5.80	17.92	16.12	5.26	21.65	20.91

Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Adamstown 110 kV	2.27	12.65	11.62	2.07	16.46	15.87	4.71	17.71	15.88	3.98	22.24	21.21
Agannygal 110 kV	2.23	5.88	5.32	2.90	4.63	4.51	2.67	6.41	5.85	3.73	4.97	4.85
Aghada 110 kV	3.54	9.01	8.64	4.06	10.36	10.19	4.35	10.20	9.79	5.23	11.50	11.32
Aghada A 220 kV	6.61	14.24	13.18	6.67	18.35	17.72	12.79	21.73	19.61	13.04	26.04	24.93
Aghada B 220 kV	6.61	14.24	13.18	6.67	18.35	17.72	12.79	21.73	19.61	13.04	26.04	24.93
Aghada C 220 kV	6.49	13.82	12.82	6.23	17.79	17.19	12.04	20.79	18.84	10.84	24.98	23.95
Aghada D 220 kV	6.61	14.24	13.18	6.67	18.35	17.72	12.79	21.73	19.61	13.04	26.04	24.93
Ahane 110 kV	3.33	14.10	13.30	3.52	11.50	11.28	4.26	15.33	14.39	4.65	12.24	12.02
Anner 110 kV	3.02	6.91	6.54	3.27	4.87	4.80	3.72	7.49	7.03	4.12	5.09	5.01
Ardnacrusha 110 kV	3.98	17.73	16.25	4.34	19.31	18.59	5.21	19.29	17.48	5.99	20.41	19.68
Ardnagappary 110 kV	2.63	2.34	2.22	3.57	1.33	1.32	2.90	2.46	2.31	4.08	1.39	1.37
Arigna 110 kV	3.49	8.18	7.59	3.88	6.27	6.14	4.40	8.85	8.26	5.11	6.66	6.54
Arklow 110 kV	3.13	12.59	12.09	3.11	17.44	17.17	5.41	14.31	13.71	5.30	19.81	19.38
Arklow 220 kV	2.72	8.53	8.25	2.67	10.52	10.36	4.47	9.89	9.60	4.47	12.06	11.91
Artane 110 kV	2.69	11.64	11.01	2.00	13.98	13.66	5.29	14.71	13.66	3.19	17.25	16.71
Arva 110 kV	3.19	9.92	9.13	3.60	7.45	7.29	4.11	10.64	9.85	4.88	7.83	7.68
Athea 110 kV	4.27	9.42	8.38	4.26	8.86	8.49	7.54	10.17	9.17	7.52	9.23	8.93
Athlone 110 kV	3.32	7.61	7.31	3.59	8.40	8.28	5.57	10.38	9.71	6.19	10.12	9.90
Athy 110 kV	2.08	7.44	7.30	2.52	5.91	5.86	2.66	8.08	7.80	3.43	6.28	6.22
Aughinish 110 kV	4.72	10.75	9.72	4.97	12.44	11.94	6.56	11.15	10.18	7.11	12.75	12.30
Aungierstown 110 kV	2.76	21.16	18.46	2.24	28.96	27.33	5.31	26.86	23.78	4.53	36.24	34.23
Baldonnell 110 kV	2.56	19.91	17.50	2.07	26.15	24.84	4.78	25.28	22.48	3.86	32.54	30.98
Ballinknocka 110 kV	4.39	10.10	9.31	4.37	12.77	12.31	6.12	10.55	9.80	6.12	13.19	12.78
Ballyadam 110 kV	2.87	9.67	9.23	3.40	9.80	9.65	3.31	10.74	10.23	4.12	10.63	10.45
Ballybeg 110 kV	2.62	7.12	6.98	2.64	8.40	8.28	4.32	8.01	7.75	4.26	9.30	9.18
Ballydine 110 kV	2.87	7.60	7.26	2.71	5.81	5.74	3.54	8.30	7.87	3.33	6.13	6.04

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Ballylickey 110 kV	2.60	3.81	3.49	3.31	2.16	2.12	2.95	4.04	3.71	3.91	2.26	2.22
Ballymoneen 110 kV	3.24	16.97	15.70	2.97	21.07	20.30	4.47	19.28	17.73	4.04	23.55	22.71
Ballynadride 110 kV	3.74	7.18	6.70	4.51	8.42	8.19	4.61	7.71	7.16	5.84	8.72	8.48
Ballynahulla 110 kV	6.09	11.36	9.97	5.94	12.89	12.23	11.25	12.64	11.38	10.68	14.00	13.43
Ballynahulla 220 kV	4.53	10.77	9.84	4.44	11.53	11.13	6.87	12.37	11.54	7.14	12.77	12.45
Ballyragget 110 kV	3.26	7.75	7.65	3.37	6.19	6.15	4.79	8.42	8.20	5.05	6.53	6.49
Ballyvouskill 110 kV	6.74	12.49	11.04	6.20	15.57	14.74	11.44	13.86	12.49	9.93	17.01	16.28
Ballyvouskill 220 kV	4.84	10.96	10.00	4.90	13.09	12.58	7.25	12.49	11.61	7.65	14.59	14.16
Ballywater 110 kV	3.02	6.89	6.68	1.96	6.67	6.61	4.08	7.46	7.21	2.40	7.16	7.08
Balruntagh 110 kV	3.28	5.19	5.07	3.86	4.43	4.40	4.59	5.52	5.41	5.82	4.57	4.55
Baltrasna 110 kV	2.60	11.00	10.51	2.79	8.87	8.73	4.19	12.51	11.97	4.66	9.77	9.66
Bancroft 110 kV	2.24	12.02	11.42	1.88	13.75	13.44	3.91	14.00	13.24	2.94	15.75	15.40
Bandon 110 kV	4.23	7.47	6.97	5.00	7.06	6.90	5.31	8.25	7.62	6.64	7.55	7.36
Banoge 110 kV	2.99	7.09	6.95	3.10	6.85	6.79	4.24	7.62	7.41	4.48	7.23	7.17
Barnageeragh 110 kV	2.88	21.99	19.80	2.65	28.46	27.23	5.29	27.65	25.21	5.18	34.32	33.15
Barnahealy A 110 kV	3.43	12.38	11.67	3.81	12.59	12.33	4.16	14.43	13.50	4.84	14.17	13.86
Barnahealy B 110 kV	4.62	12.44	11.74	4.79	12.76	12.49	6.12	14.31	13.42	6.48	14.21	13.90
Barnakyle 110 kV	2.73	20.84	18.21	2.28	27.98	26.41	5.26	26.49	23.46	4.71	34.92	33.04
Baroda 110 kV	2.42	9.67	9.34	2.67	10.68	10.49	3.35	10.99	10.45	3.90	11.77	11.56
Barrymore 110 kV	4.09	8.35	7.90	4.46	5.18	5.12	5.17	9.10	8.59	5.84	5.48	5.41
Belcamp 110 kV	2.98	13.33	12.02	2.76	17.89	17.28	6.54	15.19	14.05	6.12	20.33	19.75
Belcamp 220 kV	4.77	21.90	19.02	2.66	28.82	27.16	7.04	37.14	33.50	5.08	45.58	43.67
Belcamp 380 kV	2.46	10.76	9.80	1.76	12.58	12.22	2.46	14.49	13.95	2.45	15.51	15.37
Belgard 110 kV	2.21	12.60	11.77	1.83	15.33	14.76	3.96	14.65	13.61	2.94	17.32	17.01
Bellacorick 110 kV	3.99	5.92	5.67	4.50	9.21	9.00	7.29	9.52	8.74	8.03	12.68	12.20
Bellewstown 110 kV	2.85	13.88	13.02	2.93	15.58	15.13	5.73	20.28	18.37	5.77	20.28	19.59
Bendinstown 110 kV	2.92	9.90	9.56	2.95	12.00	11.79	4.14	10.83	10.33	4.21	12.95	12.70
Binbane 110 kV	4.21	5.59	5.09	5.44	4.76	4.63	4.90	5.82	5.28	6.69	4.86	4.72

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Blackrock 110 kV	2.29	12.75	11.93	1.20	12.00	11.74	3.86	14.99	13.69	1.58	13.25	12.86
Blake 110 kV	2.23	8.46	8.23	2.53	5.52	5.46	3.10	9.42	9.01	3.71	5.93	5.87
Blundelstown 110 kV	2.12	8.51	8.30	2.41	8.81	8.68	3.01	9.32	9.03	3.64	9.51	9.41
Boggeragh 110 kV	4.66	9.00	7.78	5.21	8.56	8.15	5.94	9.57	8.39	6.93	8.95	8.57
Bogtown 110 kV	2.81	6.56	6.36	2.94	7.53	7.44	3.62	7.61	7.37	3.91	8.46	8.35
Booltiagh 110 kV	3.73	8.52	7.76	4.24	6.64	6.47	5.27	8.95	8.22	6.39	6.84	6.68
Bracetown 220 kV	4.00	20.08	17.72	2.12	21.50	20.65	5.99	30.07	27.76	3.75	28.44	27.83
Bracklone 110 kV	2.70	8.30	8.18	3.07	7.29	7.23	3.78	9.18	8.93	4.58	7.75	7.69
Bracklone 110 kV	2.70	8.30	8.18	3.07	7.29	7.23	3.78	9.18	8.93	4.58	7.75	7.69
Brinny A 110 kV	3.73	6.58	6.18	4.37	5.66	5.56	4.55	7.22	6.73	5.58	6.03	5.91
Brinny B 110 kV	3.74	6.61	6.21	4.38	5.70	5.60	4.55	7.26	6.77	5.59	6.08	5.96
Buffy 110 kV	3.18	5.91	5.70	3.53	7.96	7.83	4.17	6.41	6.12	4.82	8.29	8.13
Butlerstown 110 kV	3.65	12.24	11.78	3.69	11.75	11.59	5.14	14.12	13.41	5.26	13.14	12.92
Cabra 110 kV	2.64	11.20	10.63	1.84	12.37	12.17	5.08	14.09	13.10	2.77	15.06	14.64
Caherhurly 110 kV	3.73	10.18	9.65	3.90	11.95	11.68	4.83	10.87	10.28	5.16	12.55	12.28
Cahir 110 kV	3.72	9.73	8.98	4.25	7.46	7.30	4.67	10.46	9.58	5.57	7.60	7.43
Carlow 110 kV	2.84	9.93	9.52	3.04	10.36	10.18	3.96	10.89	10.28	4.37	11.16	10.94
Carrickalangan 110 kV	4.16	9.13	7.96	4.80	10.66	10.07	4.80	9.34	8.16	5.69	10.91	10.32
Carrickmines 220 kV	3.85	17.71	16.05	1.90	22.63	21.79	6.04	27.09	24.93	3.32	32.20	31.28
Carrickmines A 110 kV	2.43	11.61	11.13	2.36	12.58	12.36	4.75	13.81	13.01	4.34	14.50	14.17
Carrickmines B 110 kV	2.49	13.36	12.65	2.36	15.73	15.35	4.80	15.77	14.87	4.37	18.22	17.78
Carrick-on-Shannon 110 kV	3.56	13.06	12.29	3.79	13.59	13.23	4.68	14.75	13.75	5.17	14.84	14.48
Carrigadrohid 110 kV	4.52	14.55	13.22	4.57	12.94	12.56	5.84	16.08	14.71	6.02	13.95	13.58
Carrigdangan 110 kV	3.07	5.66	5.32	3.95	6.18	6.04	3.57	6.06	5.71	4.84	6.50	6.36
Carrowbeg 110 kV	2.43	3.10	2.95	3.02	2.68	2.64	2.82	3.44	3.23	3.76	2.83	2.78
Cashla 110 kV	3.98	18.25	16.78	3.89	22.99	22.15	6.18	20.93	19.12	6.08	25.91	24.91
Cashla 220 kV	3.71	10.56	10.03	3.76	10.71	10.51	6.33	13.03	12.40	6.75	12.42	12.21

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Castlebagot 110 kV	2.79	21.40	18.64	2.32	29.86	28.13	5.42	27.24	24.08	4.96	37.57	35.42
Castlebagot 220 kV	3.82	22.48	19.64	1.95	27.33	25.95	4.88	34.24	31.04	3.36	38.06	36.74
Castlebar 110 kV	3.48	5.89	5.46	3.55	5.66	5.52	4.22	6.93	6.36	4.53	6.06	5.90
Castledockrill 110 kV	3.53	8.43	8.18	2.42	9.16	9.04	5.19	9.18	8.85	3.13	9.88	9.74
Castlefarm A 110 kV	4.42	10.32	9.36	4.60	11.44	11.01	5.99	10.71	9.80	6.39	11.74	11.36
Castlefarm B 110 kV	4.42	10.30	9.34	4.61	11.42	11.00	6.00	10.69	9.78	6.40	11.73	11.34
Castlelost 220 kV	2.53	6.85	6.69	2.70	7.25	7.24	5.00	9.82	9.73	5.48	9.49	9.45
Castletreasu 110 kV	4.19	13.62	12.79	4.20	16.44	16.00	5.33	15.76	14.70	5.39	18.54	18.02
Castleview 110 kV	2.97	12.46	11.79	3.60	11.88	11.66	3.45	14.32	13.47	4.47	13.25	12.99
Cathaleen's Fall 110 kV	4.34	12.10	10.49	4.78	11.36	10.83	5.15	12.50	10.86	5.85	11.57	11.05
Cauteen 110 kV	4.13	8.76	7.75	4.44	4.91	4.79	5.30	9.36	8.30	5.85	5.15	5.03
Celtic 380 kV	8.19	5.32	5.13	9.07	5.09	5.03	15.25	6.11	5.90	19.32	5.62	5.56
Central Park 110 kV	2.21	10.63	10.20	1.91	11.40	11.10	3.96	12.50	11.83	3.02	12.76	12.59
Charleville 110 kV	3.72	7.50	6.97	4.44	8.57	8.32	4.57	8.06	7.45	5.74	8.91	8.65
Cherrywood 110 kV	2.07	9.81	9.45	1.93	9.79	9.72	3.51	11.46	10.87	3.01	11.08	10.86
City West 110 kV	1.83	7.69	7.24	1.95	6.39	6.24	2.94	9.69	8.89	3.17	7.47	7.28
CKM Country 110 kV	2.49	13.36	12.65	2.36	15.73	15.35	4.80	15.77	14.87	4.37	18.22	17.78
Clahane 110 kV	2.74	8.31	7.79	2.71	8.75	8.54	3.51	8.80	8.24	3.50	9.07	8.86
Clashavoon 220 kV	5.12	11.29	10.41	5.21	12.38	12.00	7.44	12.99	12.11	7.86	13.90	13.54
Clashavoon A 110 kV	5.12	17.84	15.90	5.15	21.46	20.36	6.96	19.90	17.81	7.14	23.68	22.60
Clashavoon B 110 kV	5.12	17.84	15.90	5.15	21.46	20.36	6.96	19.90	17.81	7.14	23.68	22.60
Cliff 110 kV	3.80	8.70	7.80	4.55	7.32	7.09	4.42	8.99	8.08	5.52	7.47	7.24
Cloghboola 110 kV	3.40	7.73	7.22	4.01	7.94	7.74	5.17	8.23	7.81	6.77	8.21	8.07
Cloghboola 110 kV	3.40	7.73	7.22	4.01	7.94	7.74	5.17	8.23	7.81	6.77	8.21	8.07
Clogher 110 kV	4.13	10.40	8.88	4.66	10.91	10.29	4.75	10.62	9.10	5.51	11.05	10.44
Cloghran 110 kV	2.88	22.13	19.91	2.62	28.54	27.30	5.25	27.87	25.40	5.07	34.44	33.26
Cloncreen 110 kV	3.72	10.94	10.33	3.96	13.19	12.81	6.58	14.66	13.55	7.27	16.20	15.72
Clonee 220 kV	4.09	20.39	17.97	2.18	22.03	21.14	6.14	30.74	28.33	3.95	29.33	28.68

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Clonfad 110 kV	3.39	7.82	7.61	3.19	8.50	8.41	4.71	8.72	8.37	4.36	9.25	9.12
Clonkeen A 110 kV	3.72	6.32	6.02	4.21	4.39	4.34	4.83	6.75	6.42	5.70	4.60	4.55
Clonkeen B 110 kV	3.34	10.30	9.04	2.41	11.76	11.15	3.98	11.30	10.07	2.75	12.69	12.12
Cloon 110 kV	3.23	8.31	7.92	3.71	8.93	8.78	4.27	9.15	8.70	5.22	9.59	9.42
Clutterland 110 kV	2.76	21.25	18.52	2.25	29.14	27.49	5.31	26.99	23.88	4.60	36.51	34.47
Codling 1 220 kV	3.55	11.50	10.74	1.93	14.34	13.95	6.33	14.95	14.36	2.98	17.94	17.64
Codling 2 220 kV	3.46	11.29	10.58	1.66	14.31	13.99	5.23	14.37	13.78	2.57	17.63	17.33
Codling 3 220 kV	3.46	11.29	10.58	1.66	14.31	13.99	5.23	14.37	13.78	2.57	17.63	17.33
College Park 110 kV	2.74	20.22	18.40	2.16	25.01	24.17	4.91	25.02	23.05	3.46	29.79	28.70
Cookstown 110 kV	1.96	8.40	8.11	1.89	6.97	6.86	3.11	9.53	9.15	2.81	7.65	7.56
Cookstown A 110 kV	1.71	6.50	6.20	1.84	5.02	4.93	2.63	8.10	7.42	2.90	5.75	5.62
Coolderrig 110 kV	2.36	12.35	11.35	2.18	15.20	14.52	5.32	17.39	15.58	4.44	20.03	19.34
Coolnabacky 110 kV	3.62	16.76	16.19	3.61	21.04	20.82	5.85	18.58	17.87	5.90	23.20	22.82
Coolnabacky 400 kV	3.17	10.14	9.47	2.23	10.30	10.12	3.59	12.53	12.18	3.39	11.64	11.60
Coolnanoonag 110 kV	4.50	19.07	17.64	4.10	23.49	22.67	7.98	21.71	20.25	7.39	26.17	25.51
Coolroe 110 kV	2.86	10.12	9.48	3.66	9.26	9.07	3.29	11.11	10.41	4.49	9.86	9.67
Coolshamroge 110 kV	2.54	9.54	8.91	3.11	9.14	8.92	3.04	10.16	9.44	3.94	9.44	9.22
Coomagearlahy 110 kV	3.69	8.15	6.97	3.76	8.90	8.37	4.49	8.84	7.67	4.65	9.55	9.04
Coomataggart 110 kV	5.48	7.17	6.70	5.32	5.72	5.62	7.85	7.73	7.32	7.54	5.96	5.87
Coomataggart 110 kV	5.48	7.17	6.70	5.32	5.72	5.62	7.85	7.73	7.32	7.54	5.96	5.87
Coomnaclohy 110 kV	3.97	9.23	8.45	3.37	11.42	10.98	5.07	10.07	9.34	4.14	12.25	11.87
Corbetstown 110 kV	3.55	9.57	9.39	3.51	12.68	12.53	5.73	12.16	11.59	5.53	15.52	15.20
Cordal 110 kV	5.50	9.48	8.48	4.27	10.71	10.24	9.09	10.37	9.47	6.11	11.48	11.09
Corderry 110 kV	3.34	9.16	8.22	3.78	9.57	9.20	4.06	9.85	8.91	4.80	10.12	9.76
Corduff 110 kV	3.00	23.81	21.32	2.67	30.34	28.99	5.48	30.61	27.71	5.34	37.22	35.89
Corduff 220 kV	5.04	23.66	20.36	2.71	31.00	29.09	7.96	41.04	36.71	5.46	49.77	47.53
Corkagh 110 kV	2.75	21.05	18.36	2.30	28.71	27.10	5.30	26.67	23.61	4.77	35.81	33.84
Corraclassy 110 kV	3.24	7.08	6.59	3.83	5.18	5.09	3.94	7.40	6.91	4.88	5.37	5.28

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Cow Cross 110 kV	3.20	12.45	11.77	3.52	10.87	10.68	3.79	14.46	13.57	4.35	12.08	11.86
Crane 110 kV	3.81	10.02	9.58	3.64	10.67	10.50	5.67	10.89	10.35	5.35	11.54	11.33
Croaghaun 110 kV	4.00	5.32	5.11	4.56	7.48	7.35	6.81	8.07	7.51	7.57	9.67	9.39
Cromcastle A 110 kV	2.59	11.36	10.69	2.19	12.18	11.96	4.87	13.40	12.38	3.67	13.94	13.52
Cromcastle B 110 kV	2.59	11.36	10.69	2.19	12.18	11.96	4.87	13.40	12.38	3.67	13.94	13.52
Crory 110 kV	4.01	9.84	9.46	3.97	11.69	11.49	6.35	10.74	10.29	6.30	12.74	12.52
Cruiserath 220 kV	4.83	23.06	19.90	2.64	30.18	28.37	7.49	39.48	35.44	5.18	47.97	45.88
Cuilleen 110 kV	3.17	7.23	6.96	3.55	8.12	8.01	5.28	9.89	9.27	6.27	9.83	9.62
Cullenagh 110 kV	4.15	14.57	13.97	4.23	16.19	15.90	6.17	16.83	15.98	6.46	18.42	18.07
Cullenagh 220 kV	4.13	9.03	8.82	4.08	8.89	8.78	6.44	11.18	10.87	6.46	10.55	10.45
Cunghill 110 kV	2.63	6.12	5.70	2.93	5.52	5.39	3.09	6.88	6.43	3.55	5.91	5.80
Cureeny 110 kV	3.65	6.17	5.93	3.60	5.06	5.00	4.75	6.59	6.34	4.69	5.26	5.21
Cureeny T 110 kV	3.62	7.68	7.30	4.13	5.74	5.66	4.70	8.24	7.84	5.64	5.97	5.90
Cushaling 110 kV	3.75	11.11	10.48	4.03	13.65	13.24	6.71	14.93	13.77	7.61	16.84	16.32
Dallow 110 kV	2.47	5.43	5.21	2.89	3.78	3.75	3.17	6.14	5.88	3.92	4.08	4.04
Dalton 110 kV	3.67	5.11	4.69	4.16	4.06	3.96	4.79	5.69	5.18	5.81	4.28	4.17
Dardistown 110 kV	2.74	11.53	10.84	2.54	12.66	12.42	5.45	13.62	12.57	4.79	14.55	14.10
Darndale 110 kV	2.94	13.02	11.75	2.73	17.27	16.69	6.38	14.79	13.62	5.93	19.42	18.94
Deenes 110 kV	2.70	11.43	10.90	2.92	10.95	10.75	4.34	13.30	12.67	4.94	12.32	12.14
Dennistown 110 kV	3.33	7.11	6.79	3.24	9.14	8.96	4.37	7.52	7.12	4.25	9.65	9.42
Derrybrien 110 kV	2.25	4.70	4.19	3.03	4.23	4.08	2.69	5.09	4.57	3.90	4.56	4.41
Derrygreenag 220 kV	3.48	8.76	8.51	3.26	11.15	11.12	7.15	11.05	10.96	6.91	13.75	13.66
Derryiron 110 kV	3.56	9.78	9.59	3.59	13.01	12.85	5.79	12.51	11.90	5.81	16.00	15.66
Derrylahan 110 kV	3.31	12.90	12.45	3.48	14.50	14.20	5.81	18.15	17.13	6.08	18.63	18.25
Donore 110 kV	2.83	12.19	11.47	2.94	14.57	14.15	4.99	15.71	14.56	5.30	17.81	17.29
Doon 110 kV	3.24	7.64	7.21	3.38	5.51	5.44	4.04	8.30	7.76	4.29	5.75	5.66
Dromada 110 kV	4.10	8.64	7.66	3.20	8.02	7.70	6.97	9.27	8.39	4.75	8.34	8.08
Drombeg 110 kV	3.75	9.38	8.92	3.97	9.59	9.42	5.65	10.06	9.64	6.19	10.13	9.98

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Drumkeen 110 kV	3.39	8.59	7.55	4.05	7.16	6.89	3.81	8.87	7.78	4.71	7.29	7.02
Drumline 110 kV	2.49	9.28	8.72	3.08	8.16	8.00	2.97	9.90	9.24	3.89	8.43	8.26
Drybridge 110 kV	2.77	15.27	14.26	2.87	15.61	15.16	4.64	19.81	18.21	4.90	18.74	18.22
Dublin Array 220 kV	3.44	15.81	14.47	1.72	19.82	19.21	5.00	23.08	21.50	2.90	26.99	26.37
Dundalk 110 kV	2.05	9.08	8.71	2.41	8.12	7.97	2.62	10.01	9.43	3.25	8.67	8.52
Dunfirth 110 kV	3.56	3.72	3.59	3.83	4.25	4.20	4.91	4.10	3.85	5.46	4.59	4.48
Dungarvan 110 kV	4.13	6.97	6.59	4.28	7.54	7.39	5.42	7.61	7.12	5.71	8.09	7.89
Dunmanway 110 kV	3.82	9.53	8.58	4.46	8.89	8.59	4.64	10.42	9.38	5.67	9.45	9.14
Dunstown 220 kV	5.09	22.20	19.93	2.49	24.75	23.98	5.87	29.77	28.13	4.68	30.37	29.92
Dunstown 400 kV	4.59	13.00	11.75	2.55	15.56	15.07	5.52	17.90	17.08	4.59	19.61	19.32
Effernoge 110 kV	3.86	9.88	9.46	3.77	10.61	10.45	5.84	10.74	10.24	5.69	11.45	11.25
Ennis 110 kV	3.08	13.07	11.73	3.62	11.61	11.19	3.86	14.21	12.59	4.82	12.31	11.86
Fassaroe East 110 kV	1.73	7.79	7.58	1.83	5.88	5.80	2.59	8.89	8.53	2.67	6.42	6.34
Fassaroe West 110 kV	1.75	7.95	7.74	1.84	6.07	5.99	2.64	9.09	8.72	2.69	6.64	6.56
Ferry View 110 kV	3.20	5.78	5.58	3.54	7.80	7.68	4.22	6.27	5.99	4.85	8.13	7.97
Finglas 220 kV	5.19	23.35	20.10	2.80	31.00	29.07	8.45	41.05	36.65	5.81	50.75	48.38
Finglas A 110 kV	3.06	13.41	12.49	2.94	14.53	14.14	7.00	16.21	14.88	6.60	16.83	16.26
Finglas B 110 kV	3.11	13.13	12.37	2.95	16.69	16.48	7.56	17.02	15.79	7.14	21.22	20.72
Firlough 110 kV	3.43	6.03	5.75	3.91	7.30	7.16	4.80	7.67	7.28	5.60	8.62	8.45
Flagford 110 kV	3.79	13.83	13.01	4.10	16.25	15.75	5.15	15.72	14.64	5.82	17.96	17.46
Flagford 220 kV	3.91	7.68	7.35	4.28	6.90	6.79	6.00	8.43	8.14	7.03	7.43	7.35
Fortunestown 110 kV	1.79	7.51	7.12	1.90	6.31	6.17	2.83	9.52	8.74	3.05	7.38	7.19
Francis Street A 110 kV	2.32	12.75	11.93	1.79	14.99	14.46	3.94	14.97	13.67	2.66	16.95	16.54
Francis Street B 110 kV	2.24	12.58	11.81	1.82	15.26	14.72	4.04	14.68	13.67	2.90	17.28	16.99
Gallanstown 110 kV	2.69	12.61	12.00	2.89	12.20	11.95	4.50	14.49	13.94	5.11	13.71	13.52
Galway 110 kV	3.95	14.37	13.32	3.37	17.23	16.57	5.90	16.37	14.76	4.73	19.01	18.23
Garballagh 110 kV	2.96	12.53	11.90	3.10	13.86	13.54	5.16	15.94	14.93	5.57	16.44	16.06
Garrintaggar 110 kV	3.27	8.82	8.74	3.54	9.00	8.92	4.84	9.54	9.32	5.48	9.54	9.47

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Garrow 110 kV	5.70	12.05	10.61	5.03	14.88	14.07	8.45	13.33	11.96	7.07	16.21	15.49
Garvagh 110 kV	3.57	7.33	6.56	4.02	8.33	7.98	4.39	7.82	7.06	5.15	8.81	8.46
Gilra 110 kV	2.39	6.85	6.55	2.84	5.03	4.98	2.89	7.46	7.16	3.60	5.38	5.32
Glanagow 220 kV	6.51	13.65	12.68	6.35	17.58	17.01	12.59	20.96	18.96	11.72	25.12	24.07
Glanlee 110 kV	3.60	8.03	6.87	3.52	8.72	8.21	4.35	8.70	7.56	4.29	9.35	8.87
Glansillagh 220 kV	3.65	16.85	15.53	3.27	22.57	21.78	8.11	28.79	26.52	6.54	34.88	33.68
Glasmore A 110 kV	1.95	7.11	6.84	2.05	4.79	4.72	2.98	8.08	7.58	3.19	5.21	5.12
Glen 110 kV	3.56	7.31	6.55	4.02	8.32	7.96	4.37	7.80	7.04	5.14	8.79	8.45
Glenart 220 kV	2.71	8.09	7.84	2.67	10.14	9.99	4.45	9.32	9.07	4.42	11.55	11.41
Glencloosagh 220 kV	3.69	18.33	16.75	3.56	9.33	9.17	7.48	31.13	28.56	7.20	10.71	10.60
Glenlara A 110 kV	2.65	3.33	3.15	3.49	2.80	2.76	3.07	3.52	3.32	4.23	2.93	2.88
Glenlara B 110 kV	4.98	8.69	7.42	3.56	9.71	9.11	7.40	9.35	8.15	4.65	10.30	9.77
Glenree 110 kV	3.32	5.89	5.62	3.64	6.70	6.58	4.52	7.31	6.95	4.95	7.72	7.58
Golagh 110 kV	3.40	8.15	7.20	3.94	6.93	6.68	3.82	8.36	7.39	4.55	7.11	6.85
Gorman 110 kV	2.96	15.91	15.00	3.07	18.96	18.44	4.57	19.27	18.00	4.97	22.27	21.68
Gorman 220 kV	2.98	11.92	11.32	2.87	9.80	9.80	4.69	13.76	13.36	4.77	10.86	10.76
Gorman ESS 110 kV	2.93	15.62	14.75	3.02	18.49	18.00	4.49	18.87	17.66	4.82	21.67	21.11
Gortawee 110 kV	3.29	6.69	6.21	4.01	5.25	5.15	4.09	7.03	6.55	5.30	5.39	5.29
Grahomick 110 kV	2.94	6.09	5.85	2.83	7.83	7.70	3.73	6.40	6.11	3.57	8.22	8.06
Grange 110 kV	2.65	11.69	10.96	1.76	11.50	11.46	5.08	13.85	12.74	2.64	13.32	12.93
Grange Castle 110 kV	2.39	12.69	11.64	2.19	16.36	15.76	5.49	18.05	16.12	4.60	22.27	21.22
Great Island 110 kV	4.45	17.42	16.84	4.32	22.54	22.09	7.66	20.86	19.89	7.49	26.99	26.44
Great Island 220 kV	4.15	11.21	10.87	4.07	13.38	13.27	8.02	15.95	15.43	8.14	18.57	18.31
Greenlink	4.47	14.55	14.11	6.33	5.00	4.98	9.05	20.40	19.77	17.46	5.44	5.43
Griffinrath A 110 kV	2.63	11.21	10.91	2.72	10.87	10.73	3.99	12.39	12.06	4.16	11.90	11.77
Griffinrath B 110 kV	2.71	11.63	11.31	2.74	10.87	10.73	4.19	12.88	12.57	4.21	11.91	11.78
Harolds Cross 110 kV	2.33	12.79	11.97	1.74	14.94	14.42	3.97	15.02	13.72	2.56	16.88	16.48
Harristown 110 kV	3.49	6.65	6.46	3.72	7.78	7.68	4.89	7.50	7.16	5.37	8.57	8.42

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Heuston 110 kV	2.27	12.84	12.03	1.92	15.75	15.35	4.15	15.01	13.96	3.19	17.89	17.57
Huntstown A 220 kV	4.96	23.11	19.93	2.74	14.78	14.40	7.54	39.96	35.78	6.80	15.90	15.67
Huntstown B 220 kV	4.89	23.04	19.88	2.08	15.62	15.22	7.51	39.95	35.78	3.70	18.21	17.90
Ikerrin 110 kV	4.13	6.01	5.45	4.52	7.10	6.82	5.48	6.46	5.86	6.16	7.47	7.18
Inchicore 220 kV	4.29	21.71	19.02	2.17	28.57	27.02	6.31	35.95	32.26	3.86	43.85	41.93
Inchicore A 110 kV	2.55	14.19	13.20	2.38	17.78	17.46	5.08	16.79	15.58	4.78	20.90	20.21
Inchicore B 110 kV	2.57	13.73	12.57	2.41	17.99	17.49	6.20	19.40	17.31	5.62	24.77	23.67
Inniscarra 110 kV	2.87	10.05	9.39	3.62	8.93	8.74	3.30	10.98	10.28	4.43	9.43	9.25
Irishtown 220 kV	3.93	18.59	16.71	1.94	24.53	23.45	6.45	31.86	28.88	3.57	38.87	37.31
Kellis 110 kV	3.11	10.68	10.28	3.34	12.94	12.69	4.52	11.73	11.15	5.07	14.03	13.75
Kellis 220 kV	3.09	8.39	8.17	3.36	7.05	6.97	4.87	9.46	9.26	5.60	7.71	7.67
Kellystown 220 kV	3.83	18.57	16.69	2.19	19.65	19.08	4.52	24.71	23.38	3.87	23.73	23.41
Kilbarry 110 kV	4.18	16.59	15.32	4.60	15.88	15.44	5.24	19.49	17.67	6.07	17.80	17.25
Kilcarbery 110 kV	2.74	20.89	18.25	2.29	28.08	26.55	5.27	26.49	23.48	4.72	34.98	33.09
Kildonan 110 kV	2.43	15.49	14.47	2.09	13.95	13.81	4.01	18.37	17.30	3.21	15.97	15.65
Kilkenny 110 kV	3.46	12.02	11.75	2.93	15.25	15.03	5.18	13.17	12.66	4.12	16.59	16.32
Kill Hill 110 kV	3.85	6.80	6.24	4.59	5.77	5.62	4.85	7.26	6.66	6.05	6.05	5.90
Killinskiduf 110 kV	2.96	12.36	11.88	2.89	16.97	16.71	4.93	14.04	13.46	4.66	19.24	18.83
Killonan 110 kV	4.15	21.44	19.53	4.25	25.39	24.42	5.69	23.81	21.61	6.00	27.74	26.67
Killonan 220 kV	4.05	11.34	10.76	4.47	10.52	10.35	5.94	12.87	12.35	7.39	11.53	11.38
Killoteran 110 kV	3.95	13.75	13.20	3.91	14.40	14.17	5.85	15.97	15.12	5.81	16.36	16.05
Kilmahud 110 kV	2.74	20.97	18.31	2.27	28.13	26.59	5.25	26.55	23.54	4.64	34.98	33.11
Kilmore 110 kV	2.72	11.89	11.17	2.38	12.90	12.58	5.38	14.15	13.02	4.25	14.76	14.30
Kilnap 110 kV	4.16	17.45	16.13	4.56	16.41	15.96	5.19	20.38	18.60	5.99	18.27	17.75
Kilpaddoge 110 kV	4.56	19.33	17.86	4.24	24.42	23.54	8.16	22.05	20.55	7.93	27.43	26.63
Kilpaddoge 220 kV	3.77	18.45	16.86	3.43	25.02	24.06	8.11	31.50	28.87	7.08	38.82	37.38
Kilpaddoge 400 kV	2.80	9.91	9.21	2.39	12.38	12.05	4.24	15.03	14.21	3.94	16.79	16.43
Kilteel 110 kV	2.38	8.56	8.34	2.69	8.56	8.45	3.36	9.61	9.18	4.02	9.29	9.15

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Kilvinoge 110 kV	3.59	8.50	8.41	3.86	8.92	8.86	5.13	9.22	9.06	5.75	9.42	9.37
Kinnegad 110 kV	3.44	8.19	7.93	3.54	9.05	8.94	4.84	9.38	8.95	5.07	10.05	9.88
Kishoge 110 kV	2.70	20.51	17.96	2.24	26.73	25.36	5.13	25.84	22.98	4.46	32.91	31.35
Knockacummer 110 kV	4.74	7.57	6.43	4.06	7.25	6.84	6.75	8.08	6.98	5.49	7.52	7.17
Knockalough 110 kV	3.24	5.13	4.97	3.03	6.81	6.71	4.29	5.54	5.33	3.96	7.10	6.98
Knockanure 220 kV	3.91	15.67	14.40	2.89	20.28	19.55	7.92	22.30	20.83	4.52	26.71	25.95
Knockanure A 110 kV	5.03	13.06	11.90	4.47	14.52	13.92	11.28	14.55	13.34	8.91	15.58	15.08
Knockanure B 110 kV	2.87	9.15	8.61	3.14	7.39	7.26	3.83	9.78	9.25	4.36	7.72	7.59
Knockdrin 110 kV	3.56	9.72	9.53	3.59	12.93	12.77	5.77	12.40	11.81	5.79	15.88	15.54
Knockearagh 110 kV	3.54	5.94	5.58	4.26	4.84	4.76	4.64	6.41	5.97	5.99	5.13	5.03
Knocknamona 110 kV	4.07	6.73	6.33	3.98	10.04	9.73	5.24	7.32	6.84	5.10	10.87	10.50
Knockraha 380 kV	8.31	5.33	5.14	9.05	5.36	5.28	15.83	6.13	5.91	19.47	6.06	5.99
Knockraha A 110 kV	5.28	21.64	19.94	5.39	23.37	22.58	7.34	26.00	23.62	7.74	27.00	26.08
Knockraha A 220 kV	6.10	15.99	14.78	5.84	18.74	18.15	9.78	21.72	19.92	9.30	24.28	23.47
Knockraha B 110 kV	5.28	21.64	19.94	5.39	23.37	22.58	7.34	26.00	23.62	7.74	27.00	26.08
Knockraha B 220 kV	6.10	15.99	14.78	5.84	18.74	18.15	9.78	21.72	19.92	9.30	24.28	23.47
Knockranny 110 kV	4.24	8.92	8.03	3.57	11.20	10.70	6.25	9.65	8.68	4.95	11.92	11.39
Knockranny A 110 kV	3.18	5.94	5.73	3.52	8.01	7.87	4.17	6.45	6.16	4.82	8.34	8.17
Knockranny B 110 kV	4.24	8.92	8.03	3.57	11.20	10.70	6.25	9.65	8.68	4.95	11.92	11.39
Knockumber 110 kV	2.13	8.65	8.41	2.39	6.50	6.42	2.84	9.88	9.42	3.38	7.09	7.01
Laghtanvack 110 kV	3.98	5.90	5.65	4.45	9.11	8.90	7.45	9.61	8.81	8.06	12.66	12.17
Lanesboro 110 kV	3.35	10.22	9.84	3.75	10.33	10.19	4.54	11.65	11.07	5.36	11.24	11.06
Lenalea 110 kV	3.45	6.75	6.13	4.14	7.28	7.03	3.92	7.04	6.36	4.85	7.50	7.23
Letterkenny110 kV	3.69	10.27	8.85	4.26	9.59	9.12	4.22	10.76	9.20	5.02	9.91	9.42
Liberty A 110 kV	3.92	16.79	15.52	3.47	18.12	17.56	4.81	19.81	17.98	4.18	20.52	19.81
Liberty B 110 kV	3.87	16.78	15.51	3.39	18.08	17.52	4.73	19.78	17.96	4.06	20.45	19.76
Lickny 110 kV	2.46	5.22	5.13	2.31	6.03	5.99	3.12	5.48	5.34	2.90	6.28	6.22
Limerick 110 kV	3.40	17.95	16.49	3.63	16.20	15.70	4.33	19.82	17.98	4.82	17.41	16.90

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Lisdrum 110 kV	2.08	5.72	5.48	2.30	8.12	7.96	2.55	6.11	5.80	2.89	8.60	8.39
Lisdrumdoagh 110 kV	2.08	5.70	5.47	2.31	8.14	7.98	2.55	6.09	5.79	2.91	8.62	8.41
Lisheen 110 kV	3.17	5.17	4.34	3.59	8.23	7.46	3.73	5.47	4.61	4.29	8.64	7.86
Lislea 110 kV	2.25	6.24	5.89	2.64	4.77	4.70	2.75	6.60	6.23	3.36	4.99	4.92
Lodgewood 110 kV	4.01	9.84	9.46	3.97	11.69	11.49	6.35	10.74	10.29	6.30	12.74	12.52
Lodgewood 220 kV	3.28	7.88	7.68	3.37	7.42	7.33	5.34	9.17	8.94	5.53	8.39	8.32
Longpoint 220 kV	6.58	14.09	13.05	6.15	17.89	17.29	12.27	21.27	19.23	10.32	25.06	24.02
Loughtown 220 kV	4.11	11.14	10.80	3.96	13.20	13.09	7.78	15.80	15.29	7.51	18.24	17.99
Louth 220 kV	3.54	17.65	16.23	3.01	20.31	19.71	5.57	21.30	20.27	5.03	23.05	22.60
Louth A 110 kV	3.27	14.44	13.59	3.37	17.91	17.45	4.95	15.85	15.05	5.27	19.60	19.18
Louth A 275 kV	3.96	10.33	9.70	3.35	11.99	11.85	6.74	12.47	12.05	5.64	14.03	13.82
Louth B 110 kV	2.95	14.81	14.02	3.04	17.98	17.51	4.32	16.36	15.56	4.56	19.77	19.40
Louth B 275 kV	3.87	10.34	9.70	3.18	12.24	12.08	6.47	12.48	12.06	5.14	14.44	14.21
Lumcloon 110 kV	3.50	8.42	8.16	3.79	9.92	9.79	5.22	9.64	9.37	5.92	10.90	10.79
Lysaghtstown 110 kV	3.14	12.29	11.65	3.45	14.24	13.92	3.64	13.78	12.99	4.14	15.52	15.17
Macetown 110 kV	2.49	17.35	16.04	2.33	17.26	17.22	4.22	20.93	19.52	3.84	20.16	19.64
Macroom 110 kV	4.71	16.89	15.14	4.58	17.11	16.42	6.14	18.81	16.92	6.02	18.66	17.99
Mallow 110 kV	3.83	6.95	6.63	4.68	6.04	5.96	4.76	7.56	7.15	6.18	6.43	6.32
Marina 110 kV	4.44	18.77	17.19	4.80	20.37	19.66	5.68	22.49	20.17	6.45	23.32	22.42
Maynooth A 110 kV	3.10	14.37	13.92	3.12	17.16	17.09	5.23	16.26	15.67	5.29	19.27	18.97
Maynooth A 220 kV	3.95	21.05	18.76	1.97	21.57	20.91	4.44	29.66	27.79	3.26	26.97	26.50
Maynooth B 110 kV	2.54	16.42	15.47	2.69	15.31	15.32	4.26	18.60	17.87	4.70	16.99	16.74
Maynooth B 220 kV	3.77	19.52	17.62	2.03	19.12	18.67	4.08	25.77	24.27	3.22	22.87	22.48
McDermott 110 kV	2.79	11.96	11.32	2.02	14.07	13.74	5.76	15.28	14.13	3.22	17.38	16.82
Meath Hill 110 kV	2.26	9.63	9.30	2.63	9.51	9.33	2.98	10.73	10.20	3.69	10.22	10.05
Meentycat 110 kV	3.18	7.02	6.26	4.08	5.82	5.63	3.55	7.21	6.43	4.72	5.83	5.65
Metro Airport 110 kV	2.67	12.10	10.98	2.32	15.66	15.19	5.31	13.65	12.62	4.22	17.57	17.00
Metro North 110 kV	2.50	11.76	10.69	2.17	14.91	14.27	4.65	13.24	12.27	3.73	16.68	16.17

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Midleton 110 kV	2.95	10.79	10.24	3.38	11.73	11.50	3.39	12.04	11.37	4.06	12.71	12.45
Milltown A 110 kV	2.49	13.88	12.92	1.97	16.55	15.94	4.50	16.45	14.95	3.09	19.14	18.42
Milltown B 110 kV	2.06	11.31	10.66	1.50	13.44	13.00	3.47	13.08	12.23	2.19	15.08	14.85
Misery Hill 110 kV	2.44	13.53	12.61	2.04	16.30	15.69	4.32	15.99	14.55	3.26	18.58	18.09
Monatooreen 110 kV	4.05	20.11	18.63	4.07	21.61	20.94	4.99	23.88	21.85	5.14	24.75	23.98
Moneteen 110 kV	3.50	11.99	11.16	3.81	8.62	8.47	4.50	12.85	11.99	5.11	9.09	8.94
Moneypoint 110 kV	4.37	9.92	9.59	4.58	9.76	9.59	8.40	10.73	10.34	9.09	10.29	10.17
Moneypoint 220 kV	3.78	18.18	16.64	3.35	24.62	23.70	8.01	30.35	27.95	6.68	37.51	36.19
Moneypoint G1 400 kV	3.11	10.05	9.34	2.77	13.37	12.99	5.43	15.35	14.49	5.46	18.70	18.33
Moneypoint G2 400 kV	3.11	10.05	9.34	2.77	13.37	12.99	5.43	15.35	14.49	5.46	18.70	18.33
Moneypoint G3 400 kV	3.11	10.05	9.34	2.77	13.37	12.99	5.43	15.35	14.49	5.46	18.70	18.33
Monread 110 kV	2.33	8.50	8.30	2.60	8.32	8.21	3.22	9.55	9.11	3.76	9.04	8.91
Mooretown 220 kV	5.07	23.27	20.05	2.70	30.58	28.70	8.17	40.47	36.20	5.33	49.43	47.19
Mount Lucas 110 kV	3.27	8.06	7.76	3.23	8.77	8.65	4.51	9.60	9.21	4.50	9.98	9.83
Moy 110 kV	3.64	6.76	6.39	3.87	8.26	8.07	6.04	10.24	9.47	6.07	10.89	10.58
Mulgeeth 110 kV	3.60	4.22	4.08	3.86	5.18	5.11	4.99	4.65	4.39	5.53	5.62	5.48
Mullagharlin 110 kV	2.10	9.24	8.92	2.46	9.26	9.08	2.69	10.13	9.64	3.34	9.86	9.70
Mullingar 110 kV	3.08	8.11	7.88	3.12	9.22	9.12	4.17	8.79	8.41	4.30	9.81	9.65
Mulreavy 110 kV	4.19	9.17	7.82	4.68	9.88	9.30	4.83	9.36	8.02	5.52	9.99	9.42
Mungret A 110 kV	3.33	11.31	10.56	3.69	7.97	7.83	4.24	12.10	11.32	4.90	8.39	8.26
Mungret B 110 kV	3.33	11.34	10.58	3.69	7.98	7.84	4.24	12.12	11.35	4.89	8.40	8.27
Nangor 110 kV	2.33	12.38	11.38	2.07	15.84	15.11	5.14	17.47	15.65	3.98	21.15	20.38
Navan 110 kV	2.79	13.85	13.07	2.92	14.11	13.77	4.13	16.46	15.42	4.51	16.11	15.76
Nenagh 110 kV	2.50	3.98	3.78	3.15	2.36	2.34	3.00	4.24	4.02	3.98	2.47	2.44
Newbridge 110 kV	2.60	11.32	10.85	2.79	10.62	10.44	3.71	13.14	12.38	4.14	11.85	11.63
Newbury 110 kV	2.82	12.57	11.38	2.51	16.59	16.05	5.88	14.25	13.15	4.92	18.67	18.23
Nisa Belcamp 220 kV	3.63	13.61	12.48	2.02	17.42	16.89	6.39	18.45	17.52	3.11	22.68	22.29
North Quays 110 kV	2.59	14.18	13.18	1.92	16.58	15.96	4.82	16.85	15.29	2.96	19.15	18.44

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
North Wall 220 kV	4.72	21.76	18.94	2.53	27.98	26.44	7.29	37.69	33.97	4.76	44.49	42.68
Oaklands 110 kV	3.02	10.11	9.85	3.03	11.20	11.03	4.79	11.20	10.90	4.72	12.15	11.99
Oldbridge 110 kV	2.82	14.46	13.47	2.93	16.70	16.16	5.04	19.52	17.81	5.39	20.91	20.21
Oldcourt A 110 kV	2.90	10.36	9.87	3.32	8.12	8.02	3.37	11.83	11.22	4.05	8.90	8.78
Oldcourt B 110 kV	2.92	10.43	9.93	3.33	8.21	8.10	3.40	11.91	11.30	4.07	9.00	8.88
Oldstreet 220 kV	3.23	9.14	8.84	3.12	10.51	10.54	6.97	13.25	12.68	6.42	13.99	13.74
Oldstreet 400 kV	2.85	8.26	7.79	2.25	8.36	8.22	4.06	10.96	10.63	3.67	9.83	9.72
Oriel 220 kV	2.98	12.87	12.16	2.40	13.30	13.19	4.48	14.89	14.46	3.67	14.70	14.54
Oriel Offshore 220 kV	3.00	8.66	8.35	2.33	9.77	9.78	4.44	9.54	9.41	3.50	10.62	10.53
Oriel onshore 220 kV	3.10	9.35	9.00	2.37	10.39	10.40	4.72	10.42	10.23	3.59	11.37	11.27
Oughtragh 110 kV	2.57	4.85	4.55	3.09	3.06	3.02	3.19	5.15	4.79	4.04	3.16	3.11
Pelletstown 110 kV	2.71	11.31	10.73	2.25	12.12	11.94	5.38	14.24	13.25	3.87	14.73	14.33
Philipstown 110 kV	3.68	10.59	10.04	3.88	12.06	11.75	6.34	13.96	12.98	6.82	14.58	14.20
Platin 110 kV	2.86	14.22	13.31	2.95	15.98	15.51	5.65	20.48	18.57	5.76	20.66	19.96
Pollahoney 110 kV	3.04	11.47	11.10	3.05	15.59	15.37	5.11	13.02	12.52	5.06	17.49	17.15
Pollaphuca 110 kV	2.12	3.09	3.00	2.73	2.62	2.60	2.68	3.24	3.13	3.68	2.64	2.61
Poolbeg A 110 kV	2.74	14.83	13.76	2.56	18.35	17.82	5.34	17.71	16.07	4.91	21.45	20.60
Poolbeg A 220 kV	4.72	21.57	18.80	2.40	27.12	25.68	7.24	37.29	33.65	4.23	42.57	40.92
Poolbeg B 110 kV	2.73	14.81	13.75	2.56	18.33	17.80	5.34	17.69	16.05	4.91	21.43	20.58
Poolbeg B 220 kV	4.35	21.11	18.58	2.18	27.73	26.28	6.23	34.30	30.96	3.86	41.81	40.10
Poppintree 110 kV	2.75	12.26	11.50	2.38	13.27	12.94	5.52	14.65	13.46	4.29	15.23	14.74
Portan 260 kV	4.36	15.74	14.49	4.47	0.00	0.00	7.39	20.81	20.11	10.93	3.54	3.54
Portan 400 kV	4.95	13.92	12.43	3.25	10.22	10.00	5.95	20.78	19.70	8.00	12.91	12.81
Portlaoise 110 kV	3.27	14.11	13.64	3.44	12.38	12.22	4.88	15.78	15.18	5.32	13.41	13.26
Pottery 110 kV	2.28	10.99	10.53	1.72	10.93	10.86	4.18	12.98	12.27	2.59	12.48	12.33
Prospect 220 kV	3.54	15.08	14.06	2.86	16.72	16.31	6.76	22.54	21.25	4.69	21.63	21.20
Raffeen 220 kV	6.37	13.58	12.62	5.86	16.88	16.31	11.53	19.75	18.00	9.49	22.95	22.08
Raffeen A 110 kV	3.96	14.48	13.55	4.33	16.90	16.44	5.05	17.17	15.93	5.77	19.48	18.92

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Raffeen B 110 kV	5.48	14.64	13.68	5.69	17.70	17.19	7.93	17.07	15.84	8.44	20.09	19.49
Rappareehill 110 kV	3.42	7.80	7.58	3.88	8.44	8.36	4.64	8.63	8.32	5.56	9.08	8.97
Rathcobican 220 kV	3.37	9.38	9.07	3.33	12.31	12.19	6.97	11.85	11.73	7.08	15.00	14.89
Rathcobican 380 kV	3.14	9.21	8.59	2.55	10.81	10.59	4.77	12.37	12.02	4.55	13.31	13.21
Rathkeale 110 kV	2.40	7.82	7.31	3.02	5.89	5.79	3.04	8.49	7.89	4.05	6.19	6.08
Rathnaskillo 110 kV	4.03	7.96	7.65	4.43	8.36	8.24	5.42	8.67	8.31	6.23	8.87	8.74
Ratrussan 110 kV	3.03	8.27	7.15	3.52	8.82	8.34	3.92	8.75	7.66	4.79	9.04	8.62
Reamore 110 kV	2.57	9.49	8.67	2.68	8.12	7.90	3.20	10.13	9.24	3.41	8.40	8.17
Richmond A 110 kV	2.60	6.91	6.71	3.19	6.19	6.13	3.26	7.72	7.37	4.27	6.67	6.58
Richmond B 110 kV	2.60	6.91	6.71	3.19	6.19	6.13	3.26	7.72	7.37	4.27	6.67	6.58
Rinawade 110 kV	2.38	9.55	9.18	2.54	6.79	6.71	3.81	10.29	10.00	4.10	7.29	7.24
Ringaskiddy 110 kV	4.16	12.04	11.39	4.25	11.77	11.55	5.29	13.80	12.98	5.49	13.07	12.81
Ringsend 110 kV	2.75	14.95	13.84	2.58	18.51	17.95	5.37	17.91	16.17	4.99	21.68	20.78
Rossiple 110 kV	3.95	9.17	8.85	4.07	9.67	9.55	5.57	9.97	9.59	5.88	10.25	10.11
Ryebrook 110 kV	2.18	14.35	13.30	2.36	12.43	12.07	3.32	16.09	15.20	3.77	13.53	13.28
Salthill 110 kV	3.51	13.72	12.77	2.77	16.15	15.57	4.92	15.54	14.08	3.62	17.72	17.04
Screeb 110 kV	2.79	2.70	2.63	3.28	1.87	1.86	3.57	2.95	2.82	4.40	1.98	1.96
Seal Rock A 110 kV	4.61	10.55	9.56	4.71	12.21	11.73	6.33	10.94	10.00	6.59	12.51	12.08
Seal Rock B 110 kV	4.62	10.56	9.56	4.72	12.22	11.73	6.35	10.95	10.01	6.60	12.52	12.08
Shankill 110 kV	3.01	9.48	8.48	3.41	8.28	7.99	3.85	10.17	9.12	4.58	8.70	8.42
Shannonbridge 110 kV	3.34	14.48	13.76	3.53	18.81	18.31	6.17	21.07	19.70	6.81	25.87	25.15
Shannonbridge 220 kV	3.30	7.35	7.15	3.60	8.27	8.15	5.89	8.88	8.72	6.87	9.61	9.55
Shanonagh 110 kV	3.14	7.63	7.43	3.36	8.63	8.54	4.27	8.22	7.91	4.72	9.11	8.99
Shellybanks A 220 kV	4.60	21.41	18.68	2.22	25.10	23.88	6.87	36.93	33.34	3.74	37.95	36.65
Shellybanks B 220 kV	3.82	17.81	16.08	1.78	23.02	22.12	6.30	30.23	27.51	3.19	35.83	34.52
Shelton Abbey 110 kV	3.00	11.15	10.80	2.98	14.48	14.39	5.00	12.55	12.14	4.84	16.17	15.88
Singland 110 kV	4.01	17.43	16.14	4.19	16.90	16.39	5.37	19.13	17.53	5.82	18.06	17.55
SKERD ROCK 220 kV	3.28	9.53	9.11	2.07	12.72	12.60	4.51	11.78	11.39	2.57	15.44	15.21

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030

	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]	X/R ratio	Ik'' [kA]	Ik' [kA]
Sliabh Bawn 110 kV	3.48	9.32	8.98	3.96	9.11	9.00	4.69	10.42	10.01	5.66	9.58	9.46
Slievecallan 110 kV	4.57	7.00	6.06	5.29	6.91	6.57	6.35	7.34	6.39	7.89	7.08	6.76
Sligo 110 kV	2.89	10.02	9.22	3.23	9.06	8.83	3.44	11.13	10.22	4.00	9.71	9.47
Snugborough 110 kV	2.92	22.16	19.95	2.62	28.30	27.09	5.43	27.92	25.44	5.03	34.11	32.96
Somerset 110 kV	2.12	7.32	7.04	2.60	4.84	4.80	2.62	8.58	8.27	3.47	5.30	5.26
Sorne Hill 110 kV	3.07	3.75	3.15	3.81	3.51	3.32	3.37	3.87	3.25	4.30	3.62	3.41
Southbank 220 kV	4.66	21.49	18.74	2.72	9.75	9.71	7.08	37.13	33.52	6.35	11.40	11.28
Srahnakilly 110 kV	4.02	5.71	5.48	4.54	8.81	8.62	7.06	8.95	8.27	7.84	11.87	11.45
Srananagh 110 kV	3.49	11.88	10.82	3.84	12.45	12.03	4.30	13.05	11.91	4.92	13.41	12.98
Srananagh 220 kV	4.14	4.81	4.62	4.63	3.78	3.73	6.04	5.21	5.03	7.22	4.00	3.96
Stevenstown 110 kV	1.90	5.86	5.70	2.02	3.76	3.72	2.88	6.48	6.13	3.11	4.03	3.98
Stonestown 110 kV	3.50	8.98	8.65	3.78	10.16	10.02	5.30	10.47	10.13	5.96	11.42	11.28
Stratford 110 kV	2.10	4.53	4.39	2.53	3.34	3.31	2.67	4.88	4.66	3.39	3.49	3.45
Taney 110 kV	1.99	9.50	9.15	1.34	9.17	9.22	3.29	11.04	10.51	1.84	10.31	10.13
Tarbert 110 kV	4.45	7.81	7.73	4.60	5.79	5.75	11.35	8.56	8.43	11.67	6.05	6.02
Tarbert 220 kV	3.63	17.14	15.78	3.29	22.24	21.47	7.84	29.34	27.00	6.73	33.62	32.51
Tawnaghmore A 110 kV	2.88	4.90	4.71	3.40	4.92	4.86	4.12	7.06	6.69	5.02	6.05	5.96
Tawnaghmore B 110 kV	2.91	4.86	4.67	3.40	5.52	5.44	4.68	7.42	6.94	5.61	7.18	7.02
Thornsberry 110 kV	3.25	7.31	7.09	3.54	6.84	6.77	4.62	8.75	8.37	5.27	7.81	7.71
Thurles 110 kV	3.88	6.54	5.64	4.42	7.68	7.22	4.90	7.04	6.06	5.74	8.13	7.65
Tievebrack 110 kV	3.63	4.93	4.57	4.50	3.42	3.36	4.14	5.16	4.74	5.33	3.54	3.47
Timahoe 110 kV	3.05	8.56	8.45	2.73	8.53	8.46	4.59	9.55	9.33	3.89	9.25	9.18
Timoney 110 kV	4.15	6.06	5.51	4.57	7.34	7.05	5.53	6.51	5.92	6.27	7.72	7.42
Tipperary 110 kV	3.90	7.87	7.22	4.33	4.76	4.67	4.95	8.45	7.73	5.68	4.98	4.88
Tonroe 110 kV	3.63	6.32	5.95	2.80	6.89	6.74	4.95	7.81	7.33	3.42	7.94	7.77
Trabeg 110 kV	4.38	18.67	17.11	4.74	20.28	19.58	5.61	22.38	20.09	6.36	23.24	22.34
Tralee 110 kV	3.21	10.15	9.24	3.44	8.72	8.47	4.25	10.89	9.91	4.72	9.04	8.79
Trien A 110 kV	2.83	8.65	8.11	3.11	7.68	7.52	3.73	9.21	8.65	4.26	7.97	7.81

Table E-4: Ireland Short Circuit Currents for Maximum and Minimum Demand in 2030												
	Summer						Winter					
	Three phase			Single phase			Three phase			Single phase		
Station	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**	**X/R ratio**	**Ik'' [kA]**	**Ik' [kA]**
Trien B 110 kV	4.32	10.32	9.55	3.78	7.90	7.70	7.97	11.21	10.42	6.22	8.22	8.06
Trillick 110 kV	3.11	4.08	3.42	3.86	3.51	3.33	3.43	4.22	3.53	4.36	3.62	3.43
Trinity 110 kV	2.38	13.14	12.27	1.92	15.67	15.10	4.11	15.47	14.11	2.96	17.80	17.34
Tullabeg 110 kV	3.24	7.72	7.55	3.31	10.10	9.97	4.58	8.25	8.00	4.77	10.69	10.54
Tullabrack 110 kV	3.32	7.56	7.19	3.49	5.60	5.53	4.90	7.97	7.67	5.29	5.78	5.72
Turlough 220 kV	3.05	13.26	12.26	3.02	11.46	11.26	4.93	14.90	14.16	5.21	12.13	11.94
Tynagh 220 kV	3.33	8.72	8.44	3.44	10.46	10.49	8.09	14.03	13.17	9.17	15.07	14.71
Uggool 110 kV	4.29	8.55	7.67	3.77	10.74	10.24	6.33	9.22	8.27	5.32	11.41	10.88
Walterstown 110 kV	3.44	2.37	2.26	3.89	2.52	2.48	4.69	2.61	2.40	5.57	2.71	2.62
Waterford 110 kV	4.02	14.58	14.02	4.05	15.09	14.84	6.05	17.04	16.11	6.16	17.22	16.88
Wexford 110 kV	3.96	8.54	8.05	3.16	10.10	9.86	5.57	9.16	8.55	4.14	10.76	10.46
Whitebank 110 kV	2.71	14.89	13.80	2.53	18.40	17.85	5.21	17.83	16.11	4.79	21.54	20.65
Whitegate 110 kV	3.34	9.73	9.29	3.75	9.95	9.79	4.03	11.03	10.53	4.70	10.95	10.78
Wolfe Tone 110 kV	2.72	11.73	11.09	1.94	13.59	13.27	5.45	14.88	13.78	3.03	16.68	16.17
Woodhouse 110 kV	4.22	6.94	6.51	3.80	10.14	9.82	5.50	7.55	7.04	4.81	10.99	10.61
Woodland 220 kV	4.88	24.27	21.31	2.44	29.25	27.88	6.60	36.40	33.79	4.63	39.64	38.66
Woodland 400 kV	5.16	14.06	12.54	2.62	16.63	16.00	6.38	21.05	19.94	5.02	22.19	21.80
Yellowmeadow 110 kV	2.48	12.90	11.84	2.35	16.48	15.89	5.76	18.04	16.17	5.23	22.08	21.07

E.4 Short Circuit Currents in Northern Ireland

Methodology used in Northern Ireland

Short circuit current levels are calculated in accordance with the UK Engineering Recommendation G74, which is a computer based analysis, based on the International Standard IEC60909. Compliance with G74 includes:

- Short circuit current contributions from all synchronous and non-synchronous rotating plant including induction motors embedded in the general load;
- Comprehensive plant parameters including time-dependent impedances, transformer winding and earthing configurations;
- Pre-fault voltage levels at each node which should be obtained from a credible, pre-fault load flow study; and
- Pre-fault transformer tap settings should also be obtained from the load flow study.

The short circuit current level network model includes the following component parameters:

- Transformer impedance variation with tap position;
- Zero sequence mutual coupling effect;
- Unsaturated generator reactance values; and
- Power station auxiliaries fault level contributions.

The calculation of the X/R ratios, used by SONI, is undertaken in accordance with IEC60909-0 Method C, which is known as the equivalent frequency method. The equivalent frequency method is considered to be the most appropriate general purpose method for calculating the DC component of short circuit currents on the Northern Ireland transmission system.

The Northern Ireland transmission system is designed and operated to maintain short circuit current levels below the ratings of equipment at each substation. Table E-5 below, indicates the range of circuit breaker RMS ratings that are currently installed on the Northern Ireland transmission system, for the respective voltage levels currently operated.

Table E-5: Northern Ireland Station Equipment Rating Range by Voltage Level

Voltage Level	Short Circuit Current Levels (kA)
275[2]	31.5 – 40
110	18.4 – 40

Analysis

The total RMS break current at a busbar is an indication of the short circuit current level that one could expect at that point in the transmission system. However, they do not necessarily represent the short circuit current that could flow through each individual breaker, which may be lower.

2 The switchgear ratings at Castlereagh, Coolkeeragh, Magherafelt, Tandragee and Kells 275 kV substations have been temporarily reduced to 10 kA by NIE Networks following review of the capability of concrete structures to withstand mechanical loading under fault conditions. This is under constant review and projects will be brought forward to address this issue.

Northern Ireland Short Circuit Current Level Results

Tables E-6 to E-11 contain the following three-phase and single-phase short circuit current level results for maximum winter peak and minimum summer valley system demand conditions for 2024, 2027 and 2030:

- **Initial Short Circuit Current (I")**
  This is the initial RMS value of the AC component of the short circuit current, prior to contact separation time.
  It is calculated using generator sub-transient reactances.
- **Peak Make Current (ip)**
  The largest peak current occurs around 10ms, and is the short circuit current that equipment must be able to withstand, for example, when a circuit breaker is closed directly onto an earthed section of network, thus energising a fault.
  All equipment in the fault current path will be subjected to the peak make current, and therefore should be rated to withstand this.
- **RMS Break Current (IB)**
  This is the RMS value of the AC component of the short circuit current at the time of circuit breaker contact separation. The break time at which contact separation occurs varies from circuit to circuit, and depends on protection settings, fault location, circuit breaker design etc. For the purposes of this report, we have used a short circuit current break time of 50ms for all 275 kV and 110 kV calculations.

In the Northern Ireland results tables, the RMS Break and Peak Make ratings of the existing nodes are shown. It should be noted that the Ballylumford 110 kV node (highlighted in the tables with *) currently has separate ratings for three-phase and single-phase faults; these are indicated in the tables. All ratings are in kA.

Single phase to earth short circuit currents tend to be larger than three phase short circuit currents in heavily meshed transmission networks. This is due to the multiplicity of zero phase sequence paths available to earth fault currents. In all tables, any nodes where short circuit currents exceed 90% of the corresponding existing rating are highlighted in **orange**. Any nodes where short circuit currents exceed the corresponding existing ratings are highlighted in **red**.

The results presented in the following section are indicative only. They are based on intact network conditions and are representative of the assumed generation dispatch and transmission system conditions.

Northern Ireland Short Circuit Currents for Minimum Demand in 2024

Table E-6: Northern Ireland Short Circuit Currents for Minimum Demand in 2024												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
275 kV												
Ballylumford	31.5	79	12.03	19.17	11.47	28.93	10.21	13.97	23.22	13.37	34.23	12.46
Castlereagh	10	79	10.19	14.91	10.48	25.94	9.38	8.89	16.04	9.28	22.56	8.80
Coolkeeragh	10	79	12.90	18.71	10.06	25.57	9.04	14.01	22.71	8.67	22.21	8.29
Hannahstown	31.5	79	10.37	15.35	10.38	25.75	9.30	9.23	17.90	9.15	22.37	8.69
Kells	10	79	11.03	15.93	11.07	27.66	9.89	9.97	15.14	11.70	28.88	10.97
Kilroot	31.5	79	10.70	14.77	10.03	24.98	9.05	11.78	16.36	13.14	33.06	12.23
Magherafelt	10	79	11.59	17.07	12.30	30.90	10.89	9.97	19.22	11.12	27.46	10.50
Moyle	31.5	79	11.94	18.85	11.31	28.52	10.08	13.82	22.72	13.17	33.69	12.29
Tandragee	10	79	10.37	14.81	12.89	31.98	11.43	9.13	17.92	11.83	28.87	11.16
Tamnamore	40	100	10.86	15.47	12.28	30.63	10.89	9.15	16.82	10.52	25.67	9.97
110 kV												
Aghyoule	40	100	3.98	8.73	4.20	8.80	3.69	5.36	12.09	4.11	9.19	3.88
Antrim	40	100	4.38	6.97	8.80	18.84	8.42	3.67	16.04	8.85	18.19	8.60
Aught	40	100	4.47	5.96	10.29	22.13	9.57	4.98	6.96	13.21	29.07	12.66
Ballylumford	21.9	55	9.96	22.05	16.92	41.75	15.61	11.21	24.94	16.66	41.69	15.97
Ballymena	40	100	4.61	8.28	8.07	17.47	7.72	5.43	11.09	8.53	19.11	8.14
Banbridge	18.4	46.8	3.95	6.31	6.34	13.25	6.15	5.41	10.60	6.28	14.05	6.19
Ballyvallagh	21.9	46.8	5.05	6.30	13.32	29.40	12.43	5.28	8.69	12.55	27.96	12.08
Ballynahinch	18.4	46.8	4.10	6.85	5.36	11.31	5.18	3.88	12.66	5.47	11.40	5.37
Belfast Central	n/a	n/a	7.78	11.79	12.30	29.35	11.47	5.79	12.32	14.66	33.24	14.00
Belfast North	n/a	n/a	4.76	7.31	12.21	26.62	11.47	3.58	11.79	12.07	24.65	11.68
Brockaghboy	40	100	5.94	8.15	4.63	10.54	4.02	6.22	8.64	4.90	11.26	4.58
Carnmoney	31.5	79	4.04	7.02	8.04	16.90	7.70	3.11	8.41	8.09	15.94	7.90
Castlereagh	31.5	79	10.26	18.74	14.94	37.01	13.75	10.28	16.34	18.43	45.66	17.41
Coleraine	40	100	4.18	5.83	8.72	18.46	7.79	4.85	7.91	9.99	21.86	9.33
Coolkeeragh	31.5	79	9.62	20.37	19.76	48.54	17.25	10.08	21.32	22.39	55.33	20.79
Creagh	31.5	79	3.50	4.27	7.84	15.92	7.44	4.43	6.86	8.24	17.68	7.97

Table E-6: Northern Ireland Short Circuit Currents for Minimum Demand in 2024

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Cregagh	26.2	65	8.61	13.93	13.61	32.94	12.60	7.63	14.23	16.47	39.17	15.65
Culmore Road	26.2	65	7.95	14.22	17.92	42.88	15.83	8.63	15.96	20.76	50.27	19.39
Donegall North	31.5	79	8.12	12.78	13.90	33.36	12.96	6.51	11.97	15.41	35.71	14.77
Donegall South	n/a	n/a	5.92	8.30	11.07	25.22	10.46	5.22	3.76	11.45	25.44	11.09
Dromore	31.5	79	4.39	6.32	12.64	27.08	11.00	4.51	6.44	12.36	26.63	11.54
Drumnakelly	31.5	79	7.05	11.53	18.05	42.40	16.55	7.70	16.72	17.94	42.72	17.15
Dungannon	40	100	6.57	11.22	16.92	39.26	15.35	7.44	16.59	15.64	37.03	14.93
Eden	25	62.5	4.08	6.39	8.76	18.45	8.36	3.59	6.01	8.70	17.78	8.49
Enniskil	31.5	79	3.91	5.06	8.94	18.65	7.79	4.84	6.62	10.47	22.91	9.69
Enniskillen	31.5	79	10.19	11.83	3.22	7.97	3.07	0.00	0.00	0.00	0.00	0.00
Finaghy	31.5	79	9.25	15.27	14.40	35.20	13.40	7.47	14.66	16.09	38.13	15.39
Glengormley	18.4	46.8	4.06	6.11	6.05	12.73	5.87	4.92	10.33	5.66	12.43	5.56
Gort Cluster	40	100	7.26	9.34	7.96	18.79	7.45	6.61	13.63	7.45	17.31	7.15
Hannahstown	31.5	79	10.53	19.35	15.75	39.13	14.56	10.25	18.12	17.55	43.48	16.73
Kells	40	100	8.57	16.64	17.19	41.59	15.78	8.12	14.80	18.61	44.67	17.48
Killymallaght	40	100	6.14	8.68	12.61	28.91	11.16	5.61	10.18	11.49	25.91	10.93
Knock	n/a	n/a	4.85	7.33	13.03	28.53	12.11	3.49	11.30	13.62	27.63	13.07
Larne	18.4	46.8	4.37	5.43	8.59	18.38	8.19	4.77	14.95	8.37	18.26	8.15
Limavady	40	100	3.77	4.56	7.58	15.69	6.93	4.54	7.26	7.99	17.24	7.61
Lisburn	18.4	46.8	5.54	7.59	11.03	24.81	10.43	5.57	9.88	10.63	23.92	10.33
Lisaghmore	31.5	79	4.39	6.90	9.60	20.57	8.90	4.29	11.83	9.23	19.67	8.93
Loguestown	26.2	65	3.64	5.07	6.07	12.44	5.60	3.98	7.15	6.57	13.75	6.27
Magherakeel Cluster	40	100	5.41	9.58	4.44	9.94	4.18	7.15	12.39	4.86	11.43	4.68
Moyle	40	100	33.94	48.16	10.05	27.26	9.64	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	4.57	6.80	7.27	15.71	6.96	5.98	10.10	7.07	16.13	6.91
Newry	18.4	46.8	3.82	6.55	5.36	11.13	5.20	3.70	11.93	5.36	11.04	5.28
Omagh	40	100	5.10	7.64	15.83	35.02	13.69	5.50	9.84	16.18	36.34	14.97
Rasharkin	40	100	4.58	6.95	7.67	16.58	6.93	4.71	8.61	7.83	17.05	7.40

Table E-6: Northern Ireland Short Circuit Currents for Minimum Demand in 2024												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Rathgael	26.2	65	4.14	6.59	5.72	12.10	5.52	3.94	12.88	5.78	12.08	5.67
Rosebank	40	100	9.36	15.71	13.99	34.24	12.93	11.01	19.97	17.06	42.62	16.18
Slieve Kirk	40	100	4.78	7.34	9.24	20.17	8.25	5.73	12.79	7.35	16.65	7.08
Springtown	n/a	n/a	4.53	7.08	9.71	20.95	9.05	4.34	12.87	9.53	20.36	9.23
Strabane	18.4	46.8	4.93	6.46	15.50	34.05	13.70	5.76	9.54	16.34	37.03	15.37
Tandragee	31.5	79	8.60	17.19	19.33	46.78	17.65	8.06	15.63	19.49	46.73	18.59
Tremoge	40	100	4.24	6.11	9.27	19.70	8.51	4.77	9.75	8.39	18.30	8.07
Tamnamore	40	100	7.84	16.07	19.96	47.66	17.94	7.19	14.06	17.61	41.49	16.78
Waringstown	18.4	46.8	4.81	7.40	7.94	17.36	7.63	4.87	16.06	7.59	16.64	7.45

Northern Ireland Short Circuit Currents for Maximum Demand in 2024

Table E-7: Northern Ireland Short Circuit Currents for Minimum Demand in 2024												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
275 kV												
Ballylumford	31.5	79	13.61	20.64	18.13	46.30	16.17	15.51	25.24	18.56	47.96	17.45
Castlereagh	10	79	10.87	15.02	15.75	39.28	14.02	8.66	15.88	11.52	27.92	10.98
Coolkeeragh	10	79	13.30	17.93	12.60	32.10	11.55	14.09	22.35	9.75	24.98	9.43
Hannahstown	31.5	79	10.93	15.30	15.61	38.95	13.94	9.00	17.92	11.35	27.65	10.84
Kells	10	79	13.26	18.91	19.00	48.41	16.96	9.89	14.92	16.49	40.65	15.61
Kilroot	31.5	79	15.47	23.81	19.78	51.12	17.61	14.66	20.33	23.09	59.38	21.44
Magherafelt	10	79	12.37	16.89	18.39	46.53	16.46	9.66	19.03	13.84	34.02	13.23
Moyle	31.5	79	13.40	20.05	17.75	45.28	15.86	15.24	24.44	18.19	46.93	17.12
Tandragee	10	79	10.76	14.39	19.23	47.90	17.18	8.83	17.86	14.78	35.90	14.09
Tamnamore	40	100	11.23	14.87	17.95	44.93	16.09	8.80	16.49	12.78	31.04	12.25

Table E-7: Northern Ireland Short Circuit Currents for Minimum Demand in 2024												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
110 kV												
Aghyoule	40	100	3.99	8.81	4.26	8.93	3.74	5.41	12.27	4.15	9.29	3.91
Antrim	40	100	4.17	6.79	9.91	20.99	9.56	3.52	16.41	9.50	19.32	9.31
Aught	40	100	4.26	5.57	11.18	23.79	10.48	4.79	6.61	14.16	30.91	13.61
Ballylumford	21.9	55	12.90	26.00	21.15	53.73	19.55	13.19	27.64	18.85	47.99	18.18
Ballymena	40	100	4.41	8.08	9.02	19.33	8.65	5.30	11.02	9.13	20.35	8.77
Banbridge	18.4	46.8	3.77	6.09	6.90	14.27	6.66	5.32	10.57	6.64	14.81	6.52
Ballyvallagh	21.9	46.8	4.78	5.49	15.87	34.63	14.88	5.12	8.32	13.86	30.68	13.42
Ballynahinch	18.4	46.8	4.18	6.85	5.62	11.90	5.34	3.89	12.87	5.64	11.75	5.48
Belfast Central	n/a	n/a	9.11	12.14	13.49	32.92	12.26	6.50	12.74	15.58	36.09	14.57
Belfast North	n/a	n/a	4.27	6.57	14.70	31.31	13.73	3.29	11.41	13.53	27.05	13.04
Brockaghboy	40	100	5.95	8.49	4.84	11.03	4.26	6.31	9.22	5.12	11.79	4.81
Carnmoney	31.5	79	4.05	7.49	5.29	11.14	5.13	2.60	9.25	5.48	10.30	5.38
Castlereagh	31.5	79	14.31	22.96	16.71	42.88	14.92	13.20	17.62	19.86	50.58	18.31
Coleraine	40	100	4.02	5.72	9.43	19.79	8.40	4.75	7.89	10.63	23.16	9.89
Coolkeeragh	31.5	79	9.86	21.77	23.53	58.00	20.63	10.19	22.16	25.43	62.93	23.68
Creagh	31.5	79	3.30	3.98	8.70	17.40	8.22	4.31	6.62	8.86	18.90	8.56
Cregagh	26.2	65	10.68	15.02	15.08	37.54	13.58	9.17	15.16	17.65	43.10	16.39
Culmore Road	26.2	65	7.85	13.99	20.95	50.03	18.61	8.55	15.85	23.33	56.42	21.85
Drumquin	40	100	5.43	7.63	6.98	15.64	6.26	5.88	12.13	6.44	14.65	6.13
Donegall North	31.5	79	7.70	12.13	17.27	41.13	15.97	6.08	11.35	18.02	41.24	17.17
Donegall South	n/a	n/a	5.48	7.59	13.12	29.45	12.34	4.90	3.20	12.85	28.18	12.40
Dromore	31.5	79	4.16	6.05	13.42	28.40	11.76	4.31	6.21	12.84	27.39	12.01
Drumnakelly	31.5	79	6.55	10.77	22.52	52.22	20.56	7.38	16.54	20.62	48.77	19.65
Dungannon	40	100	6.14	10.78	19.76	45.31	18.06	7.18	16.57	17.26	40.65	16.52
Eden	25	62.5	4.18	6.45	7.72	16.36	7.41	3.08	4.83	7.79	15.31	7.62
Enniskil	31.5	79	3.83	4.91	9.55	19.83	8.32	4.70	6.37	11.01	23.94	10.15
Enniskillen	31.5	79	10.57	12.18	3.24	8.06	3.11	0.00	0.00	0.00	0.00	0.00

Table E-7: Northern Ireland Short Circuit Currents for Minimum Demand in 2024

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Finaghy	31.5	79	8.98	15.05	18.03	43.91	16.65	7.09	14.26	18.96	44.56	18.03
Glengormley	18.4	46.8	3.83	5.33	6.50	13.50	6.32	4.79	9.51	5.94	12.96	5.84
Gort Cluster	40	100	7.10	9.17	8.30	19.52	7.82	7.57	13.61	8.62	20.46	8.22
Hannahstown	31.5	79	10.54	20.51	20.17	50.13	18.48	10.10	18.09	21.02	51.98	19.91
Kells	40	100	8.80	18.62	21.80	52.93	20.17	8.00	14.79	21.69	51.96	20.61
Killymallaght	40	100	5.90	8.22	13.61	30.98	12.17	5.46	10.04	12.06	27.04	11.51
Knock	n/a	n/a	5.13	7.04	14.33	31.74	12.97	3.68	11.55	14.35	29.50	13.52
Larne	18.4	46.8	4.17	4.96	9.58	20.29	9.16	4.63	14.93	8.93	19.36	8.72
Limavady	40	100	3.63	4.39	8.01	16.40	7.33	4.43	7.15	8.28	17.77	7.89
Lisburn	18.4	46.8	5.18	7.20	13.05	28.97	12.32	5.34	9.73	11.86	26.48	11.50
Lisaghmore	31.5	79	4.21	6.57	10.39	22.05	9.69	4.16	11.74	9.69	20.50	9.39
Loguestown	26.2	65	3.54	5.00	6.41	13.06	5.89	3.89	7.52	6.84	14.25	6.51
Magherakeel Cluster	40	100	5.35	9.59	4.46	9.95	4.21	7.07	12.37	4.88	11.46	4.70
Moyle	40	100	52.13	70.91	11.47	31.56	11.14	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	4.68	6.70	7.67	16.67	7.23	6.15	10.16	7.31	16.76	7.06
Newry	18.4	46.8	3.71	6.59	5.82	11.99	5.60	3.61	12.16	5.64	11.55	5.52
Omagh	40	100	4.76	7.21	17.09	37.26	14.91	5.20	9.44	17.17	38.13	15.91
Rasharkin	40	100	4.52	7.40	8.26	17.81	7.54	4.71	9.20	8.32	18.09	7.91
Rathgael	26.2	65	4.19	6.46	5.98	12.68	5.68	3.93	12.89	5.95	12.42	5.77
Rosebank	40	100	12.17	17.78	15.53	39.22	13.96	12.90	21.65	18.29	46.47	16.96
Slieve Kirk	40	100	4.60	7.10	9.70	21.00	8.73	5.67	12.48	7.59	17.16	7.33
Springtown	n/a	n/a	4.36	6.84	10.56	22.59	9.89	4.21	13.54	10.08	21.38	9.77
Strabane	18.4	46.8	4.65	6.01	17.07	37.04	15.23	5.54	9.17	17.47	39.30	16.49
Tandragee	31.5	79	8.24	17.47	24.63	59.25	22.37	7.74	15.32	22.80	54.33	21.65
Tremoge	40	100	4.05	5.85	9.68	20.35	8.98	4.62	9.57	8.59	18.62	8.30
Tamnamore	40	100	7.40	16.31	24.10	57.03	21.85	6.83	13.66	19.70	46.01	18.85
Waringstown	18.4	46.8	4.57	7.12	8.82	19.07	8.45	4.70	16.14	8.13	17.67	7.94

Northern Ireland Short Circuit Currents for Minimum Demand in 2027

Table E-8: Northern Ireland Short Circuit Currents for Minimum Demand in 2027												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
400 kV												
Turleena	31.5	79	14.88	19.55	8.19	21.10	7.65	10.58	22.07	9.36	23.28	9.00
275 kV												
Ballylumford	31.5	79	12.09	18.45	12.82	32.35	11.62	14.18	22.95	14.45	37.04	13.60
Castlereagh	10	79	10.41	14.56	11.50	28.53	10.48	8.84	15.80	9.76	23.71	9.33
Coolkeeragh	10	79	13.05	18.17	10.96	27.88	10.03	14.09	22.62	9.06	23.21	8.73
Hannahstown	31.5	79	10.46	14.88	11.47	28.49	10.45	9.15	17.75	9.63	23.50	9.22
Kells	10	79	11.17	15.54	12.51	31.31	11.39	9.89	14.92	12.68	31.27	11.98
Kilroot	31.5	79	10.83	14.41	11.20	27.92	10.28	12.00	16.22	14.30	36.05	13.44
Magherafelt	10	79	11.98	17.14	14.44	36.41	13.02	10.04	20.35	12.37	30.56	11.75
Moyle	31.5	79	11.99	18.13	12.63	31.84	11.46	14.02	22.43	14.22	36.41	13.39
Tandragee	10	79	10.83	15.28	15.23	37.98	13.72	9.12	18.85	13.53	33.03	12.86
Tamnamore	40	100	11.55	16.28	15.12	37.98	13.63	9.45	21.72	12.57	30.82	11.96
Turleena	40	100	11.51	16.26	15.31	38.44	13.80	9.42	21.68	13.12	32.16	12.49
110 kV												
Aghyoule	40	100	4.00	8.79	4.23	8.86	3.72	5.39	12.21	4.13	9.24	3.90
Antrim	40	100	4.33	7.00	8.97	19.16	8.63	3.59	16.10	8.97	18.34	8.74
Aught	40	100	4.40	5.84	10.41	22.32	9.79	4.91	6.85	13.36	29.31	12.87
Airport Road	40	100	5.16	7.17	7.11	15.77	6.85	5.81	10.29	7.24	16.44	7.09
Ballylumford	40	100	11.67	23.31	16.17	40.65	15.17	12.46	25.97	16.09	40.73	15.56
Ballymena	40	100	4.58	8.32	8.17	17.67	7.87	5.41	11.17	8.60	19.25	8.24
Banbridge	18.4	46.8	3.89	7.06	6.35	13.23	6.18	5.25	10.62	6.02	13.39	5.94
Ballyvallagh	21.9	46.8	5.21	6.19	13.58	30.18	12.82	5.70	9.13	13.51	30.55	13.09
Ballynahinch	18.4	46.8	4.48	7.10	5.11	11.00	4.96	4.03	12.66	5.33	11.19	5.24
Belfast Central	n/a	n/a	11.44	14.84	12.29	30.82	11.52	7.13	13.40	14.67	34.51	14.06
Belfast North	n/a	n/a	4.70	7.30	12.41	26.99	11.79	3.55	11.92	12.13	24.73	11.80
Brockaghboy	40	100	6.26	9.10	4.83	11.11	4.23	6.42	9.56	5.40	12.48	5.03
Carnmoney	31.5	79	3.84	6.44	4.54	9.44	4.43	2.62	8.15	4.90	9.22	4.83

Table E-8: Northern Ireland Short Circuit Currents for Minimum Demand in 2027

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Castlereagh	31.5	79	14.88	21.28	13.55	34.91	12.66	12.95	16.24	17.04	43.30	16.22
Coleraine	40	100	4.16	5.90	8.88	18.80	8.00	4.82	7.38	10.95	23.93	10.22
Coolkeeragh	31.5	79	9.60	20.45	20.48	50.30	18.18	10.03	21.42	23.07	56.98	21.61
Creagh	31.5	79	3.42	4.15	7.94	16.05	7.59	4.36	6.72	8.31	17.79	8.07
Cregagh	26.2	65	12.04	15.96	12.64	31.89	11.85	9.59	14.11	15.55	38.19	14.86
Culmore Road	26.2	65	7.87	14.04	18.48	44.16	16.57	8.55	15.85	21.32	51.56	20.07
Drumquin	40	100	5.96	9.33	7.37	16.81	6.64	6.56	11.45	7.67	17.80	7.27
Donegall North	31.5	79	8.14	13.03	14.23	34.18	13.47	6.46	12.09	15.66	36.23	15.11
Donegall South	n/a	n/a	5.88	8.29	11.21	25.49	10.68	5.16	3.60	11.50	25.49	11.19
Dromore	31.5	79	4.47	6.86	13.27	28.55	11.68	4.41	6.41	13.05	27.98	12.22
Drumnakelly	31.5	79	7.02	11.43	19.58	45.94	18.18	7.69	16.97	18.82	44.81	18.11
Dungannon	40	100	6.54	11.08	18.22	42.24	16.84	7.23	15.03	17.39	41.01	16.68
Eden	25	62.5	4.21	6.44	6.61	14.02	6.39	3.17	5.43	6.98	13.83	6.86
Enniskil	31.5	79	3.92	5.10	9.15	19.10	8.03	4.75	6.52	10.63	23.17	9.86
Enniskillen	31.5	79	10.45	12.14	3.21	7.97	3.08	0.00	0.00	0.00	0.00	0.00
Finaghy	31.5	79	9.34	15.75	14.78	36.17	13.96	7.43	14.99	16.38	38.78	15.78
Glengormley	18.4	46.8	3.72	5.77	5.61	11.56	5.47	3.55	11.32	5.54	11.30	5.45
Gort Cluster	40	100	7.33	9.41	8.15	19.26	7.67	7.71	13.83	8.56	20.39	8.16
Hannahstown	31.5	79	10.72	20.47	16.26	40.48	15.28	10.32	18.68	17.95	44.50	17.24
Kells	40	100	8.58	16.90	18.03	43.62	16.82	8.04	14.99	19.56	46.87	18.50
Killymallaght	40	100	6.17	8.99	12.96	29.74	11.64	5.63	10.54	11.70	26.39	11.19
Knock	n/a	n/a	5.75	7.64	11.94	27.04	11.22	3.97	12.05	12.78	26.76	12.33
Larne	18.4	46.8	4.43	5.35	8.64	18.56	8.30	4.58	5.24	8.60	18.59	8.41
Limavady	40	100	3.74	4.53	7.65	15.78	7.04	4.30	6.05	8.04	17.14	7.69
Lisburn	18.4	46.8	5.48	7.52	11.23	25.20	10.71	5.53	9.93	10.69	24.03	10.43
Lisaghmore	31.5	79	4.33	6.79	9.69	20.70	9.08	4.24	11.79	9.25	19.67	8.99
Loguestown	26.2	65	3.62	5.10	6.12	12.53	5.68	3.87	7.15	6.75	14.05	6.46
Magherakeel Cluster	40	100	5.46	9.80	4.47	10.02	4.22	7.17	12.57	4.92	11.59	4.74

Table E-8: Northern Ireland Short Circuit Currents for Minimum Demand in 2027													
Node	Rating		Three phase					Single phase					
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Moyle	40	100	36.41	49.74	10.32	28.05	9.95	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	5.01	6.96	6.81	15.00	6.56	6.16	10.10	6.73	15.43	6.59
Newry	18.4	46.8	3.84	6.71	5.44	11.29	5.30	3.70	12.04	5.39	11.09	5.31
Omagh	40	100	5.07	7.68	16.59	36.65	14.51	5.32	9.73	16.94	37.81	15.74
Omagh South	40	100	4.47	6.86	13.27	28.55	11.68	4.41	6.41	13.05	27.98	12.22
Rasharkin	40	100	4.73	7.73	7.97	17.34	7.28	4.78	9.46	8.33	18.17	7.88
Rathgael	26.2	65	4.46	6.72	5.41	11.63	5.24	4.04	12.73	5.57	11.70	5.47
Rosebank	40	100	12.85	17.33	12.73	32.34	11.94	13.04	18.90	15.87	40.36	15.16
Slieve Kirk	40	100	4.76	7.44	9.38	20.46	8.47	5.75	12.92	7.42	16.80	7.16
Springtown	n/a	n/a	4.48	7.05	9.83	21.14	9.24	4.30	13.56	9.60	20.46	9.33
Strabane	40	100	4.86	6.41	15.95	34.94	14.31	5.71	9.56	16.67	37.69	15.79
Tandragee	31.5	79	8.78	17.91	21.13	51.30	19.58	8.07	15.82	20.46	49.08	19.64
Tremoge	40	100	4.17	5.99	9.43	19.98	8.74	4.68	9.70	8.51	18.50	8.22
Tamnamore	40	100	7.98	16.61	22.05	52.80	20.18	7.65	14.38	20.89	49.68	19.95
Waringstown	18.4	46.8	4.77	7.45	8.13	17.73	7.84	4.82	16.30	7.68	16.80	7.55

Northern Ireland Short Circuit Currents for Maximum Demand in 2027

Table E-9: Northern Ireland Short Circuit Currents for Maximum Demand in 2027													
Node	Rating		Three phase					Single phase					
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
400 kV												
Turleena	31.5	79	16.14	19.91	10.23	26.52	9.83	10.36	22.11	11.19	27.76	10.90
275 kV												
Ballylumford	31.5	79	13.28	19.30	19.51	49.72	17.76	15.50	24.67	19.42	50.19	18.47
Castlereagh	10	79	10.70	14.27	17.01	42.34	15.42	8.52	15.59	12.01	29.02	11.53
Coolkeeragh	10	79	13.61	17.82	13.67	34.93	12.80	14.33	22.69	10.10	25.91	9.85
Hannahstown	31.5	79	10.76	14.50	16.80	41.84	15.27	8.89	17.73	11.76	28.60	11.32

Table E-9: Northern Ireland Short Circuit Currents for Maximum Demand in 2027												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Kells	10	79	13.01	17.77	20.70	52.65	18.89	9.74	14.70	17.34	42.67	16.59
Kilroot	31.5	79	15.09	22.17	21.23	54.73	19.27	14.66	19.82	24.30	62.50	22.83
Magherafelt	10	79	12.54	16.41	21.06	53.34	19.34	9.71	20.14	15.11	37.16	14.60
Moyle	31.5	79	13.08	18.77	19.08	48.54	17.40	15.22	23.86	19.01	49.06	18.10
Tandragee	10	79	10.96	14.25	22.28	55.63	20.40	8.73	18.60	16.82	40.79	16.18
Tamnamore	40	100	11.67	15.01	21.66	54.47	19.93	9.02	21.52	15.26	37.17	14.75
Turleena	40	100	11.62	14.97	22.01	55.32	20.24	8.97	21.44	16.06	39.09	15.50
110 kV												
Aghyoule	40	100	4.02	8.89	4.30	9.04	3.78	5.46	12.40	4.19	9.40	3.94
Airport Road	40	100	4.71	6.70	8.09	17.60	7.62	5.49	9.94	7.89	17.70	7.61
Agivey	40	100	6.27	9.60	5.86	13.48	5.30	6.68	10.61	6.73	15.65	6.34
Aught	40	100	4.17	5.44	11.41	24.15	10.83	4.70	6.49	14.39	31.29	13.94
Antrim	40	100	4.15	7.02	10.22	21.61	9.86	3.46	16.72	9.74	19.72	9.50
Ballylumford	40	100	12.46	25.74	21.44	54.29	19.98	12.87	27.59	19.05	48.40	18.45
Ballymena	40	100	4.34	8.08	9.13	19.51	8.80	5.24	11.05	9.19	20.44	8.84
Banbridge	18.4	46.8	3.70	6.77	6.86	14.12	6.66	5.14	10.46	6.30	13.97	6.21
Ballyvallagh	21.9	46.8	4.72	5.43	16.47	35.83	15.56	5.38	8.67	15.27	34.13	14.82
Ballynahinch	18.4	46.8	4.13	6.79	5.65	11.93	5.36	3.82	12.83	5.64	11.70	5.47
Belfast Central	n/a	n/a	10.49	14.42	15.37	38.18	13.85	6.51	12.83	17.39	40.30	16.16
Belfast North	n/a	n/a	4.21	6.59	14.95	31.73	14.08	3.12	11.53	13.94	27.49	13.50
Brockaghboy	40	100	6.39	9.33	5.24	12.09	4.68	6.65	10.05	5.79	13.46	5.45
Carnmoney	31.5	79	3.68	6.19	4.96	10.19	4.80	2.50	7.92	5.21	9.69	5.11
Castlereagh	31.5	79	14.13	22.60	17.29	44.31	15.45	12.24	15.89	20.78	52.53	19.12
Coleraine	40	100	5.52	13.12	12.50	28.09	11.49	6.44	15.82	14.21	32.87	13.47
Coolkeeragh	31.5	79	9.66	21.44	24.88	61.16	22.31	10.02	21.97	26.43	65.27	24.94
Creagh	31.5	79	3.25	3.91	8.82	17.59	8.38	4.25	6.57	8.94	19.01	8.64
Cregagh	26.2	65	11.11	15.73	15.90	39.75	14.30	8.89	13.61	18.65	45.36	17.27
Culmore Road	26.2	65	7.65	13.62	21.98	52.29	19.95	8.38	15.59	24.15	58.24	22.90
Drumquin	40	100	5.82	9.13	7.48	16.98	6.78	6.45	11.30	7.72	17.86	7.34

Table E-9: Northern Ireland Short Circuit Currents for Maximum Demand in 2027

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Donegall North	31.5	79	7.64	12.29	17.64	41.97	16.47	5.66	10.80	19.06	43.05	18.27
Donegall South	n/a	n/a	5.42	7.57	13.30	29.78	12.60	4.69	3.05	13.23	28.75	12.83
Dromore	31.5	79	4.26	6.58	13.99	29.76	12.43	4.25	6.22	13.48	28.67	12.67
Drumnakelly	31.5	79	6.47	10.60	23.78	55.02	22.03	7.32	16.66	21.32	50.37	20.47
Dungannon	40	100	6.12	10.61	20.93	47.95	19.42	6.97	14.83	19.05	44.65	18.33
Eden	25	62.5	3.95	5.98	7.45	15.57	7.15	2.99	4.67	7.57	14.76	7.39
Enniskil	31.5	79	3.85	4.97	9.77	20.31	8.57	4.72	6.45	11.20	24.37	10.35
Enniskillen	31.5	79	10.84	12.49	3.24	8.09	3.12	0.00	0.00	0.00	0.00	0.00
Finaghy	31.5	79	8.93	15.29	18.45	44.89	17.19	6.74	13.35	20.21	47.10	19.34
Glengormley	18.4	46.8	3.57	5.57	6.07	12.39	5.93	3.45	11.37	5.82	11.77	5.73
Gort Cluster	40	100	7.13	9.15	8.40	19.76	7.98	7.85	12.24	9.31	22.25	8.89
Hannahstown	31.5	79	10.54	21.21	20.72	51.50	19.19	10.33	18.60	22.66	56.17	21.60
Kells	40	100	8.51	18.52	22.84	55.20	21.33	7.79	14.95	22.75	54.28	21.66
Killymallaght	40	100	5.88	8.48	14.04	31.93	12.75	5.44	10.24	12.27	27.51	11.80
Knock	n/a	n/a	4.99	6.86	14.71	32.41	13.34	3.59	11.58	14.68	29.98	13.82
Larne	18.4	46.8	4.14	4.92	9.78	20.67	9.39	4.35	5.10	9.34	19.98	9.14
Limavady	40	100	3.75	4.78	8.88	18.35	8.30	4.38	6.46	8.92	19.09	8.60
Lisburn	18.4	46.8	5.11	7.12	13.27	29.36	12.62	5.18	9.51	12.08	26.81	11.76
Lisaghmore	31.5	79	4.12	6.46	10.58	22.34	9.99	4.10	11.69	9.77	20.60	9.51
Loguestown	26.2	65	4.05	7.37	7.70	16.20	7.27	4.27	8.88	7.91	16.84	7.64
Magherakeel Cluster	40	100	5.37	9.71	4.49	10.04	4.26	7.08	12.47	4.93	11.59	4.76
Moyle	40	100	54.66	71.18	11.55	31.82	11.28	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	4.62	6.61	7.74	16.76	7.29	5.89	9.90	7.33	16.69	7.08
Newry	18.4	46.8	3.68	6.54	5.85	12.03	5.65	3.62	12.17	5.64	11.54	5.52
Omagh	40	100	4.76	7.32	17.74	38.69	15.72	5.07	9.45	17.78	39.28	16.60
Omagh South	40	100	4.26	6.58	13.99	29.76	12.43	4.25	6.22	13.48	28.67	12.67
Rasharkin	40	100	4.83	8.28	9.28	20.31	8.68	4.89	10.22	9.26	20.30	8.89
Rathgael	26.2	65	4.14	6.40	6.00	12.70	5.70	3.85	12.84	5.94	12.35	5.76

Table E-9: Northern Ireland Short Circuit Currents for Maximum Demand in 2027

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Rosebank	40	100	11.99	17.49	16.03	40.42	14.42	12.49	19.03	19.12	48.43	17.69
Slieve Kirk	40	100	4.56	7.16	9.89	21.36	9.00	5.65	12.62	7.66	17.29	7.42
Springtown	n/a	n/a	4.27	6.72	10.77	22.92	10.21	4.14	13.50	10.17	21.50	9.91
Strabane	40	100	4.58	5.98	17.56	37.97	15.94	5.50	9.19	17.86	40.12	17.00
Tandragee	31.5	79	8.25	17.70	26.15	62.90	24.11	7.67	15.40	23.48	55.87	22.48
Tremoge	40	100	4.02	5.90	9.86	20.71	9.24	4.55	9.62	8.75	18.88	8.48
Tamnamore	40	100	7.49	16.57	25.98	61.62	24.00	7.28	14.02	23.27	54.92	22.34
Waringstown	18.4	46.8	4.52	7.04	8.95	19.30	8.62	4.66	16.17	8.16	17.71	7.99

Northern Ireland Short Circuit Currents for Minimum Demand in 2030

Table E-10: Northern Ireland Short Circuit Currents for Minimum Demand in 2030

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
400 kV												
Turleenan	50	125	13.67	17.61	8.53	21.79	7.92	9.96	20.75	9.89	24.42	9.46
275 kV												
Ballylumford	31.5	79	11.23	17.06	12.31	30.83	11.13	13.19	21.32	14.05	35.77	13.30
Castlereagh	10	79	10.12	14.31	11.51	28.47	10.45	8.71	15.67	9.78	23.70	9.31
Coolkeeragh	10	79	10.49	13.63	9.22	22.91	8.48	12.20	18.31	8.20	20.71	7.84
Hannahstown	31.5	79	10.21	14.60	11.34	28.08	10.30	9.03	17.48	9.59	23.36	9.14
Kells	10	79	10.74	14.93	12.10	30.13	10.97	9.68	14.69	12.43	30.55	11.83
Kilroot	31.5	79	10.48	14.02	10.94	27.17	10.02	11.55	15.76	14.08	35.36	13.32
Magherafelt	10	79	10.85	15.06	13.47	33.58	12.12	9.60	19.21	11.94	29.34	11.44
Moyle	31.5	79	11.23	17.01	12.25	30.67	11.08	13.12	21.16	13.98	35.59	13.24
Tandragee	10	79	10.38	14.68	15.01	37.23	13.46	8.86	18.42	13.56	32.96	12.99
Tamnamore	40	100	10.88	15.15	14.67	36.59	13.16	9.03	20.85	12.53	30.54	12.03
Turleenan	40	100	10.89	15.27	14.96	37.32	13.42	8.96	20.80	13.15	32.00	12.60

Table E-10 Northern Ireland Short Circuit Currents for Minimum Demand in 2030

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
110 kV												
Aghyoule	40	100	3.97	8.71	4.22	8.83	3.71	5.36	12.13	4.11	9.19	3.88
Agivey	40	100	6.66	9.30	6.13	14.26	5.51	7.08	10.20	7.33	17.22	6.84
Antrim	40	100	4.44	7.18	9.11	19.55	8.73	3.63	16.69	9.10	18.64	8.82
Aught	40	100	4.38	6.04	9.57	20.49	8.95	4.87	7.00	12.42	27.22	11.86
Airport Road	40	100	4.28	6.40	8.40	17.89	8.05	5.19	9.68	8.20	18.20	8.00
Ballylumford	40	100	10.27	20.41	14.37	35.60	13.64	11.36	23.41	14.92	37.40	14.36
Ballymena	40	100	4.61	8.32	8.21	17.78	7.88	5.44	11.20	8.60	19.28	8.23
Banbridge	18.4	46.8	3.82	6.94	6.39	13.26	6.22	5.20	10.55	6.01	13.35	5.92
Ballyvallagh	21.9	46.8	5.30	6.40	12.99	28.96	12.35	5.78	9.22	13.18	29.88	12.70
Ballynahinch	18.4	46.8	3.94	6.59	5.72	11.95	5.53	3.68	12.22	5.77	11.86	5.67
Belfast Central	40	100	9.18	14.06	19.66	48.03	18.07	9.29	15.34	24.84	60.77	23.34
Belfast North	40	100	9.13	13.91	19.46	47.48	17.89	9.19	15.08	24.47	59.76	23.01
Brockaghboy	40	100	6.73	9.03	5.43	12.65	4.82	6.84	9.65	6.11	14.28	5.71
CAM	40	100	3.67	6.51	9.11	18.71	8.35	4.05	7.25	10.63	22.35	10.00
Carnmoney	31.5	79	4.70	7.49	4.87	10.58	4.72	2.81	9.10	5.14	9.87	5.05
Castlereagh	31.5	79	9.70	16.03	19.75	48.58	18.11	7.70	12.27	24.88	59.24	23.34
Coleraine	40	100	3.91	6.71	9.09	18.96	8.26	4.52	8.01	11.45	24.70	10.67
Coolkeeragh	31.5	79	7.88	15.85	17.40	41.57	15.61	8.59	17.49	20.33	49.19	18.86
Creagh	31.5	79	3.92	4.79	9.00	18.79	8.51	5.57	7.40	9.20	20.70	8.87
Cregagh	26.2	65	8.87	13.43	19.03	46.26	17.51	8.57	13.59	23.73	57.42	22.34
Culmore Road	40	100	6.92	12.40	15.94	37.32	14.43	7.67	14.13	18.96	45.12	17.68
Drumquin	40	100	5.92	9.20	7.31	16.65	6.57	6.50	11.37	7.57	17.54	7.17
Donegall North	31.5	79	8.80	13.59	19.41	47.14	17.89	8.46	13.76	23.88	57.65	22.52
Donegall South	n/a	n/a	5.25	7.13	13.11	29.16	12.48	4.33	2.99	13.71	29.28	13.23
Drumnakelly	31.5	79	6.65	11.22	20.02	46.55	18.58	7.34	16.66	19.05	45.02	18.22
Dungannon	40	100	6.41	10.89	18.42	42.56	16.96	7.09	14.75	17.46	41.04	16.66
Eden	25	62.5	4.30	7.04	6.29	13.42	6.06	3.22	5.06	6.75	13.43	6.61

Table E-10 Northern Ireland Short Circuit Currents for Minimum Demand in 2030

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Enniskil	31.5	79	3.93	5.15	9.10	19.00	7.97	4.78	6.61	10.56	23.04	9.78
Enniskillen	31.5	79	10.38	12.10	3.22	7.98	3.08	0.00	0.00	0.00	0.00	0.00
Finaghy	31.5	79	8.32	12.81	18.40	44.33	17.05	5.73	11.53	22.16	50.15	21.01
Glengormley	18.4	46.8	3.74	5.74	5.64	11.63	5.48	3.57	11.42	5.56	11.35	5.46
Gort Cluster	40	100	7.30	9.42	8.14	19.21	7.63	7.98	12.46	9.14	21.89	8.66
Gowangis	40	100	5.49	7.49	11.80	26.49	11.15	8.33	11.82	10.52	25.35	10.13
Hannahstown	31.5	79	9.60	16.24	20.71	50.88	19.02	8.60	14.68	25.45	61.60	23.95
Kells	40	100	9.05	16.86	18.30	44.60	16.97	8.88	17.03	19.72	47.94	18.53
Killymallaght	40	100	6.03	9.17	12.14	27.75	10.85	5.56	10.46	11.23	25.27	10.67
Knock	n/a	n/a	4.11	6.19	16.38	34.58	15.23	2.78	10.95	16.09	30.78	15.42
Larne	18.4	46.8	4.50	5.47	8.41	18.12	8.05	4.64	5.31	8.49	18.41	8.27
Limavady	40	100	2.73	3.92	6.56	12.49	6.11	3.19	4.92	7.49	14.86	7.17
Lisburn	18.4	46.8	5.07	7.08	12.62	27.88	12.07	4.97	9.34	12.01	26.42	11.64
Lisaghmore	31.5	79	4.32	6.90	8.97	19.15	8.36	4.25	11.65	8.83	18.77	8.51
Loguestown	26.2	65	3.42	5.08	6.19	12.51	5.78	3.60	6.55	6.84	13.99	6.54
Magherakeel Cluster	40	100	5.40	9.56	4.44	9.95	4.19	7.13	12.39	4.85	11.41	4.67
Moyle	40	100	34.73	46.86	10.10	27.42	9.74	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	4.21	6.30	7.98	16.93	7.66	5.55	9.58	7.54	16.97	7.38
Newry	18.4	46.8	3.78	6.71	5.48	11.34	5.32	3.71	12.26	5.41	11.14	5.32
Omagh	40	100	5.10	7.77	16.29	36.03	14.33	5.30	9.71	16.81	37.48	15.54
Omagh South	40	100	4.50	6.89	13.09	28.20	11.50	4.43	6.45	12.97	27.84	12.11
Rasharkin	40	100	5.45	8.58	10.65	23.87	9.78	5.68	11.60	10.85	24.52	10.28
Rathgael	26.2	65	3.90	6.19	6.10	12.71	5.89	3.67	12.23	6.06	12.46	5.95
Rosebank	40	100	8.70	13.44	18.08	43.82	16.68	10.12	16.21	22.39	55.37	21.12
Slieve Kirk	40	100	4.76	7.61	8.99	19.60	8.06	5.66	13.07	7.20	16.25	6.91
Springtown	n/a	n/a	4.43	7.03	9.06	19.45	8.49	4.29	12.50	9.09	19.38	8.78
Strabane	40	100	4.84	6.64	15.01	32.84	13.51	5.64	9.63	16.01	36.13	15.05
Tandragee	31.5	79	8.19	17.24	21.59	51.89	19.95	7.67	15.61	20.70	49.27	19.79
Tremoge	40	100	4.20	6.15	9.45	20.03	8.74	4.65	9.78	8.56	18.57	8.24

Table E-10 Northern Ireland Short Circuit Currents for Minimum Demand in 2030												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Tamnamore	40	100	7.73	15.93	22.26	53.04	20.32	7.47	14.10	21.03	49.83	19.96
Waringstown	18.4	46.8	4.69	7.37	8.21	17.85	7.91	4.78	16.20	7.74	16.88	7.58
York	18.4	46.8	9.20	14.21	19.96	48.75	18.32	9.36	15.64	25.28	61.90	23.73

Northern Ireland Short Circuit Currents for Maximum Demand in 2030

Table-E 11: Northern Ireland Short Circuit Currents for Maximum Demand in 2030												
Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
400 kV												
Turleenan	50	125	16.05	19.36	10.73	27.80	10.31	10.14	21.82	11.63	28.76	11.34
275 kV												
Ballylumford	31.5	79	13.21	19.11	19.77	50.35	17.97	15.49	24.72	19.63	50.73	18.67
Castlereagh	10	79	10.61	14.17	17.39	43.25	15.78	8.46	15.52	12.13	29.28	11.66
Coolkeeragh	10	79	13.51	17.72	13.77	35.15	12.90	14.26	22.64	10.14	26.01	9.90
Hannahstown	31.5	79	10.72	14.46	17.05	42.45	15.48	8.85	17.58	11.84	28.78	11.40
Kells	10	79	13.07	17.64	21.02	53.47	19.21	9.74	14.68	17.49	43.03	16.74
Kilroot	31.5	79	15.08	21.93	21.47	55.37	19.52	14.68	19.74	24.49	63.00	23.04
Magherafelt	10	79	12.51	16.26	21.38	54.15	19.69	9.64	20.11	15.26	37.51	14.75
Moyle	31.5	79	13.17	18.99	19.60	49.92	17.84	15.35	24.43	19.50	50.37	18.56
Tandragee	10	79	10.92	14.09	22.77	56.82	20.87	8.61	18.54	17.09	41.36	16.45
Tamnamore	40	100	11.67	14.90	22.22	55.88	20.44	8.81	21.47	15.53	37.72	15.02
Turleenan	40	100	11.63	14.87	22.59	56.77	20.79	8.71	21.38	16.39	39.73	15.84

Table-E 11: Northern Ireland Short Circuit Currents for Maximum Demand in 2030													
Node	Rating		Three phase					Single phase					
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
110 kV												
Aghyoule	40	100	4.02	8.89	4.30	9.03	3.78	5.46	12.40	4.19	9.40	3.94
Agivey	40	100	6.63	9.11	6.64	15.44	6.08	7.15	10.15	7.82	18.39	7.40
Antrim	40	100	4.13	6.91	10.37	21.92	10.01	3.46	16.70	9.85	19.93	9.61
Aught	40	100	4.16	5.46	11.40	24.12	10.83	4.71	6.52	14.38	31.28	13.92
Airport Road	40	100	3.96	5.95	9.55	19.98	9.10	4.98	9.40	8.88	19.55	8.65
Ballylumford	40	100	12.32	25.58	21.59	54.61	20.11	12.80	27.51	19.16	48.65	18.55
Ballymena	40	100	4.33	8.00	9.26	19.77	8.92	5.25	10.95	9.28	20.66	8.94
Banbridge	18.4	46.8	3.67	6.76	6.92	14.22	6.72	5.11	10.45	6.34	14.04	6.24
Ballyvallagh	21.9	46.8	4.68	5.37	16.68	36.25	15.76	5.38	8.61	15.41	34.46	14.96
Ballynahinch	18.4	46.8	3.70	6.34	6.28	12.94	6.03	3.53	12.29	6.08	12.37	5.94
Belfast Central	40	100	8.68	13.54	26.01	63.02	23.31	8.83	14.87	31.23	75.86	28.86
Belfast North	40	100	8.62	13.36	25.64	62.08	23.03	8.73	14.57	30.63	74.30	28.36
Brockaghboy	40	100	6.69	8.84	5.82	13.54	5.25	6.87	9.57	6.45	15.08	6.11
CAM	40	100	4.15	8.99	11.98	25.35	11.27	4.55	9.49	12.88	27.81	12.36
Carnmoney	31.5	79	4.48	7.00	5.59	12.03	5.40	2.66	9.04	5.68	10.74	5.56
Castlereagh	31.5	79	9.27	16.20	26.16	63.96	23.37	7.10	11.49	31.32	73.63	28.88
Coleraine	40	100	5.10	13.94	12.85	28.42	11.94	5.95	16.19	14.89	33.95	14.15
Coolkeeragh	31.5	79	9.44	21.62	24.86	60.95	22.31	10.01	22.40	26.39	65.17	24.89
Creagh	31.5	79	3.68	4.42	10.14	20.85	9.60	5.41	7.07	9.98	22.33	9.64
Cregagh	26.2	65	8.31	12.82	24.94	60.06	22.40	8.06	12.92	29.55	70.86	27.37
Culmore Road	40	100	7.53	13.73	21.97	52.14	19.94	8.38	15.82	24.12	58.16	22.86
Drumquin	40	100	5.81	9.12	7.49	16.99	6.79	6.44	11.30	7.73	17.87	7.34
Donegall North	31.5	79	8.27	12.96	25.48	61.32	22.98	7.96	13.10	29.62	70.88	27.57
Donegall South	n/a	n/a	4.75	6.37	15.82	34.49	14.81	3.99	2.53	15.49	32.48	14.90
Dromore	31.5	79	4.24	6.57	14.02	29.81	12.46	4.24	6.21	13.50	28.70	12.69

Table-E 11: Northern Ireland Short Circuit Currents for Maximum Demand in 2030

Node	Rating		Three phase					Single phase				
	RMS [kA]	Peak [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]	X/R ratio (AC)	X/R ratio (DC)	I'' [kA]	ip [kA]	IB [kA]
Drumnakelly	31.5	79	6.16	10.49	24.50	56.21	22.67	7.06	16.57	21.65	50.84	20.78
Dungannon	40	100	6.01	10.53	21.30	48.65	19.78	6.90	14.78	19.28	45.11	18.55
Eden	25	62.5	3.99	6.40	7.49	15.71	7.19	3.01	4.84	7.62	14.89	7.44
Enniskil	31.5	79	3.85	4.96	9.80	20.35	8.59	4.72	6.45	11.22	24.41	10.37
Enniskillen	31.5	79	10.84	12.49	3.25	8.10	3.12	0.00	0.00	0.00	0.00	0.00
Finaghy	31.5	79	7.77	12.06	23.71	56.55	21.59	5.16	10.79	26.92	59.69	25.26
Glengormley	18.4	46.8	3.56	5.53	6.13	12.51	5.99	3.44	11.34	5.86	11.86	5.77
Gort Cluster	40	100	7.10	9.13	8.42	19.80	8.00	7.83	12.23	9.34	22.29	8.91
Gowangis	40	100	5.14	6.86	13.73	30.42	13.04	8.23	11.46	11.45	27.54	11.13
Hannahstown	31.5	80	9.21	16.35	27.61	67.45	24.83	8.09	14.14	31.89	76.50	29.64
Kells	40	100	8.70	18.23	23.57	57.14	22.00	8.51	17.28	23.29	56.28	22.16
Killymallaght	40	100	5.86	8.49	14.03	31.89	12.75	5.43	10.26	12.27	27.48	11.79
Knock	n/a	n/a	3.51	5.34	20.46	41.56	18.67	2.48	10.53	18.40	34.16	17.52
Larne	18.4	46.8	4.12	4.89	9.87	20.85	9.47	4.34	5.08	9.41	20.11	9.20
Limavady	40	100	2.53	3.62	7.31	13.65	6.91	3.02	4.69	8.15	15.94	7.87
Lisburn	18.4	46.8	4.62	6.39	14.93	32.34	14.08	4.70	8.97	13.30	28.91	12.89
Lisaghmore	31.5	79	4.11	6.48	10.58	22.32	9.99	4.10	11.70	9.76	20.59	9.51
Loguestown	26.2	65	3.84	6.79	7.81	16.22	7.42	3.98	8.99	8.04	16.85	7.79
Magherakeel Cluster	40	100	5.33	9.55	4.47	9.97	4.24	7.05	12.35	4.87	11.45	4.71
Moyle	40	100	56.67	73.94	11.60	31.97	11.33	0.00	0.00	0.00	0.00	0.00
Newtownards	40	100	3.90	5.87	9.04	18.84	8.62	5.36	9.32	8.13	18.16	7.92
Newry	18.4	46.8	3.65	6.54	5.90	12.11	5.70	3.60	12.17	5.67	11.60	5.55
Omagh	40	100	4.74	7.30	17.79	38.77	15.77	5.05	9.43	17.82	39.34	16.63
Omagh South	40	100	4.24	6.57	14.02	29.81	12.46	4.24	6.21	13.50	28.70	12.69
Rasharkin	40	100	5.30	8.12	12.48	27.81	11.72	5.62	11.55	11.98	27.02	11.54
Rathgael	26.2	65	3.67	5.90	6.75	13.87	6.48	3.52	12.28	6.45	13.13	6.30
Rosebank	40	100	8.16	12.87	23.34	56.06	21.06	9.95	16.08	27.54	67.97	25.60

Table-E 11: Northern Ireland Short Circuit Currents for Maximum Demand in 2030													
Node	**Rating**		**Three phase**					**Single phase**					
	RMS [kA]	**Peak [kA]**	**X/R ratio (AC)**	**X/R ratio (DC)**	**I'' [kA]**	**ip [kA]**	**IB [kA]**	**X/R ratio (AC)**	**X/R ratio (DC)**	**I'' [kA]**	**ip [kA]**	**IB [kA]**	
Slieve Kirk	40	100	4.55	7.15	9.88	21.33	9.00	5.63	12.64	7.64	17.23	7.40	
Springtown	n/a	n/a	4.26	6.74	10.76	22.90	10.20	4.15	13.36	10.17	21.50	9.91	
Strabane	40	100	4.57	5.99	17.57	37.98	15.95	5.48	9.18	17.88	40.14	17.01	
Tandragee	31.5	79	7.80	17.57	26.97	64.34	24.83	7.38	15.37	23.89	56.50	22.86	
Tremoge	40	100	4.00	5.89	9.91	20.78	9.29	4.53	9.60	8.77	18.93	8.50	
Tamnamore	40	100	7.30	16.44	26.61	62.83	24.58	7.18	13.94	23.63	55.65	22.69	
Waringstown	18.4	46.8	4.45	7.02	9.05	19.46	8.72	4.62	16.17	8.22	17.81	8.05	
York	40	100	8.70	13.73	26.50	64.24	23.72	8.90	15.22	31.90	77.57	29.45	

Appendix F: Approaches to Consultation for Developing the Grid

F-1 EirGrid Approach to Consultation

In December 2017 EirGrid launched Have Your Say[1], which outlines our approach to consultation. It followed a review of our consultation activities, after which, we made a commitment to improve the way we engage with the public and stakeholders.

Have Your Say outlines the way we develop our projects and how the public can engage with us at each stage of project development.

F-2 SONI Approach to Consultation

SONI has reviewed its approach to engaging and consulting with the public and stakeholders, this included independent analysis by The Consultation Institute (TCI) which made a number of recommendations. Following engagement with a range of stakeholders and in line with TCI's recommendations, SONI has developed a new Grid Development Process[2]. This three part process puts stakeholders and the community at the heart of what we do. To find out more visit www.soni.ltd.uk and if you have any queries you can contact us at info@soni.ltd.uk.

1 Have your say
2 SONIs Powering The Future Grid Development Process brochure

Appendix G: References

The following documents are referenced in this All-Island Ten Year Transmission Forecast Statement:

- **All-Island Generation Capacity Statement 2023-2032**. EirGrid and SONI issued this report in January 2024. Its main purpose is to inform market participants, regulatory agencies and policy makers of the likely minimum generation capacity required to achieve an adequate supply and demand balance for electricity for the period 2023 to 2032.

  Available on https://cms.eirgrid.ie/sites/default/files/publications/19035-EirGrid-Generation-Capacity-Statement-Combined-2023-V5-Jan-2024.pdf

- **Transmission Development Plan Ireland 2024-2033**, CRU approved version published in September 2024. The main purpose of this document is to document the plan for the development of the Irish transmission system and interconnection for the following 10 year period.

  Available on https://cms.eirgrid.ie/sites/default/files/publications/Transmission-Development-Plan-2024.pdf.

- **Transmission Development Plan Northern Ireland 2023-2032**, UR approved version published in January 2025. The main purpose of this document is to document the plan for the development of the Northern Ireland transmission system and interconnection for the following 10 year period.

  Available on https://www.soni.ltd.uk/community/projects-in-your-area/tdpni

- **EirGrid Grid Code Version 14.3**. The EirGrid Grid Code covers technical aspects relating to the operation and use of the transmission system, and to plant and apparatus connected to the transmission system or to the distribution system.

  Available on https://cms.eirgrid.ie/sites/default/files/publications/GridCodeVersion14.3.pdf.

- **SONI Grid Code, June 2024**.
  The SONI Grid Code is designed to permit the development, maintenance and operation of an efficient, co-ordinated and economical Transmission System in Northern Ireland. The grid code is prepared by SONI pursuant to condition 16 of SONI's Licence.

  Available on https://cms.soni.ltd.uk//sites/default/files/2024-10/SONI_GridCode_Jun_2024.pdf.

- **Transmission System Security and Planning Standards Ireland**, May 2016. This document sets out the technical standards by which the adequacy of the grid in Ireland is determined.

  Available on http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Transmission-System-Security-and-Planning-Standards-TSSPS-Final-May-2016-APPROVED.pdf.

- **Transmission System Security and Planning Standards Northern Ireland,** June 2023. This document sets out the technical standards by which the adequacy of the grid in Northern Ireland is determined.

  Available on https://www.soni.ltd.uk/customer-and-industry/general-customer-information/Transmission-System-Security-and-Planning-Standards-June-2023.pdf

- **Electricity Regulation Act, 1999**. This act provides the regulatory framework for the introduction of competition in the generation and supply of electricity in Ireland. The Act provided for the establishment of the Commission for Regulation of Utilities (CRU) (previously called the Commission for Energy Regulation) and gave it the necessary powers to licence and regulate the generation, distribution, transmission and supply of electricity.

  Available on www.cru.ie.

- **EirGrid's TSO Licence.** On June 29 2006, the CER issued a Transmission System Operator (TSO) Licence to EirGrid plc. pursuant to Section 14(1)(e) of the Electricity Regulation Act, 1999, as inserted by Regulation 32 of S.I. No. 445 of 2000 – European Communities (Internal Market in Electricity) Regulations 2001. The most recent update was issued in Mach 2017.

  Available on www.cru.ie.

- **SONI's Licence to Participate in the Transmission of Electricity,** updated to February 2019.

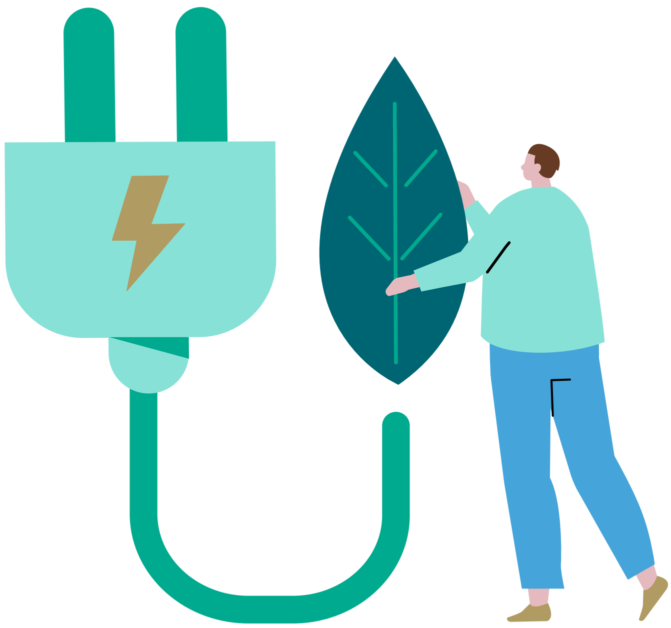
  Available on www.uregni.gov.uk. Condition 33 requires SONI to prepare a statement (in a form; in consultation with EirGrid; and based on methodologies approved by UREGNI) showing in respect of each of the ten succeeding financial years; circuit capacity; forecast electrical flows and loading on each part of the transmission system; and fault levels for each transmission node.

- **Ireland's Climate Action Plan** published by the Department of Communications, Climate Action and Environment.

  Available on www.dccae.gov.ie.

- **Northern Ireland Energy Strategy 'Path to Net Zero Energy'** published by the Department for the Economy.

  Available on https://www.economy-ni.gov.uk/articles/northern-ireland-energy-strategy-path-net-zero-energy



Appendix H: Power flows

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Louth	Tandragee	1	275	3.28	-1.37	0.5	91	2.3	10.3	-43.6	-1.12	6.15	0.56	-0.75	0.11
Louth	Tandragee	2	275	3.27	-1.41	0.5	91.1	1.29	10.3	-43.7	-0.63	6.15	0.55	-0.76	0.11
Ballylumford	Hana2A	2	275	47.6	-0.89	6.71	103	-13.6	11.8	72.5	19.2	10.6	221	4.46	25.1
Ballylumford	Kellis	1	275	12.3	29.1	4.45	-139	46.1	16.6	35.9	31.9	6.77	64.8	57.1	9.81
Ballylumford	Hannahstown	1	275	-14	17.2	3.12	-65.2	5.57	7.43	-8.04	15.4	2.45	54.3	20.7	6.6
Ballylumford	Ballycro	1	275	-30.8	-36.8	6.76	24.6	-50.7	6.39	-2.31	-5.34	0.82	52.1	-11.5	6.06
Ballylumford	Ballycro	2	275	-	-	-	-	-	-	-3.69	-13	1.9	92.4	-20.1	10.7
Castlreagh	Hannahstown	1	275	-21.4	-16.8	3.84	-7.49	-13.3	1.74	-29.5	-33.7	6.31	-64.3	-35.7	8.34
Castlreagh	Hannahstown	2	275	-21.4	-16.8	3.84	-7.49	-13.3	1.74	-29.5	-33.7	6.31	-64.3	-35.7	8.34
Castlreagh	Kilroot	1	275	-23.5	-2.91	3.33	-199	36.4	22.9	-27.5	-16.2	4.5	-159	21.8	18.2
Castlreagh	Tandragee	1	275	-19.7	34.7	5.63	-122	32.2	14.4	-8.91	2.61	1.31	-47.6	13.7	5.62
Coolkeeragh	Coolkeeragh 2A	1	275	88	-39.6	12.7	114	-9.44	13.7	109	-46.6	15.6	60.8	-56.7	9.93
Coolkeeragh	Coolkeeragh 2B	1	275	88	-39	12.7	114	-8.82	13.7	109	-46.1	15.6	60.8	-56.1	9.88
Coolkeeragh 2A	Magherafelt	1	275	88	-35.3	12.5	114	-5.28	13.6	109	-42.7	15.4	60.8	-52.7	9.61
Coolkeeragh 2B	Magherafelt	2	275	88	-35.3	12.5	114	-5.29	13.6	109	-42.7	15.4	60.8	-52.7	9.61
Hannahstown	Ballycro	1	275	-49	-12.2	7.11	-104	2.9	11.8	-73.7	-30.1	11.2	-223	-7.78	25.4
Kellis	Kilroot	1	275	19.5	-12	3.22	-128	23.9	14.8	26.4	-6.18	3.81	-59.6	17.3	7.04
Kellis	Kilroot	2	275	19.5	-12	3.22	-128	23.9	14.8	26.4	-6.18	3.81	-59.6	17.3	7.04
Kellis	Magherafelt	1	275	-43	13.9	6.36	17.3	-29.6	3.89	-56.5	6.32	8	42.1	-10.6	4.93
Kellis	Tandragee	1	275	8.14	6.3	1.45	95.2	-21.3	11.1	17.7	0.8	2.49	105	-20.3	12.1
Magherafelt	Tamnamore	1	275	59.3	7.61	8.42	89.6	7	10.2	76.8	-8.67	10.9	109	-22.1	12.6
Magherafelt	Tamnamore	2	275	59.3	7.61	8.42	89.6	7	10.2	76.8	-8.67	10.9	109	-22.1	12.6
Tandragee	Tamnamore	1	275	-38.3	-17.2	5.91	-42.7	-15.8	5.17	-	-	-	-	-	-
Tandragee	Tamnamore	2	275	-38.3	-17.2	5.91	-42.7	-15.8	5.17	-	-	-	-	-	-
Tandragee	Turleenan	1	275	-	-	-	-	-	-	-80.5	-37.5	12.5	-122	-27	14.2
Tandragee	Turleenan	2	275	-	-	-	-	-	-	-80.5	-37.5	12.5	-122	-27	14.2
Tamnamore	Turleenan	1	275	-	-	-	-	-	-	50.8	-12.3	7.36	14.4	-23.9	3.16
Tamnamore	Turleenan	2	275	-	-	-	-	-	-	50.8	-12.3	7.36	14.4	-23.9	3.16
Antrim	Kells	1	110	1.02	7.8	9.59	4.29	5.51	6.78	-5.58	3.47	8.01	-24.2	-0.49	23.5
Antrim	Kells	2	110	0.23	-8.11	9.9	3.72	-7.14	7.82	-6.31	-7.36	11.8	-25.6	-13.7	28.2
Ballylumford	Ballyvallagh	1	110	13	1.18	15.9	0.14	1.43	1.39	8.32	4.26	11.4	54.8	-2.73	53.3
Ballylumford	Ballyvallagh	2	110	13	1.18	15.9	0.14	1.43	1.39	8.32	4.26	11.4	54.8	-2.73	53.3

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Ballylumford	Eden	1	110	16.5	-21.7	19	31.9	2.13	19.2	12.4	-9.16	10.8	41.9	-2.11	25.3
Ballylumford	Eden	2	110	16.5	-21.8	19.1	31.9	2.15	19.3	12.5	-9.19	10.8	42.1	-2.1	25.4
Ballymena	Kells	1	110	-9.19	0.36	8.44	-24.3	-5.49	20.1	-9.51	-1.36	8.82	-30.5	-10.6	26
Ballymena	Kells	2	110	-8.93	0.41	8.2	-23.7	-5.11	19.5	-9.23	-1.26	8.55	-29.7	-10	25.2
Banbridge	Tandragee	1	110	-5.71	-0.86	7.04	-19.5	-3.63	19.3	-6.93	-1.07	8.55	-23.7	-4.58	23.4
Banbridge	Tandragee	2	110	-5.97	-0.94	7.37	-20.4	-4.11	20.2	-7.24	-1.2	8.96	-24.7	-5.17	24.5
Ballyvallagh		1	110	0	0	0	0	0	0	0	-0.18	0.13	0	-0.19	0.13
Ballyvallagh	Kells	1	110	6.45	1.04	6	-16.5	-2.59	13.5	0.38	3.82	3.52	28	-9.07	23.7
Ballyvallagh	Kells	2	110	6.74	1.12	6.27	-17.3	-2.68	14.1	0.39	4.02	3.71	29.2	-9.45	24.8
Ballyvallagh	Larne	1	110	6.33	0.68	8.06	17	4.67	15.6	8.62	1.04	11	27.9	5.98	25.2
Ballyvallagh	Larne	2	110	6.34	0.68	8.08	17.1	4.68	15.7	7.2	0.92	9.19	23.2	5.24	21.1
Ballynahinch	Castlereagh	1	110	-8.3	-1.36	10.3	-28.4	-5.91	28.1	-10.2	-1.7	12.6	-34.9	-7.8	34.7
Ballynahinch	Castlereagh	2	110	-8.32	-1.36	10.3	-28.4	-5.91	28.2	-10.2	-1.69	12.6	-35	-7.79	34.8
Belfast North Main	Donegal	1	110	-6.76	-0.19	9.01	-23.1	-3.65	28.5	-	-	-	-	-	-
Belfast North Main	Donegal	2	110	-6.78	-0.3	9.04	-23.2	-3.85	28.7	-	-	-	-	-	-
Beln1A	York St	1	110	-	-	-	-	-	-	-7.93	-0.43	3.97	-27.2	-4.88	13.8
Beln1B	York St	2	110	-	-	-	-	-	-	-7.93	-0.43	3.97	-27.2	-4.88	13.8
Brock1	Garvagh Ni	1	110	-	-	-	14.2	-1.84	9.97	0	0	0	4.75	0.89	3.36
Garvagh Ni	Rashark1	1	110	-	0.53	0.28	41.2	-8.67	21.1	0	0.47	0.25	18.5	-1.59	9.27
Carn1A	Eden1A	1	110	-11.2	22	35.8	-14.7	0.85	17.1	-6.27	-0.85	5.41	-20.7	-4.11	14.4
Carn1B	Eden1B	2	110	-11.2	22.1	36	-14.7	0.85	17.1	-6.29	-0.84	5.43	-20.8	-4.11	14.4
Cast1A	Creg1A	1	110	16.1	-8.93	14	55.1	0.39	38	3.41	4.41	4.22	19.6	28	23.6
Cast1A	Creg1B	2	110	16.1	-8.95	13.9	54.9	0.34	37.9	3.36	4.39	4.19	19.5	27.9	23.5
Cast1A	Knck1A	1	110	6.68	-4.62	12.3	22.8	-0.8	31.3	7.13	-3.72	12.2	24.4	-0.28	33.4
Cast1A	Knck1B	2	110	6.68	-4.54	12.2	22.8	-0.72	31.3	7.13	-3.65	12.1	24.4	-0.2	33.4
Cast1B	Nard1A	1	110	5.83	-7.51	8.72	20.8	-3.7	17.1	6.99	-5.95	8.42	24.8	-2.39	20.1
Cast1B	Nard1B	2	110	5.72	-7.39	8.57	20.4	-3.74	16.8	6.84	-5.87	8.27	24.3	-2.48	19.7
Cast1B	Rath1A	1	110	7.48	0.43	9.14	25.7	4.85	25.4	9.08	0.87	11.1	31.2	6.54	31
Cast1B	Rath1B	2	110	7.85	0.56	9.6	26.9	5.35	26.7	9.51	1.02	11.7	32.7	7.16	32.5
Cast1B	Rose1A	1	110	4.92	-1.08	3.5	14.2	1.74	9.4	10.6	-0.22	7.38	31.4	5.49	21
Cast1B	Rose1B	2	110	5	-1.07	3.55	14.4	1.79	9.56	10.7	-0.21	7.46	31.7	5.56	21.2
Cent1A	Creg1A	1	110	-7.08	-1.13	4.98	-24.2	-4.83	17.1	-	-	-	-	-	-

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Cent1B	Creg1B	2	110	-7.09	-1.13	4.99	-24.2	-4.83	17.2	-	-	-	-	-	-
Cole1-	Cool1-	1	110	-15.5	1.56	19	-13.8	-11.7	17.6	-	-	-	-	-	-
Cole1-	Lima1-	1	110	-11.1	1.88	13.7	-6.76	-8.01	10.2	-	-	-	-	-	-
Cent1A	Corp St	1	110	-	-	-	-	-	-	-7.4	-1.19	3.75	-25.3	-5.11	12.9
Cent1B	Corp St	2	110	-	-	-	-	-	-	-7.41	-1.19	3.75	-25.3	-5.1	12.9
Cole1-	Col_Hisc	1	110	-	-	-	-	-	-	0.01	18.7	9.33	0.07	-49.7	24.8
Cole1-	Cam	1	110	-	-	-	-	-	-	-19.1	-5.51	24.3	-25.7	7.64	26
Cole1-	Cam	2	110	-	-	-	-	-	-	-18.8	-5.23	23.8	-25.2	7.71	25.6
Cool1-	Cam	1	110	-	-	-	-	-	-	24.9	10.5	32.9	36.3	-4.68	35.5
Cole1-	Loge1A	1	110	5.63	0.55	6.9	17.9	4.46	17.9	2.37	-14.2	17.5	17	-10.1	19.2
Cole1-	Loge1B	2	110	5.51	0.54	6.76	17.5	4.38	17.5	11.6	17.4	25.5	29.5	22.9	36.3
Cole1-	Rashark1	1	110	3.91	-3.69	2.89	-22.1	0.22	11.5	10.2	-10.7	7.91	-32.5	13.6	18.3
Cool1-	Cool1	1	110	8.26	-25.3	13.3	-9.91	-13.9	7.12	-1.45	-0.55	0.77	-66	1	27.5
Cool1-	Culmore_Rd	1	110	0	-15.6	7.81	-11.1	-12.4	8.33	0	-14.5	7.25	-3.71	-14.1	7.27
Cool1-	Kill1-Cl	1	110	22.4	-8.39	16.8	3.1	12.8	7.93	25.4	-4.92	18.1	29.8	12.5	19.5
Cool1-	Lima1-	1	110	17.7	-2.62	21.8	17.8	12.4	21.1	21.4	-0.43	26.1	29.9	-6.12	29.6
Cool1-	Lsmr1A	1	110	5.58	0.73	6.87	16.9	4.69	17	6.21	0.9	7.65	20.5	5.2	20.5
Cool1-	Lsmr1B	2	110	5.6	0.74	6.89	16.9	4.7	17	6.23	0.9	7.67	20.6	5.21	20.6
Cool1-	Sprn1A	1	110	4.83	-0.57	5.93	16.5	1.81	16.1	5.51	-0.36	6.73	18.8	2.39	18.4
Cool1-	Sprn1B	2	110	4.83	-0.68	5.94	16.5	1.69	16.1	5.5	-0.47	6.73	18.8	2.28	18.4
Cool1-	Strabane	1	110	33.7	-13.5	25.4	28.2	10.2	18.1	38.9	-8.63	27.9	58.6	6.48	35.5
Aught	Culmore_Rd	1	110	0	0	0	11.1	-2.7	5.72	-	-	-	3.72	-0.8	1.9
Creagh	Kels1-	1	110	-12.5	4.56	16.3	-36.6	-0.45	35.6	-	-	-	-	-	-
Creagh	Tamnamor	1	110	-3.74	-7.21	7.45	-17.5	-11.4	16.8	-4.7	-5.82	6.86	-12.3	-14.3	15.2
Corp St	Creg1A	1	110	-	-	-	-	-	-	6.96	-12.9	7.32	15.9	-31.3	17.6
Corp St	Creg1B	2	110	-	-	-	-	-	-	6.93	-12.9	7.31	15.8	-31.3	17.5
Corp St	York St	1	110	-	-	-	-	-	-	-14.4	12.1	9.38	-41.1	26.6	24.5
Corp St	York St	2	110	-	-	-	-	-	-	-14.4	12.1	9.38	-41.1	26.6	24.5
Creagh	T_Gowangis	1	110	-	-	-	-	-	-	-16.9	2.16	15.6	-61.1	-3.07	49.4
Done1C	York St	1	110	-	-	-	-	-	-	22.4	-20.1	15	68.1	-30.4	37.3
Done1B	York St	2	110	-	-	-	-	-	-	22.2	-16.1	13.7	68.5	-26.5	36.7
Done1C	Hana1A	1	110	-14.7	1.78	10.3	-49.6	-6.52	31.6	-29	15.3	22.8	-90.7	22.4	59.1

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Done1B	Hana1A	2	110	-11.6	7.5	9.62	-40.3	1.32	25.5	-28.5	18.8	23.7	-89.8	25.8	59.1
Done1D	Finy1B	1	110	-6.2	5.36	11.9	-21.9	2.07	25.5	-7.31	5.69	13.4	-25.8	0.88	30
Done1A	Finy1A	2	110	-6.99	-7.86	15.3	-23.3	-12.4	30.7	-8.23	-8.68	17.3	-27.3	-13.8	35.6
Dromore	Drumquin	1	110	0	-0.95	0.51	-20.2	4.64	10.4	0	-4.47	2.39	-16.1	-0.72	8.06
Dromore	Enniskil	1	110	10.8	-4.15	14.1	20.4	3.63	20.1	12.9	-1.61	15.9	39.3	5.84	38.6
Dromore	Enniskil	2	110	10.8	-4.15	14.1	20.4	3.63	20.1	12.9	-1.61	15.9	39.3	5.84	38.6
Dromore	Omah1-	1	110	-10.7	4.6	5.87	-10.2	-5.93	5.91	-12.9	3.83	6.75	-31.1	-5.47	15.8
Dromore	Omah1-	2	110	-10.8	4.64	5.92	-10.3	-5.97	5.29	-13	3.86	6.8	-31.4	-5.5	14.2
Drum1-	Tand1A	1	110	-3.76	-5.86	8.82	-7.53	-23.4	21.8	-2.6	-6.47	8.83	-19.2	-22.2	25.9
Drum1-	Tand1A	2	110	-3.76	-5.86	8.82	-7.53	-23.4	21.8	-2.6	-6.47	8.83	-19.2	-22.2	25.9
Drum1-	Tand1A	3	110	-4.2	-5.97	6.76	-8.95	-24.2	20.5	-3.02	-6.66	6.77	-21.1	-22.4	24.4
Drum1-	Tamnamor	1	110	-6.04	6.77	8.32	-28.1	25.4	30.6	-10.2	6.71	6.58	-19	20	14.3
Drum1-	Tamnamor	2	110	-6.32	6.8	8.52	-29.4	26.1	31.7	-10.1	7.88	6.92	-18.8	21.6	14.8
Drumquin	Curr_Wf	1	110	-	-	-	-	-	-	-	-1.62	2.03	-4.2	-0.67	8.5
Drumquin	Wind_Pt	1	110	-	-	-	-	-	-	-	-1.95	3.25	-5.15	-0.78	8.69
Dung1-	Tamnamor	1	110	-10.1	-0.42	6.45	-25.5	-14.1	16.4	-11.1	0.37	7.09	-46	-14.3	27.1
Dung1-	Tamnamor	2	110	-7.06	0.67	4.93	-19	-7.47	14.2	-7.69	1.3	5.41	-33.3	-5.85	23.5
Dung1B	Omah1-	1	110	-1.85	-3.05	1.92	-24.2	11.4	13.9	-2.9	-5.97	3.57	12.8	6.32	7.4
Dung1B	Tamnamor	3	110	-8.85	-1.69	4.84	-21.6	-14.4	13.4	-9.76	-0.97	5.27	-39.6	-15.6	22
Enniskil	Ennk_Pst	1	110	-0.25	0.56	0.49	0.3	-0.86	0.73	-0.15	4.28	3.42	0.57	1.08	0.98
Cam	Lima1-	1	110	0	0	0	0	0	0	-13.4	0.26	16.4	-7.27	10.3	12.2
Finy1A	Hana1A	1	110	-11.6	-7.67	9.66	-39	-14.5	28.9	-13.4	-8.66	11.1	-45	-16.2	33.2
Finy1B	Hana1A	2	110	-10.8	5.41	8.37	-37.5	-0.1	26	-12.4	5.55	9.44	-43.3	-1.72	30.1
Glen1A	Kels1-	1	110	-7.38	-5.42	11.2	-23.3	-12.4	29.4	-3.15	-0.48	3.88	-10.8	-1.84	12.1
Glen1B	Kels1-	2	110	0	0	0	0	0	0	-3.15	-0.48	3.88	-10.8	-1.84	12.1
Gort	Omah1-	1	110	0.04	2.06	1.03	5.62	4	3.45	-0.13	0.25	0.14	16	8.98	9.17
Gort	Tamnamor	1	110	-0.04	1.68	0.84	21	-6.03	10.9	0.13	3.67	1.84	-7.1	-6.88	4.94
Hana1A	Hana1B	1	110	-16.4	-2.12	5.6	-58.6	8.99	20.1	-28	29.6	13.8	-102	22	35.3
Hana1A	Lisb1A	1	110	2.44	-10.8	13.5	13.1	-7.85	14.8	1.87	-10.8	13.3	23.4	-1.37	22.7
Hana1A	Lisb1B	2	110	2.56	-11.4	14.6	12.3	-8.88	15.2	1.85	-11.5	14.5	22.5	-1.99	22.6
Hana1A	Colinglen_Be	1	110	-	-	-	-	-	-	-	-1.51	1.08	0	-1.62	1.15
Kels1-	Glen1B	2	110	0	-3.06	3.73	0	-2.89	3.21	-	-	-	-	-	-

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Kels1-	Kell_Wind1	1	110	0	0	0	0	0	0	0	-1.11	0.77	0	-1.15	0.8
Kels1-	Rashark1	1	110	-7.38	-3.57	4.43	-34.7	8.04	18.5	-3.29	0.21	1.78	13.1	-8.36	8.04
Kels1-	T_Gowangis	1	110	0	0	0	0	0	0	6.67	-2.75	3.9	55.6	-6.91	28.7
Kell_Wind1	Kell_Wind2	1	110	0	0	0	0	0	0	0	-0.3	0.24	0	-0.31	0.2
Kill1-Cl	Skrk1-	1	110	0.01	-5.26	4.83	-21.8	7.16	18.5	0.01	-5.23	4.8	-7.23	6.11	7.64
Kill1-Cl	Strabane	1	110	22.4	-2.78	15.8	35.6	3.64	21.6	25.4	0.55	17.7	45.8	2.99	27.7
Lisb1A	Tand1A	1	110	-4.09	-10.1	13.3	-19.3	-12.4	22.3	-6.77	-10.7	15.4	-16.3	-8.3	17.8
Lisb1B	Tand1A	2	110	-3.91	-10.7	14.3	-19.9	-13.6	24	-6.72	-11.4	16.6	-16.8	-9.07	19.1
Makl1-Cl	Omah1-	1	110	0	0.92	0.66	41.3	-9.82	27.1	0	0.92	0.66	13.8	-2.12	8.89
Newy1A	Tand1B	1	110	-10.8	-1.83	13.4	-34.6	-8.63	34.6	-12.4	-2.14	15.4	-41.7	-10.3	41.7
Newy1B	Tand1B	2	110	-10.8	-1.83	13.4	-34.6	-8.64	34.7	-12.5	-2.14	15.4	-41.8	-10.3	41.8
Omah1-	Strabane	1	110	-20.3	7.77	20	-16.1	-4.04	13.4	-24.7	2.66	22.8	-29.7	0.58	23.9
Omah1-	Strabane	2	110	-20	7.62	26.1	-15.8	-3.99	15.8	-24.3	2.6	29.8	-29.2	0.55	28.3
Omah1-	Trem	1	110	0.32	-1.29	0.72	4.89	-9.9	5.72	0.37	1.43	0.8	-19.2	-8.72	10.9
Rashark1	T_Gowangis	1	110	-	-	-	-	-	-	10.3	-3.69	5.18	6.3	7.92	4.31
Strabane	Stra_Pst	1	110	3.24	1.08	2.73	-0.86	0.5	0.8	0.48	-2.3	1.88	-0.97	1.42	1.38
Tand1A	Warn1A	1	110	9.09	1.17	11.6	32.7	7.1	29.6	10.6	1.5	13.5	37.7	8.85	34.3
Tand1A	Warn1B	2	110	9.07	1.17	11.6	32.6	7.09	29.5	10.5	1.5	13.5	37.6	8.83	34.2
Trem	Tamnamor	1	110	0.32	3.18	1.72	27.9	-11.8	15.7	1.65	5.68	3.18	-11.6	-6.31	6.83
Tamnamor	Heron_Bes	1	110	-	-	-	-	-	-	0	-0.51	0.36	0	-0.54	0.37
Woodland	Turleena	1	400	-	-	-	-	-	-	59.7	17.4	4.37	217	34.3	12.7
Celtic	Knockraha	1	400	-	-	-	-	-	-	200	-56.2	18.9	700	-79.5	64.1
Dunstown	Moneypoint	1	400	-249	41.4	19.7	-173	36.3	12.1	-	-	-	-	-	-
Mnypg1	Oldstreet	1	400	132	-55.9	11.2	82.2	-50.5	6.63	32.2	-57.4	5.13	136	-92	11.3
Oldstreet	Woodland	1	400	193	-26.8	19.5	119	64.5	13.5	-	-	-	-	-	-
Woodland	Portan	1	400	-450	28.3	65.8	-489	9.05	71.4	-100	166	28.3	-500	170	77.1
Aghada	Aghada_B	1	220	148	-32.6	25.6	-82.8	9.44	14.1	-47.6	2.29	8.03	191	18.2	32.4
Aghada	Aght2102	1	220	39.3	-7.89	6.76	69.5	-3.66	11.7	40.3	-6.41	6.87	76.2	-0.71	12.9
Aghada	Knockraha	1	220	161	-29.5	41.6	264	-10.4	56.5	157	-20.5	40.4	178	26.1	38.5
Aghada	Raffeen	1	220	108	-41	26.5	179	-36.4	35.6	93.7	-34.1	23	169	-18.9	33.2
Aghada	Longpoint	1	220	-456	111	87.3	-430	41.1	75.3	-244	58.7	46.7	-456	-7.44	79.4
Aghada_B	Glanagow	1	220	-10.2	-3.81	2.04	-73.7	4.05	12.9	-203	22.2	38	15.5	-7.87	3.03

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Aghada_B	Knockraha	2	220	158	-28.8	40.9	260	-9.78	55.7	155	-19.9	39.8	176	26.1	37.9
Arklow	Carrickmines	1	220	112	-11	25.8	108	-21.3	21.5	90.5	-9.09	21	169	-27.1	33.3
Arklow	Lodgewood	1	220	-137	14	31.8	-146	16	28.6	-108	13.2	25.2	-221	32.2	43.6
Arklow	Glenart	1	220	-	-	-	-	-	-	0.06	-0.46	0.11	0.07	-0.52	0.1
Ballyvouskil	Clashavoon	1	220	-66.5	8.4	9.06	-58.7	21.9	7.91	-173	36.8	24	-193	49.4	25.1
Ballyvouskil	Ballynahulla	1	220	66.3	-28.8	9.49	160	-33	20.5	175	-59.8	24.3	272	-45.8	34.8
Belcamp	Finglas	1	220	-118	-26.7	26.4	-118	-19.9	26.1	-104	-19.1	23.2	-13.4	-20.6	5.38
Belcamp	Shellybanks	1	220	-	-	-	-	-	-	-82	-44	16.3	-106	-19.9	18.9
Castlelost	Maynooth A	1	220	-	-	-	-	-	-	48.5	6.66	13.7	121	-30	29.7
Castlelost	Shannonbridg	1	220	-	-	-	-	-	-	-48.5	-6.66	13.7	-121	30	29.7
Clonee	Corduff	1	220	76.8	-11.5	17.9	1.23	13.4	2.62	-101	73.3	28.8	8.14	87.9	17.2
Clonee	Woodland	1	220	-208	10.5	47.9	-132	-11.7	25.8	-37.2	-75.6	19.4	-146	-87.5	33.2
Clonee	Bracetown	1	220	0	-8.26	1.47	0	-9.32	1.47	-	-8.35	1.48	-	-9.4	1.48
Clonee	Bracetown	2	220	0	-8.26	1.47	0	-9.32	1.47	-	-8.35	1.48	-	-9.4	1.48
Clashavoon	Knockraha	1	220	-107	26.1	17.1	-118	15.3	15.8	-191	44.9	30.4	-260	46.3	35.2
Cashla	Flagford	1	220	131	-27.3	38.2	104	0.3	23.9	87.6	-30.6	26.5	72	2.57	16.5
Cashla	Prospect	1	220	-73	-0.44	18.6	-82.1	9.58	17.7	-39.2	-15.3	10.7	-75.8	18.3	16.7
Cashla	Tynagh	1	220	-199	91.2	28.8	-126	-5.28	15.9	-136	84.3	21.1	-90.9	-5	11.5
Carrickmines	Dunstown	1	220	-95.4	-2.66	22	-97	21	19.4	2.75	-45.2	10.4	-120	13.4	23.5
Carrickmines	Irishtown	1	220	-90.1	-64.9	18.7	-263	-35.7	44.8	-212	-30.3	36.1	-188	-63.6	33.5
Carrickmines	Ckmn_Pst	1	220	206	-20.5	59.3	248	-8.21	70.9	211	-13.3	60.3	248	3.16	70.9
Cullenagh	Great Island	1	220	29.3	-2.21	3.93	69.6	-36.1	9.89	84.4	-14.2	11.5	156	-65.4	21.3
Cullenagh	Knockraha	1	220	-90.3	10.4	14.1	-180	33.7	23.9	-126	21	19.8	-261	64.1	35.1
Corduff	Cruiserath	1	220	31	-6.72	4.92	31	-7.89	4.38	79.5	-1.21	12.4	79.5	-2.54	10.9
Corduff	Cruiserath	2	220	36	-6.98	5.7	36	-8.12	5.05	92.5	-1.88	14.4	92.5	-3.22	12.7
Corduff	Finglas	1	220	149	-86.4	39.7	64.7	-40.5	14.9	-84.2	18.9	19.9	-46.2	21.9	9.97
Corduff	Huntstown 2	1	220	-289	153	59	-399	57.8	72.6	-	-	-	-	-	-
Corduffb	Finglas220B	2	220	149	-86.4	39.7	64.7	-40.5	14.9	-84.2	18.9	19.9	-46.2	21.9	9.97
Corduffb	Woodland	2	220	-179	11	41.2	-99.9	-13.4	19.6	1.08	-78.3	18	-112	-91.6	28.2
Corduff	Mooretown	1	220	-	-	-	-	-	-	-333	93.9	58.3	-272	49.6	46.6
Huntstown	Mooretown	1	220	-	-	-	-	-	-	352	-125	63	352	-36.3	59.7
Huntstown 2	Mooretown	1	220	-	-	-	-	-	-	399	-130	70.8	399	-49.6	67.8

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Dunstown	Kellis	1	220	-85.3	15	22	-63.9	25.2	14.7	-102	43.1	28.3	-149	49.1	33.4
Dunstown	Maynooth A	1	220	119	-11.1	34.2	141	-24.8	32.8	84	16.6	19.7	143	-24.4	28.3
Dunstown	Maynooth B	2	220	99.9	-27.2	29.6	129	-15.7	29.8	86.7	7.27	20.1	178	-11.5	34.7
Dunstown	Turlough Hil	1	220	19.1	-22.5	8.42	-131	4.79	37.3	36.5	0.02	10.4	8.96	-11.1	4.06
Flagford	Louth	1	220	21.7	10.7	6.31	81.9	1.79	17.3	-5.96	22.1	5.96	109	-5.4	23
Flagford	Srananagh	1	220	48.8	-25.4	12.7	-21.3	-0.12	4.16	43.4	-28.4	12	-31.6	4.42	6.22
Finglas	Huntstown	1	220	0	-3.84	0.72	-337	52.6	60.9	-	-	-	-	-	-
Finglas	Shellybanks	1	220	-2.45	-33.6	6.28	-48.6	-55.1	13.2	-	-	-	-	-	-
Finglas220B	North Wall	1	220	-3.63	-62.1	18.7	-52	-83	29.5	-45.4	-30.4	10.2	-129	11.2	23.5
Great Island	Kellis	1	220	141	-15.9	36.1	171	6.58	36.6	117	-14.4	15.5	226	3.11	28.4
Great Island	Lodgewood	1	220	161	-23.7	37.4	180	-16.1	35.3	109	-19.3	25.6	261	-14.7	50.9
Great Island	Loughtown	1	220	0	-1.1	0.19	-400	-29	67.6	-200	43.8	34.5	-500	-60.9	84.9
Gorman	Louth	1	220	-0.79	-4.13	0.97	47.9	-1.66	10.1	-18.2	-14.7	5.4	-33.7	-7.18	7.24
Gorman	Maynooth B	1	220	-56.9	7.53	16.4	-142	-15.8	32.8	-41.5	6.48	12	-69.9	-20.6	16.7
Glanagow	Raffeen	1	220	207	-62.5	39.6	360	-46.8	57.9	241	-54.2	45.1	312	-13.8	49.8
Inchicore	Irishtown	1	220	-195	104	39.4	-452	32.9	71.5	-503	120	92	-517	-34.7	81.7
Irishtown	Shellybanks	1	220	0	-3.56	0.6	-313	12.1	52.8	-313	48.3	53.4	-313	-29.2	53
Knockanure	Ballynahulla	1	220	-65.6	50.9	11.2	-244	58.8	31.7	-173	105	27.3	-328	76.7	42.5
Knockanure	Kilpaddoge	1	220	19.7	-13.4	3.26	96	-21.5	12.9	51.8	-31.9	8.32	115	-24.5	15.5
Knockanure	Kilpaddoge	2	220	45.9	-66.7	12.3	217	-73.5	34.7	121	-103	24	261	-76.1	41.2
Knockraha	Killonan	1	220	156	-32.1	31.2	260	-11.4	46.1	220	-54.6	44.2	361	-19.8	64.2
Knockraha	Raffeen	1	220	-151	24.3	43.7	-248	9	56.8	-155	16.3	44.3	-141	-36.9	33.5
Killonan	Shannonbridg	1	220	94.6	-25	36.4	114	-31.9	33.4	79.1	-19.7	30.3	137	-34.6	39.9
Killonan	Kilpaddoge	1	220	-44.5	-28.5	12.2	-22.5	-44.2	9.67	51.6	-48.9	16.4	56.2	-44.9	14
Kellystown	Maynooth A	1	220	54.7	-39.1	9.26	72.2	-5.44	8.83	8.84	-0.35	1.22	81	46.9	11.4
Kellystown	Woodland	1	220	-169	-3.31	38.9	-189	-37.9	23.5	-126	-43.2	17.8	-198	-90.3	26.4
Kilpaddoge	Mnyp B	1	220	-53.7	12.5	8.36	76.6	-17	11.9	69.1	-39.5	12.1	181	-63.4	29.1
Kilpaddoge	Moneypoint	2	220	-53.7	12.5	8.36	76.6	-17	11.9	69.1	-39.5	12.1	181	-63.4	29.1
Kilpaddoge	Tarbert	2	220	17.7	-10.4	4.73	25.4	-15.4	5.8	20	-22	6.85	-147	73.7	32
Glansillagh	Tarbert	1	220	-	-	-	-	-	-	7.56	-9.3	1.61	-53.3	21.4	7.24
Glansillagh	Kilpaddoge	1	220	-	-	-	-	-	-	-7.56	9.3	1.61	53.3	-21.4	6.83
Castlebagot	Maynooth A	1	220	-128	37.7	20.6	-122	42.3	18.7	-55.6	-25.9	9.48	-231	18.5	33.6

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Castlebagot	Inchicore	1	220	-97.7	-62.8	21.2	-106	-61.8	22.4	-216	-21.2	39.6	-54	-74	16.7
Inchicore	Castlebagot	2	220	-	-	-	-	-	-	143	-26.2	22.5	44.1	26.9	7.47
Louth	Woodland	1	220	-84	22.6	20	-182	-18.3	38.5	-	-	-	-	-	-
Louth	Oriel	1	220	-	-	-	-	-	-	-46.2	1.73	5.83	-102	-46.3	13.6
Woodland	Oriel	1	220	-	-	-	-	-	-	46.4	-14.1	6.12	103	37.3	13.3
Maynooth A	Shannonbridg	1	220	-54.2	-6.91	20.3	-49.3	9.78	14.2	-	-	-	-	-	-
Maynooth B	Turlough Hil	1	220	-62.1	2.66	19.1	-157	10.8	44.9	-33.7	-10.6	10.9	-102	-2.33	28.9
Maynooth B	Inchicore	1	220	46.2	-3.44	5.84	15.7	-50	6.36	-	-	-	-	-	-
Castlebagot	Maynooth B	2	220	-	-	-	-	-	-	-54.9	-49.5	11.4	-138	27.5	20.3
Moneypoint	Prospect	1	220	36.5	-11	7.1	29.5	-12.8	5.27	11.8	-1.04	2.2	-3.7	1.24	0.64
North Wall	Poolbeg Nort	1	220	-3.64	4.94	1.85	-52	-7.69	15.8	-45.4	8.92	8.11	-129	55.1	24.6
Oldstreet	Tynagh	1	220	-61.6	14	14.6	-36.6	-64	14.4	-125	93.9	36.1	-171	-1.3	33.4
Poolbeg Nort	Poolbeg Sout	1	220	-6.08	-15.6	3.71	49.1	-0.92	10.9	22.3	-13.6	5.81	102	7.35	22.7
Poolbeg Nort	Shellybanks	1	220	2.45	-3.43	0.73	-101	22.7	18.1	-	-	-	-	-	-
Poolbeg Sout	Ckmn_Pst	1	220	-206	-19.6	77.4	-247	-33.2	93.4	-210	-18.2	37	-248	-35.5	43.9
Poolbeg Sout	Inchicore	1	220	44	-0.46	16.5	43.4	3.46	16.3	65.4	-0.18	11.5	58.5	4.31	10.3
Poolbeg Sout	Inchicore	2	220	57.4	0.81	16.4	56	5.79	16.1	69.3	1.92	12.2	62.1	7.1	11
Prospect	Tarbert	1	220	-37	-1.67	7.94	-53.2	7.14	11.5	-27.6	-3.24	4.87	-80.1	30.4	15
Shellybanks	Shellybanksb	1	220	0	0	0	-163	7.52	8.74	-163	27.4	10.5	-163	-16	8.77
Tarbert	Kilpaddoge	1	220	-19.4	8.7	3.29	-27.8	14.1	4.27	-	-	-	-	-	-
Ardnacrusha	Drumline	1	110	8.81	-13.8	16.5	13.8	-12.7	15.5	13.3	-16.2	21.2	34.2	-15.7	31.1
Ardnacrusha	Ennis	1	110	4.86	-15.5	16.5	0.89	-8.17	6.79	12.7	-18	22.2	21.7	-12.2	20.6
Ardnacrusha	Limerick	1	110	-6.52	16.2	9.8	-12.7	27.1	14.2	-10.5	27.5	16.5	19	36.3	19.5
Ardnacrusha	Caherhurly	1	110	-	-	-	-	-	-	0.01	-24.5	12.7	-19.1	0.56	9.95
Balruntagh	Arva	1	110	-	-	-	-	-	-	8.85	-26.5	15.7	-24	-1.8	11.5
Balruntagh	Navan	1	110	-	-	-	-	-	-	2.63	-2.7	2.12	24	1.8	11.5
Aghada	Whitegate	1	110	39.3	-6	40.2	69.4	-4.7	57.5	40.2	-4.6	40.9	76.2	-2.85	63
Arigna	Arigna_T	1	110	-1.2	0.55	1.26	-0.24	-1.06	0.88	-1.2	0.55	1.26	-2.26	-0.77	1.94
Agannygal	Derrybrien	1	110	0	-0.27	0.26	-17.7	12.4	17.6	0	-0.28	0.26	-12.4	8.39	12.2
Agannygal	Ennis	1	110	-15.4	2.42	21.1	-7.16	-0.86	7.92	-7.49	-1.51	10.3	-0.44	-1.88	2.13
Agannygal	Shannonbridg	1	110	15.4	-2.14	15	24.9	-11.5	23	7.49	1.78	7.4	12.9	-6.51	12.1
Ahane	Killonan2	1	110	-1.44	0.56	3.43	-5.12	-0.18	11.4	-0.64	0.42	1.71	-5.76	-0.2	12.8

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Adamstown	Grange Castl	1	110	18.3	-10.8	13.3	26.9	-13	16.5	23.7	-11.4	16.4	35.1	-14	20.9
Adamstown	Inch_Country	1	110	-30.8	6.3	19.6	-46.1	6.89	25.8	-36.2	6.86	23.1	-55.5	7.45	31
Anner	Doon	1	110	-14	-6.9	34.7	-14	-6.9	34.7	-14	-6.9	34.7	-14	-6.9	34.7
Arklow	Ballybeg	1	110	27.4	2.4	20.5	37.1	-0.27	23.4	27.5	-1.85	20.6	56.5	-2.53	35.6
Arklow	Banoge	1	110	-26.4	7.66	15.4	-19.9	5.05	9.76	-	-	-	-	-	-
Arklow	Shelton Abbe	2	110	2.29	0.64	3.77	2.29	0.63	2.58	-	-	-	-	-	-
Arklow	Killinskyduf	1	110	-	-	-	-	-	-	-4.71	0.23	3.8	-	-1.64	1.32
Arklow	Oaklands	1	110	-	-	-	-	-	-	-25.4	3.6	14.4	-27.1	-1.18	12.9
Arklow	Pollahoney	1	110	-	-	-	-	-	-	1.18	0.27	0.68	1.18	0.26	0.57
Arklow	Pollahoney	2	110	-	-	-	-	-	-	1.11	0.26	0.64	1.11	0.25	0.54
Athea	Dromada	1	110	-	-6.41	5.34	-8.54	0.25	6.28	0	-6.57	5.48	-5.98	-2.04	4.65
Athea	Tobertoreen	1	110	-	-	-	-6.93	6.66	4.58	0	0	0	-4.85	6.52	3.87
Athea	Knockanure B	1	110	-	6.41	3.6	25.7	-27	17.8	0	6.57	3.69	18	-19.1	12.5
Athlone	Lanesboro_A1	1	110	17.1	-11.6	20.8	3.67	14.4	12.3	22.9	-7.63	13.5	36.3	21.5	20.1
Athlone	Shannonbridg	1	110	-42.8	18.3	26.2	-79.7	40.4	47	-47.7	21.3	29.4	-30.8	40.7	26.9
Athlone	Cuilleen	1	110	-	-	-	-	-	-	0	-2.41	1.72	-89.7	-4.6	64.2
Ballinknocka	Aughinish	1	110	-	-	-	-	-	-	-7.73	30.3	17.6	36.1	22	20.1
Ballinknocka	Kilpaddoge	1	110	-	-	-	-	-	-	12.7	-30.3	18.5	-36.1	-22	20.1
Aughinish	Castlefarm	1	110	25.4	14.2	30.3	25.4	14.1	30.3	25.4	14.2	30.3	25.4	14.1	30.3
Aughinish	Kilpaddoge	1	110	-46	-16.9	27.5	-51.8	-16.8	25.9	-	-	-	-	-	-
Aughinish	Moneteen	1	110	-4.84	-10.3	6.38	0.96	-10.1	4.81	21.4	-15.3	14.8	-14.8	-5.02	7.44
Aughinish	Seal Rock	3	110	-	-0.61	0.51	-	-0.64	0.53	-40	8.59	34.1	-	-0.64	0.53
Aughinish	Seal Rock	4	110	-	-0.61	0.51	-	-0.64	0.53	-40	8.59	34.1	-	-0.64	0.53
Aughinish	Castlefarm	2	110	25.4	14.2	30.3	25.4	14.1	30.3	25.4	14.2	30.3	25.4	14.1	30.3
Arva	Carrick On S	1	110	-21.7	8.16	22.3	-37.9	12.3	32.4	-17.4	-4.88	10.2	-70.4	15.1	34.3
Arva	Gortawee	1	110	24.6	-5.07	14.1	-12.7	2.43	6.15	28.1	-9.27	16.6	-22.9	5.25	11.2
Arva	Navan	1	110	-5.31	12.6	7.68	18.2	3.6	8.83	-	-	-	-	-	-
Arva	Shankill	1	110	1.36	-8.64	4.91	18.1	-10.1	9.87	-1.16	-6.3	3.6	38.6	-11.6	19.2
Arva	Shankill	2	110	1.08	-7.05	4.01	14.3	-8.21	7.84	-0.91	-5.21	2.97	30.5	-9.35	15.2
Artane	Fin_Urban	1	110	-10.5	3.07	9.09	-33	0.29	24.3	-10.4	3.05	9.06	-37.1	-0.48	27.3
Artane	Mcdermott	1	110	6.78	-2.39	6.65	15.4	-0.99	13.4	6.76	-2.38	6.63	17.3	-0.41	15.1
Ballyvouskil	Coomnaclohy	1	110	-	-	-	-	-	-	-1.2	-9.35	6.74	-8.81	-6.96	8.02

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Ballyvouskil	Garrow	1	110	0.02	-21.7	11.1	-54.6	-18	26.1	-0.68	-21.7	11.1	-38.2	-20.8	19.8
Athy	Carlow	1	110	-35.2	7.91	36.4	-44	-1.45	36.4	-17.1	13.1	20.6	-14.9	-1.84	12.2
Athy	Coolnabacky	1	110	-	-	-	21.5	-5.48	18.1	11.4	-13.9	17.1	-10.4	-6.34	9.92
Ballywater	Crane	1	110	-	-	-	12.6	-10.9	24.5	-	-	-	8.8	-10.6	20.3
Booltiagh	Ennis	1	110	34.8	-8.21	20.1	63.5	-4.93	30.3	11.7	-0.05	6.55	44.7	-2.23	21.3
Booltiagh	Tulbrk T	1	110	-34.8	10.3	20.4	-26.4	1.27	12.6	-11.7	2.11	6.66	-12.4	0.05	5.92
Baltrasna	Deenes	1	110	-0.75	-9.32	5.25	31.8	2.56	15.2	4.9	-6.86	4.73	22.5	3.48	10.9
Baltrasna	Corduff	1	110	-3.25	10.4	6.14	-47.5	-3.1	22.7	-8.17	7.86	6.37	-40.1	-4.25	19.2
Ballylickey	Dunmanway	1	110	-5.21	5.85	11.5	6.45	-3.62	10.9	-5.19	5.84	11.5	-1	-1.83	3.07
Ballybeg	Ckm_Country	1	110	23.7	3.29	17.6	21.3	-0.87	13.4	24.8	-1.18	18.2	38.5	-4.56	24.4
Cordal	Ballynahulla	1	110	-0.02	11.5	5.9	44.1	-13.9	21	-0.02	11.5	5.9	30.9	-11.5	15
Blake	Blake T	1	110	-6.56	-0.16	4.83	-26.3	-3.61	16.7	-6.04	-0.24	4.45	-29.5	-4.34	18.8
Blundelstown	Corduff	1	110	9.05	3.78	7.55	0.59	6.68	5.16	4.25	6.15	5.75	4.68	-9.53	8.17
Blundelstown	Mullingar	1	110	-3.08	-15.5	15	-0.59	-6.68	5.45	-7.75	-8.38	10.9	-14.2	6.22	12.6
Binbane	Cath_Fall	1	110	-12.5	8.48	8.5	5.53	-7.23	4.34	-13.1	6.74	8.25	-2.11	-4.36	2.31
Binbane	Tievebrack	1	110	5.49	-6.48	6.34	-3.21	2.98	2.75	6.03	-4.71	5.71	3.7	0.28	2.33
Baroda	Monread	1	110	-2.32	2.22	3.25	6.21	-18.9	16.5	3.68	2.05	4.26	43.3	-16.5	38.3
Baroda	Newbridge	1	110	-2.94	-3.06	3.48	-11.5	18.1	17.6	-8.94	-2.89	7.7	-48.5	15.7	41.8
Ballydine	Cullenagh	1	110	-35	-0.42	17.9	-31.2	8.14	14.8	-30.9	1.45	15.8	-30.4	8.58	14.6
Ballydine	Doon	1	110	25.6	-1.9	14.4	14.4	-12.2	8.99	22	-3.85	12.6	12.4	-12.9	8.51
Barnageeragh	Cloghran	1	110	-14.9	-1.69	7.82	-14.9	-1.68	7.82	-11.3	4.09	6.26	-11.3	4.1	6.26
Barnageeragh	Snugborough	1	110	-	-	-	-	-	-	-24.5	-8.29	13.5	-24.5	-8.29	13.5
Barnahely	Raffeen	1	110	-26.6	-6.43	43.5	-33.8	-7.55	37.7	-25.8	-6.49	42.2	-38.2	-8.72	42.6
Bellacorick	Laghtanvack	1	110	-	-	-	-	-	-	10.3	-16.2	9.98	-59.4	6.1	31.1
Bellacorick	Castlebar	1	110	-16	11.7	10.2	86.3	-32	42.4	-12.2	22.1	13	117	-38.9	56.7
Bellacorick	Moy	1	110	14.1	-6.32	8.66	-12.5	-18.2	10.5	-	-	-	-	-	-
Airton	Inch_City	1	110	-28.5	-2.4	23.8	-28.5	-2.38	21	-30	-2.58	25.1	-30	-2.58	22.1
Airton	Inch_City	2	110	-28.5	-2.4	23.8	-28.5	-2.38	21	-30	-2.58	25.1	-30	-2.58	22.1
Blackrock	Ringsend	1	110	-20.2	-7.08	17.2	-62.6	-25.4	44.8	-20.1	-7.05	17.2	-70.4	-29.4	50.5
Ballyragget	Garrintaggar	1	110	-	-	-	-	-	-	7.48	-3.65	4.68	-5.07	1.92	2.58
Ballyragget	Kilkenny	1	110	-8.05	-2	4.66	-23.6	-7.21	11.8	-11.5	1.1	6.5	-12	-10.9	7.71
Bandon	Brinny	1	110	1.97	0.44	2.73	1.97	0.43	2.22	1.97	0.44	2.73	1.97	0.43	2.22

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Bandon	Dunmanway	1	110	6.05	-9.93	11.7	-8.69	7.17	9.31	18.6	-9.07	11.6	2.5	6.33	3.24
Bandon	Brinny	2	110	1.98	0.45	2.74	1.98	0.44	2.22	1.98	0.45	2.74	1.98	0.44	2.22
Bandon	Raffeenb	1	110	-28.5	8.86	30.1	-38.1	-0.93	31.5	-37.7	7.56	21.6	-56.3	-1.01	29.3
Cloghran	Corduff	1	110	-86	-13.2	44.6	-86	-13.1	39.4	-82.4	-7.45	42.4	-82.4	-7.36	37.4
Barrymore	Barrym T	1	110	-14.3	1.8	10.6	-21.9	-6.48	14.3	-12.7	1.65	9.44	-28.6	-7	18.5
Belcamp	Darndale	1	110	58.8	8.62	28.7	58.7	5.87	25.8	60.6	6.57	29.5	60.6	6.17	26.6
Belcamp	Darndale	2	110	58.8	8.62	28.7	58.7	5.87	25.8	60.6	6.57	29.5	60.6	6.17	26.6
Belcamp	Metro North	1	110	-	-	-	-	-	-	22.7	-7.76	6.45	22.5	-8.55	5.73
Belcamp	Newbury	1	110	-	-	-	-	-	-	62.6	22.8	53.8	62.8	21.5	50.3
Butlerstown	Cullenagh	1	110	-18.1	3.15	10.3	-46.9	-0.78	24.4	-17.1	2.92	9.72	-48.1	0.71	25.1
Butlerstown	Killoteran	1	110	3.22	-3.46	2.41	5.13	-7.71	4.29	5.92	-3.52	3.51	0.98	-10.5	4.89
Deenes	Drybridge	1	110	7.73	-11.6	7.83	31.8	2.7	15.2	13.4	-7.05	8.5	22.5	3.78	10.9
Cloghboola	Trien	1	110	0	1.23	0.77	30.1	-18.5	19.5	-	1.23	0.77	21.1	-17	15
Bogtown	Mount Lucas	1	110	0	0	0	16.9	-8.38	15.2	-	-	-	11.8	-11.2	13.1
Ballyadam	Midleton	1	110	20	-5.16	20.9	39.3	-4.46	32.7	19.5	-3.45	20	42.4	-3.13	35.1
Ballyadam	Whitegate	1	110	-20	5.16	20.9	-39.3	4.46	32.7	-19.5	3.45	20	-42.4	3.13	35.1
Banoge	Tullabeg	1	110	-29.1	7.89	17	-27.7	5.55	13.5	-27.7	8.28	16.3	-35.9	3.96	17.2
Banoge	Oaklands	1	110	-	-	-	-	-	-	25.5	-8.44	15.1	27.2	-4.31	13.1
Boggeragh	Clashavoon	1	110	-	0.59	0.33	49.5	-18.5	25.2	-	0.59	0.33	35.4	-9.13	17.4
Coolderrig	Grange Castl	1	110	-15.6	-0.25	11.2	-15.6	-0.25	11.2	-19.8	-0.5	14.1	-19.8	-0.49	14.1
Coolderrig	Grange Castl	2	110	-14.4	-0.64	10.3	-14.4	-0.64	10.3	-18.3	-0.93	13.1	-18.3	-0.93	13.1
Ardnagappary	Tievebrack	1	110	-3	-0.72	3.39	-2.86	-3.9	5.31	-2.99	-0.72	3.38	-6.08	-3.57	7.74
Cabra	Pelletstown	1	110	-6.72	1.24	5.51	-17.9	-2.43	13.6	-6.7	1.23	5.49	-20.1	-3.36	15.3
Cabra	Wolfe Tone	1	110	2.85	-2.51	3.51	4.73	-1.92	4.44	2.84	-2.5	3.5	5.27	-1.6	4.79
Clonfad	Kinnegad	1	110	-	-	-	-	-	-	1.55	18.2	10.3	11.2	20.6	11.2
Clonfad	Mullingar	1	110	-	-	-	-	-	-	8.39	-23.9	14.2	-11.2	-20.6	11.2
Clashavoon	Clonkeen	1	110	31.5	-13.9	19.4	66.3	-0.74	34.9	45.1	-16.9	27.1	92.6	-4.44	48.8
Clashavoon	Dunmanway	1	110	5.55	-1.03	3.17	2.53	-1.37	1.37	-0.77	-1.68	1.04	3.89	-3.07	2.36
Clashavoon	Macroom	2	110	1.28	2.37	1.67	13.8	-0.26	7.21	-9.69	5.73	6.99	1.89	1.94	1.42
Clonkeen	Knockearagh	1	110	31.3	-13.4	19.2	65.6	-2.95	31.3	44.7	-17.6	27	91.1	-10.3	43.7
Coolroe	Iniscarra	1	110	4.02	-6.05	3.71	-14.8	3.71	7.03	15.9	-11	9.87	-13.7	-5.67	6.82
Coolroe	Kilbarry	1	110	-8.77	6	5.97	3.9	-3.97	2.77	-19.6	10.9	12.6	1.43	5.43	2.79

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Corderry	Garvagh	1	110	0.01	8.07	4.53	-24.4	2.62	11.7	-3.98	12	7.1	-17.2	0.73	8.17
Corderry	Srananagh	1	110	6.38	-13	8.14	-2.24	2.45	1.58	9.38	-16.4	10.6	0.48	1.04	0.55
Corderry	Arigna_T	1	110	-6.39	5.82	4.85	45.4	-8.94	22	-5.41	5.68	4.4	33.2	-4.56	16
Cashla	Cloon	1	110	53.2	-11.9	30.6	33.8	10.8	16.9	35.3	-2.89	19.9	17.8	16.1	11.4
Cashla	Ennis	1	110	-6.61	1.97	3.87	-0.52	7.58	3.62	-13	1.28	7.32	-11.6	14.6	8.87
Cashla	Galway	1	110	11.2	-11.4	15.2	11.4	3.39	9.68	11.4	-11.9	9.29	21.4	8.81	11
Cashla	Galway	2	110	13.7	-13.8	18.5	13.9	4.24	11.9	14	-14.5	11.3	26.1	10.9	13.5
Cashla	Galway	3	110	13.7	-13.8	18.5	13.9	4.24	11.9	14	-14.5	11.3	26.1	10.9	13.5
Cashla	Salthill	1	110	9.5	-11.3	15.2	8.51	-2.81	9.24	8.44	-12.5	14.4	15.3	-0.22	14.6
Cashla	Ballymoneen	1	110	-	-	-	-	-	-	-9.7	20.2	18.1	-	-4.72	3.8
Cashla	Dalton_A2	1	110	28.2	-8.57	29.7	-5.72	12.5	11.4	24.3	-10.8	14.9	-9.83	8.32	6.13
Cashla	Somrst T	1	110	18.6	-0.61	18.8	28.3	-1.26	23.4	3.25	4.87	5.91	9.54	9.7	11.3
Clahane	Trien	1	110	-1.35	4.22	4.48	10.1	-2.37	8.54	6.04	0.09	6.1	8.06	-16.7	15.4
Clahane	Tralee	1	110	1.35	-4.22	4.22	5.35	3.76	5.31	-2.65	-1.11	2.74	2.64	-3.11	3.31
Castlebar	Cloon	1	110	-18.4	3.8	18.9	28	-15.8	26.6	-17.7	12.1	12	33.4	-12.3	16.9
Castlebar	Carrowbeg	1	110	9.71	-6.47	11.8	17.2	-3.71	14.5	9.68	-6.77	11.9	19.3	-3.21	16.2
Castlebar	Dalton_A1	1	110	-16.5	4.84	17.4	22.3	-5.91	19.1	-13.5	6.27	8.37	33.8	-18.4	18.3
Kilcumber	Cushaling	1	110	-	-	-	22.4	-20.7	21.8	-	-	-	15.7	-24.8	21
Carrigadrohi	Kilbarry	1	110	-8.17	4.39	5.21	12.7	-2.77	6.22	-	-	-	-	-	-
Carrigadrohi	Macroom	1	110	8.17	-4.39	5.21	-12.7	2.77	6.19	19.9	-8.84	12.2	8.77	-0.01	4.18
Carrigadrohi	Kilnap	1	110	-	-	-	-	-	-	-19.9	8.84	12.2	-0.81	3.5	1.71
Central Park	Taney	1	110	3.5	-7.62	7.69	7.53	-7.6	9.22	3.49	-7.64	7.71	8.46	-7.46	9.72
Cath_Fall	Cliff	1	110	0	-0.22	0.32	0	-0.21	0.31	0	-0.22	0.32	-19.9	0.47	29.2
Cath_Fall	Corraclassy	1	110	5.26	12	7.36	45.8	-5.46	22	1.66	12.7	7.19	56.9	-7.11	27.3
Cath_Fall	Srananagh	1	110	-18.1	18.2	13.4	2.84	-2.54	2	-17.9	15.3	12.3	11	-4.41	6.2
Cath_Fall	Clogher	2	110	6.84	-19.5	11.6	-27.2	11.3	14	8.07	-17.8	11	-12.2	4.87	6.23
Cahir	Doon	1	110	-1.23	7.24	4.12	28.1	6.94	13.8	0.99	9.3	5.25	33.7	9.17	16.6
Cahir	Kill Hill	1	110	27.5	-7.14	15.9	5.61	14.1	7.22	24	-4.16	13.7	1.31	15	7.16
Cahir	Tipperary	1	110	3.89	-14.5	8.42	-6.35	9.28	5.36	18.3	-16.5	13.8	10.7	7.7	6.27
Cahir	Barrym T	1	110	-39.6	14.3	40.1	-54.3	32.6	51.5	-49.4	10.8	28.4	-75.9	30.3	38.9
Carrickmines	Cherrywood	1	110	6	-2.89	6.35	22.3	-2	18.2	5.98	-2.9	6.33	25	-1.68	20.4
Carrickmines	Pottery Road	1	110	7.3	-5.41	7.64	16	-4.36	13	7.28	-5.43	7.63	17.9	-3.9	14.5

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Carrickmines	Central Park	1	110	7.7	-10.9	9.82	17.2	-10.4	12.7	7.68	-10.9	9.83	19.3	-10.2	13.7
Bracklone	Newbridge	1	110	-	-	-	-	-	-	29.5	-0.88	21.7	50.2	-7.38	31.9
Bracklone	Portlaoise	1	110	-	-	-	-	-	-	-29.5	0.88	16.6	-50.2	7.38	24.2
Cookstown	Bancroft	1	110	-1.07	0.94	1.15	-4.57	0.29	3.45	-1.06	0.94	1.14	-5.42	0.07	4.08
Cookstown	Ckm_Country	1	110	-6.23	-1.72	5.82	-10.4	-2.6	7.77	-6.22	-1.72	5.81	-11.4	-2.84	8.53
Clutterland	Kilmahud	1	110	8.86	-0.1	4.74	8.86	-0.19	3.97	3.53	-2.27	2.24	3.52	-2.32	1.89
Clutterland	Castlebagot	1	110	-46.8	-3.02	27.8	-46.8	-2.91	27.7	-120	-11.9	71.1	-119	-11.5	71
Cloon	Lanesboro_A2	1	110	22.2	-7.01	23.5	34.8	-10	29.7	13.3	-6.61	15	23	-1.99	18.9
Screeb	Knockranny	1	110	-7	2.8	5.58	-19.3	-1.97	12.2	-6.98	2.8	5.57	-21.1	-2.46	13.3
Screeb	Knockranny	1	110	-	-	-	-	-	-	-6.98	2.8	5.57	-21.1	-2.46	13.3
Crane	Effernoge	1	110	-	-	-	-	-	-	-6.71	12.5	7.96	-55.1	16.2	27.4
Crane	Lodgewood	1	110	-21	6.59	12.3	-61.9	14.1	30.2	-	-	-	-	-	-
Crane	Tullabeg	1	110	24.3	2.11	13.7	27.8	-6.08	13.6	12.3	4.45	7.36	36.1	-4.13	17.3
Crane	Wexford	1	110	-14.5	6.94	11.8	10	-10.4	6.88	-16.8	-1.51	9.47	-14.2	-15.3	9.95
Carrick On S	Flagford	1	110	-19.1	8.29	21	-11.8	-1.16	9.8	-15.8	2	16.1	-36.7	0.62	30.3
Carrick On S	Flagford	2	110	-19.6	8.56	21.6	-12.1	-1.15	10	-16.2	2.09	16.5	-37.6	0.74	31.1
Carrick On S	Arigna_T	1	110	7.61	-7.56	6.03	-44.7	10.8	21.9	6.63	-7.48	5.61	-30.8	5.04	14.9
College Park	Finglas B5	1	110	0	-3.69	3.55	0	-4.05	2.85	1.08	-3.71	3.72	3.12	-3.65	3.38
College Park	Corduff	1	110	-21.6	0.69	15.1	-23.1	1.68	16.2	-22.6	0.72	15.8	-29.1	0.74	20.3
Charleville	Glenlara	1	110	8.1	0.02	8.18	6.61	4.15	6.45	8.08	0.04	8.16	10.8	4.18	9.53
Charleville	Killonan	1	110	20.7	-10.2	17	36.3	-19	25.8	36.6	-27.9	33.9	38.2	-20.4	27.3
Charleville	Mallow	1	110	-34.6	13.2	20.8	-43.5	7.13	21	-38.5	7.87	22.1	-58.5	13	28.5
Carlow	Kellis	1	110	-31.8	7.63	33.1	-46.5	-14.4	40.2	-5.43	-1.34	5.32	-34	-15.9	30.5
Carlow	Kellis	2	110	-32	7.38	33.2	-46.5	-14.9	40.4	-5.58	-1.36	5.47	-35	-16.3	31.3
Carlow	Stratf T	1	110	5.95	-1.3	8.95	-6.86	14.1	23.1	-27.2	22	51.4	-7.94	15.5	25.6
Cow Cross	Castleview	1	110	16.7	-6.07	17.9	28.8	-5.33	24.2	17.2	-5.31	18.2	29	-3.16	24.1
Cow Cross	Oldcourt	1	110	0.3	0.02	0.9	0.3	0.01	0.9	0.3	0.02	0.9	0.3	0.01	0.9
Cow Cross	Raffeen	1	110	-11	0.33	11.1	-25.1	-2.44	20.9	-9.53	-0.85	9.67	-23.9	-4.82	20.1
Cow Cross	Whitegate	1	110	-10	5.68	11.6	-20.4	6.02	17.6	-11.5	6	13.1	-23.9	5.84	20.4
Cunghill	Glenree	1	110	-0.48	2.27	1.31	-86.5	34.1	44.3	-2.01	-10.5	6.02	-75	29.5	38.4
Cunghill	Sligo	1	110	0.48	-0.55	0.41	96.7	-27.5	47.9	2.01	12.3	7.02	82.1	-22.6	40.6
Cushaling	Mount Lucas	1	110	9	-8.58	9.14	-6.86	-26.3	17.1	11.7	-0.67	8.62	43	8.57	27.6

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Cushaling	Newbridge	1	110	6.1	6.76	6.8	39.5	-6.74	26.4	10.9	2.52	6.31	90.9	4.15	43.4
Cushaling	Philipstown	1	110	-15.1	2.4	11.2	-10.2	12.9	10.4	-22.7	-1.27	12.8	-7.82	20.3	10.4
Castleview	Knockraha	1	110	2.14	-6.91	7.3	-0.1	-8.77	7.25	3.49	-6.25	7.23	-3.42	-7.64	6.92
Coomagearlah	Glanlee	1	110	0	-2.3	2.53	-8.87	4.77	11.1	-0.7	-2.29	2.63	-6.21	3.84	8.03
Coomagearlah	Clonkeen	1	110	0	2.3	1.29	33.1	-19.1	20.1	0.7	2.29	1.35	23.2	-17.3	15.2
Corraclassy	Gortawee	1	110	4.94	15.6	9.19	45.4	-6.78	21.9	1.44	20.1	11.3	56.3	-8.57	27.1
Corraclassy	Ennk_Pst	1	110	0.25	-1.55	1.58	-0.3	-0.14	0.27	0.16	-5.27	5.32	-0.57	-2.08	1.78
Castledockre	Lodgewood	1	110	-	-	-	12.4	-11.9	18.9	-	-	-	8.66	-11.6	15.9
Cullenagh	Rathnaskillo	1	110	-	-	-	-29.7	11.2	15.1	-30.3	6.84	17.4	-34.2	15.9	18
Cullenagh	Waterford	1	110	23.6	-9.58	14.3	61	-7.62	30.6	23.6	-9.14	14.2	60.6	-11	30.6
City West	Fortunestown	1	110	22.1	0.98	17.9	76.2	22	60.1	22.1	0.98	17.8	85.7	26.8	68
City West	Inch_Country	1	110	-33	-4.86	32.4	-89.7	-26.4	69.7	-32.9	-4.85	32.3	-101	-31.7	78.9
Corduff	Gallanstown	1	110	-5.45	-8.84	5.84	35.1	3.28	16.8	-3.11	-7.06	4.33	29	4.06	14
Corduff	Ryebrook	1	110	20.4	18.8	17.2	17.1	26.9	18.7	18.1	19.6	16.6	-3.74	26.2	15.5
Knockranny A	Uggool	1	110	-	-4.32	2.21	-51.9	54.2	34.1	-	-4.35	2.23	-36.3	52.9	29.2
Knockranny A	Galway	1	110	-	4.32	2.41	51.9	-48.1	38.2	-	4.35	2.43	36.3	-52.9	34.7
Knockranny	Knockalough	1	110	-	-11.9	6.24	-10.1	-9.38	7.24	-	-12	6.3	-7.04	-10.4	6.61
Knockranny	Ferry View	1	110	-	-	-	-	-	-	-	-2.56	1.12	-9.9	15.2	7.96
Knockranny	Salthill	1	110	-7.02	19.6	10.7	23.3	39.7	20.9	-7	22.4	12	18.6	25.8	14.5
Knockranny	Buffy	1	110	0	-0.62	0.44	-32.7	-27.9	30.7	0	-0.63	0.45	-22.9	-28.8	26.3
Dundalk	Mullagharlin	1	110	-4.87	-5.48	7.41	-24.6	-12.7	22.9	-2.84	-2.24	3.65	-27.4	-13.2	25.1
Dundalk	Louthb	1	110	-14.1	8.69	16.7	-30.7	5.67	25.8	-15.7	5.4	16.7	-36.8	4.09	30.6
Drumline	Ennis	1	110	-0.52	-13.7	13.8	-12.8	-0.97	10.6	-	-	-	-	-	-
Dungarvan	Rathnaskillo	1	110	-	-	-	29.9	-11.7	15.3	20.9	-4.54	12	34.5	-15.9	18.1
Dungarvan	Woodhouse	1	110	-31	6.31	17.8	-74.5	2.59	35.5	-30.6	5.46	17.5	-85.3	5.33	40.7
Drybridge	Gorman	1	110	-9.94	1.35	10.1	-14.6	4.48	12.7	-17.1	4.08	17.7	-25.6	6.11	21.8
Drybridge	Loutha	1	110	-19.9	-20.2	28.7	-28.9	-26.7	32.5	-28.6	-21.5	36.1	-53.8	-28.5	50.4
Drybridge	Oldbridge	1	110	7.93	14.1	15.4	-12.8	7.37	12	32.8	17.5	20.9	24.6	7.54	12.2
Dunmanway	Macroom	1	110	-6.62	1.91	3.52	-0.5	0.31	0.27	-0.33	1.98	1.03	-3.85	3.79	2.49
Dunmanway	Carrigdangan	1	110	-	-0.37	0.18	-20.2	15.5	11.8	-	-0.37	0.18	-14.2	10.9	8.24
Dallow	Dallow T	1	110	-4.66	1.35	4.62	-13.2	-3.65	11.1	-4.65	1.35	4.61	-16.4	-3.83	13.7
Dardistown	Fin_Rural	1	110	-17.7	-2.03	14.8	-27.4	-6.71	20.7	-9.74	1.46	8.21	-21.4	-4.52	16.1

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Dardistown	Kilmore	1	110	10.7	-0.56	8.6	17.7	3.98	12	2.76	-4.05	3.95	10.6	1.39	7.05
Derryiron	Kinnegad	1	110	12	-3.97	12.8	10.8	-5.25	9.89	26.7	-10.1	21	50.1	-0.09	31.5
Dalton_A1	Dalton_A2	1	110	-16.7	6.98	18.3	34.2	-7.42	29	-	-	-	-	-	-
Dunfirth	Dunfir_T	1	110	-1.73	-0.2	3.05	-10.1	-0.44	17.7	0.03	-0.55	0.96	-11.3	-0.61	19.9
Drumkeen	Letterkenny	1	110	9.7	-3.74	10.5	30.2	-7.72	25.4	10.8	-1.39	11	34.2	-22	33
Drumkeen	Meentycat	1	110	-	-0.19	0.19	-25.4	16.6	25.1	-	-0.19	0.19	-17.7	29.1	28.1
Drumkeen	Clogher	1	110	-9.7	3.93	10.2	-4.83	-8.88	8.22	-10.8	1.58	10.6	-16.5	-7.14	14.6
Ennis	Slievecallan	1	110	0.01	-29	14.9	-21.6	-15.9	12.2	0.01	-29.4	15.1	-15.2	-17.5	10.5
Kill Hill	Thurles	1	110	27.4	-6.97	15.9	16.4	1.52	7.83	24	-3.86	13.6	8.84	2.68	4.4
Mount Lucas	Thornsberry	1	110	8.98	2.39	6.88	33.5	-0.66	21.1	11.7	10.1	11.5	71.1	19.7	46.4
Corkagh	Castlebagot	1	110	-62.8	-6.17	34.3	-62.8	-5.97	34.3	-78.7	-9.62	43.1	-78.3	-6.59	42.7
Corkagh	Castlebagot	2	110	-62.8	-6.17	34.3	-62.8	-5.97	34.3	-78.7	-9.62	43.1	-78.3	-6.59	42.7
Fass East	Fassaroe_T	1	110	-9.82	-0.39	9.36	-29.7	-2.86	24.2	-9.8	-0.39	9.34	-33.3	-3.64	27.3
Fass West	Ckm_Country	1	110	-9.87	-0.41	9.4	-29.8	-2.93	24.3	-9.83	-0.41	9.37	-33.5	-3.72	27.4
Flagford	Gilra	1	110	11.4	2.97	17.4	11.5	-10.8	23.1	11.4	2.95	17.4	11.5	-10.9	23.2
Flagford	Sligo	1	110	7.43	-8.69	11.6	-25.7	13.4	24	7.23	-10.2	12.6	-15.5	7.76	14.3
Flagford	Tonroe	1	110	7.13	-0.07	9.38	13	3.36	17.7	12.5	-27.2	16.8	-109	24	53.4
Flagford	Sliabh Bawn	1	110	-6.29	7.18	9.64	19.9	-4.83	16.6	-14	19.1	13.3	33.2	-6.67	16.1
Frn St A	Harolds Cros	1	110	-3.67	-0.12	3.43	-10.1	0.03	8.88	-3.77	-1.94	3.96	-11.4	0.04	9.97
Frn St A	Trinity	1	110	-3.85	0.42	3.23	-15.1	-1.17	11.1	-4.02	-1.89	3.7	-16.9	-1.69	12.5
Frn St B	Heuston Squa	1	110	-2.56	0.34	2.08	-9.5	-0.43	7.15	-2.55	0.34	2.08	-10.7	-0.59	8.04
Frn St B	Inch_City	1	110	-5.95	-1.32	5.7	-14.3	-2.18	12.7	-5.94	-1.32	5.68	-16	-2.46	14.2
Fin_Urban	Mcdermott	1	110	21.2	-16	26.8	61.4	-10.5	54.7	21.2	-15.9	26.7	69.1	-8.6	61
Fin_Urban	Pelletstown	1	110	10.2	-3.12	9.81	32.2	1.8	27.8	10.2	-3.1	9.78	36.1	2.98	31.2
Fin_Rural	Glasmore	1	110	23.2	2.21	23.6	59.2	16.4	50.3	19.8	1.69	20	66.7	19.4	56.9
Fin_Rural	Grange	1	110	25	-22.4	33.3	46.9	-16.5	39.8	13.6	-25.1	28.3	39.3	-17.8	34.5
Fin_Rural	Poppintree	1	110	26.8	-13.1	27.4	53.8	-7.3	46.8	13.2	-15.6	18.7	43.3	-8.1	38
Fin_Rural	Stephenstown	1	110	8.32	-3.69	8.67	21.7	1.66	17.7	7.24	-3.99	7.87	24.4	2.8	20
Fortunestown	Cookstown A	1	110	16	2.82	14.8	61	22.2	49.2	16	2.82	14.7	68.6	26.5	55.7
Garballagh	Gorman	1	110	-7.05	-2.53	7.13	-8.8	2.71	7.48	-15.7	-5.41	9.35	-27	-0.65	12.8
Garballagh	Platin	1	110	16.5	1.32	15.8	8.8	-2.71	7.48	30	-0.87	16.9	27	0.65	12.8
Glasmore	Stephenstown	1	110	-4.78	-7.92	6.91	-10.8	-12.4	10.5	-3.72	-7.76	6.42	-12.2	-13.3	11.5

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Griffinrath	Grfrat T	1	110	-12.1	-0.44	11.5	-33.8	-4.94	27.8	-4.08	-0.11	3.89	-28.2	-1.53	23
Great Island	Kilkenny	1	110	34.6	-14.1	21	65	-10.6	31.4	-	-	-	-	-	-
Great Island	Waterford	1	110	-0.57	2.54	1.46	-1.22	11.1	5.31	-2.01	2.39	1.75	6.48	15.7	8.08
Great Island	Waterford	2	110	-0.51	2.26	1.3	-1.1	10	4.8	-1.82	2.13	1.57	5.89	14.2	7.31
Great Island	Rosspile	1	110	24.1	-6.17	14	35.5	-16.1	18.6	10.6	-3.46	6.26	71.2	-27.8	36.4
Grange	Newbury	1	110	2.4	-1.6	2.33	-11	-8.55	11.2	-	-	-	-	-	-
Garrow	Clonkeen	1	110	0.01	-16.3	13.6	-32.9	3.93	27.6	-0.69	-16.3	13.6	-23.1	2.04	19.3
Galway	Salthill	1	110	11.3	-34.8	37	0.92	-56.4	53.2	12.3	-36.6	39	8.43	-45.2	43.4
Gallanstown	Platin	1	110	6.43	-8.25	5.88	35.1	3.29	16.8	-	-	-	-	-	-
Golagh	Golagh T	1	110	-	-	-	3.6	-0.86	3.01	-	-	-	-	-	-
Gorman	Meath Hill	1	110	-6.36	-5.05	8.2	-2.52	-1.09	2.27	-10.5	-9.41	14.2	-12.4	-0.25	10.2
Gorman	Navan	1	110	15.7	-0.5	15.8	24.2	4.83	20.4	12.5	3.88	13.2	21.2	7.02	18.4
Gorman	Navan	2	110	13.6	-0.32	13.7	22	9.39	11.4	11.1	6.15	7.12	18.7	10.9	10.3
Gorman	Navan	3	110	17.7	0.83	17.9	26.8	7.74	23	13.7	5.45	14.9	23.2	9.9	20.8
Gorman	Gorman Ess	1	110	0	-0.57	0.3	0	-0.6	0.27	0	-0.56	0.3	0	-0.59	0.27
Grange Castl	Inch_Country	1	110	-11.5	0.1	11.2	-16.6	-1.22	14.4	-13.7	-0.4	13.3	-20.1	-2.15	17.6
Grange Castl	Inch_Country	2	110	-11.5	0.1	11.2	-16.6	-1.22	14.4	-13.7	-0.4	13.3	-20.1	-2.15	17.6
Grange Castl	Nangor	1	110	4.75	0.35	3.97	5.4	0.12	4.12	4.11	0.48	3.44	5.4	0.14	4.12
Grange Castl	Nangor	2	110	5.02	0.53	4.21	5.71	0.32	4.37	4.33	0.66	3.65	5.71	0.34	4.37
Grange Castl	Yellowmeadow	1	110	-30.4	-5.85	16.6	-44	-11.1	20.4	-27.2	-6.28	14.9	-44.4	-13.1	20.8
Clogher	Mulreavy	1	110	0	-10.5	7.69	-28.5	-19.8	25.5	0	-10.6	7.82	-20	-14.4	18.1
Clogher	Cath Fall	1	110	-11.7	17.6	11.9	31.5	-5.78	15.3	-12.6	15.5	11.2	14	-3.38	6.91
Clogher	Golagh T	1	110	8.67	-5.03	5.66	6.21	3.89	3.38	9.68	-2.81	5.69	18.8	-0.9	8.66
Harolds Cros	Ringsend	1	110	-9.94	0.87	9.33	-28.8	-2.91	25.4	-10	-0.96	9.4	-32.3	-3.84	28.5
Heuston Squa	Inch_City	1	110	-8.86	1.66	7.27	-19.2	1.43	14.5	-8.84	1.66	7.25	-21.6	1.08	16.2
Iniscarra	Macroom	1	110	4.02	-5.96	3.67	-14.8	3.8	7.04	15.9	-11	9.84	5.27	-2.39	2.67
Inch_City	Milltown	1	110	13.4	-5.61	14.1	43.6	-4.98	32.7	13.3	-5.61	14	48.9	-4.51	36.7
Inch_Country	Yellowmeadow	1	110	34.4	-2.74	18.5	48	1.76	21.5	54.9	1.52	29.4	72.2	7.72	32.6
Ikerrin	Ikerin T	1	110	-10.1	-2.93	11.5	-15.2	-6.83	18.3	-10	-2.91	11.5	-21.6	-6.9	24.9
Knockanure	Kilpaddoge	1	110	-7.74	6.01	7.21	-4.58	-5.18	4.35	0.08	1.83	1.34	-11.7	14.3	11.6
Knockanure	Trien	2	110	7.74	-6.01	9.9	4.58	5.18	5.72	-0.08	-1.83	1.85	11.7	-14.3	15.3
Knockanure	Knockanure B	1	110	-0.01	4.51	0.29	9.01	9.3	0.69	-0.01	4.62	0.29	6.33	6.91	0.5

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Knockanure	Trien	1	110	0.01	-16.2	9.07	-43.7	7.93	21.1	0.01	-16.6	9.3	-30.6	4.64	14.8
Knockraha	Kilbarry	1	110	18.6	-5.66	10.9	35.2	2.99	16.8	24.2	-6.66	14.1	55.7	-0.08	26.5
Knockraha	Barrym T	1	110	55.7	-13.4	42.2	79.7	-19.2	51.6	63.3	-8.46	35.9	107	-10.6	51.4
Knockraha	Kilbarry	2	110	14.5	-8.04	16.7	29.7	-3.84	24.7	-	-	-	-	-	-
Knockraha	Lysaghtstown	1	110	-4.88	10.9	11.4	3.22	11.9	9.99	-11.5	15.1	18.1	5.61	10.2	9.46
Knockraha	Woodhouse	1	110	31.4	-6.47	18	59.5	-8.72	28.6	30.9	-7.16	17.8	75.7	-9.66	36.4
Kilbarry	Marina	1	110	-26.8	9.49	27.6	-36.8	-7.59	28.9	-	-	-	-	-	-
Kilbarry	Marina	2	110	-25.5	9.01	26.3	-35	-7.25	27.5	-18.4	11.5	21.1	-33.3	-5.7	26
Kilbarry	Mallow	1	110	43.2	-11.9	33.4	68	-0.04	42.8	-	-	-	-	-	-
Kilteel	Maynooth A	1	110	-19.3	5.99	20.4	-47.2	7.29	39.5	-11	5.44	9.15	-16.9	7.94	11.7
Kilteel	Monread	1	110	9.67	-4.77	8.05	13	19.1	14.6	2.84	-4.49	3.96	-21.5	17.7	17.5
Reamore	Tralee	1	110	0	2.94	2.35	24.8	-3.93	17.8	-	2.96	2.37	17.4	-1.57	12.4
Kilkenny	Kellis	1	110	10.9	-15.1	18.8	-11.2	1.87	9.37	-9.65	11.9	15.5	-2.25	-0.6	1.92
Kishoge	Castlebagot	1	110	-	-	-	-2.51	-0.35	1.14	-13.7	-2.34	7.42	-13.7	-2.32	6.22
Kishoge	Aungierstown	1	110	-	-	-	-0.46	-0.08	0.21	-8.11	-1.4	4.4	-8.11	-1.39	3.69
Killonan	Limerick	1	110	32.8	3.16	33.2	60.3	7.63	50.3	34.4	-1.01	34.8	75	1.42	62
Killonan	Nenagh	1	110	11.5	1.53	15.2	20.9	6.83	29	-	-	-	-	-	-
Killonan	Singland	1	110	45.3	-9.08	26	87.9	-9.09	42.1	53.2	-26.7	33.5	67.5	-23.5	34
Knockearagh	Outagh T	1	110	15.5	-9.34	10.2	27.8	-12.5	14.5	29.7	-14.4	18.5	46.6	-23.5	24.8
Knockumber	Navan	1	110	-23.7	-13	27.3	-23.7	-12.9	21.9	-23.7	-13	27.3	-23.7	-12.9	21.9
Ballynahulla	Glenlara	1	110	0.07	-41.1	30.7	-43.2	-9.05	26.6	-0.42	-41	30.6	-30.3	-11.4	19.5
Kinnegad	Mullingar	1	110	3.88	-15.1	8.75	3.22	-11.9	5.87	-	-	-	-	-	-
Kinnegad	Dunfir_T	1	110	-2.05	8.71	9.04	-2.68	4.29	4.18	-	-	-	-	-	-
Knockacummer	Glenlara	1	110	-0.01	6.16	5.05	31.2	-25.5	33	-0.01	6.16	5.05	21.8	-24.6	26.9
Killoteran	Waterford	1	110	-2.48	-3.99	4.75	-5.54	-9.89	9.37	0.24	-4.05	4.1	-11	-13.1	14.1
Kilmore	Cromcastle	2	110	-	-1.4	1.23	-	-1.51	1.33	-	-1.41	1.24	0	-1.53	1.34
Kilmore	Cromcastle	1	110	-	-1.4	1.23	-	-1.51	1.33	-	-1.41	1.24	0	-1.53	1.34
Kilmore	Newbury	1	110	29.6	-1.03	24.9	43	5.03	32.6	-	-	-	-	-	-
Kilmore	Poppintree	1	110	-19	6.56	18.4	-25.3	5.55	22.3	-6.18	9.04	10.1	-15.3	7.35	14.6
Kilmahud	Castlebagot	1	110	-20.8	-5.04	12.7	-20.8	-5.02	12.7	-31.6	-8.5	19.3	-31.6	-8.45	19.3
Kilpaddoge	Coolnanoonag	1	110	-	-2.24	1.6	-11.1	7.79	9.68	-	-2.26	1.61	-7.74	16.2	12.8
Kilpaddoge	Rathkeale	1	110	28	-2.18	20.7	40.5	1.07	25.5	13.5	3.29	10.2	28.5	8.42	18.7

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Kilpaddoge	Tralee	1	110	3.84	-5.98	6.77	1.77	3.23	3	-2.41	-1.75	2.83	3.36	-4.68	4.69
Kilpaddoge	Tralee	2	110	5.12	-5.67	4.29	0.87	3.1	1.7	-	-	-	-	-	-
Castlebagot	Barnakyle	1	110	9.01	-0.93	5.17	9.01	-1.07	5.18	-	-	-	-	-	-
Castlebagot	Barnakyle	2	110	9.01	-0.93	5.17	9.01	-1.07	5.18	52	1.82	29.7	52	1.33	29.7
Castlebagot	Aungierstown	1	110	6.99	0.42	5.47	14.5	-0.98	11.3	44	3.39	34.5	44	3.1	34.5
Lislea	Lisdrum	1	110	-3.53	10.3	10.4	17.4	-16.2	19.4	-3.91	11.5	11.6	24	-19.4	25.1
Lislea	Shankill	1	110	3.53	-10.3	10.4	-2.79	2.32	2.95	3.91	-11.5	11.6	-13.8	1.82	11.3
Lanesboro_A1	Mullingar	1	110	17.1	-6.95	18.7	18.1	-14.5	19.2	-	-	-	-	-	-
Lanesboro_A1	Richmond	1	110	4.46	-0.8	4.58	17.7	3.61	14.7	3.91	-0.72	4.02	19.4	4.38	16.2
Lanesboro_A1	Lanesboro_A2	1	110	-9.86	-3.12	7.72	-48.7	23.5	32.8	-	-	-	-	-	-
Lickny	Mullingar	1	110	-	-	-	29.1	-12.7	25.6	-	-	-	20.4	-19.3	22.7
Loutha	Mullagharlin	1	110	11.7	5.76	13.1	32.7	13.6	29.3	9.6	2.47	10	36	14.2	32
Loutha	Ratrussan	1	110	13.8	-11	18.5	-6.64	11.9	12.2	16.7	-14.4	12.4	-15.9	15	10.4
Lysaghtstown	Midleton	1	110	3.79	8.98	9.29	3.2	12.3	10.3	3.12	6.99	7.29	5.6	10.6	9.75
Limerick	Moneteen	1	110	26.4	22.6	19.5	20.6	22.2	14.4	0.27	28.1	15.8	36.4	17.5	19.2
Limerick	Rathkeale	1	110	-8.7	-1.23	8.88	-7.61	2.62	6.65	5.62	-7.33	9.33	12.3	-5.02	11
Limerick	Killonan2	2	110	-25.5	-2.78	32.1	-46.9	-5.74	45.4	-26.8	0.5	33.5	-58.2	-0.45	55.9
Coolnabacky	Portlaoise	1	110	-	-	-	21.4	-5.06	17.8	65.3	-11.1	37.2	55.3	0.79	26.3
Lisdrum	Louthb	1	110	-14.6	8.91	17.3	-7.9	7.76	9.15	-14.9	10.2	18.2	-8.6	3.26	7.6
Lisdrum	Lisdrumdoagh	1	110	-	-0.15	0.08	-	-0.16	0.07	-	-0.15	0.08	-	-0.16	0.07
Derrycarney	Portlaoise	1	110	20.1	-4.45	11.6	32.7	2.11	15.6	2.53	0.75	1.48	31	-14.7	16.3
Derrycarney	Dallow T	1	110	-20.1	4.45	11.6	-22.6	-2.28	10.8	-	-	-	-	-	-
Letterkenny	Lenalea	1	110	-2.46	0.21	1.82	-3.05	-5.7	4.07	-3.02	1.43	2.46	-10.3	-1.92	6.56
Letterkenny	Trillick	1	110	6.31	-2.33	6.41	-12.1	6.05	11	6.29	-2.38	6.4	0.12	14.9	12.1
Letterkenny	Golagh T	1	110	-8.62	3.32	9.33	-9.75	-4.6	8.91	-9.63	1.23	9.8	-18.6	-0.24	15.4
Letterkenny	Stra_Pst	1	110	-3.23	-1.91	4.7	0.86	-1.28	1.66	-0.48	1.46	1.46	0.97	-2.2	1.95
Lenalea	Tievebrack	1	110	-2.46	3.76	3.3	6.09	-2.3	4.09	-3.02	1.92	2.63	-3.87	-1.57	2.63
Liberty St	Marina	1	110	-5.65	-0.81	8.4	-15.6	-3.95	23.7	-5.63	-0.81	8.37	-17.6	-4.38	26.6
Liberty St	Marina	2	110	-2.82	-0.53	2.9	-7.59	0.67	6.4	-2.81	-0.53	2.89	-8.52	0.43	7.17
Lisheen	Thurles	1	110	-	-	-	38.1	-17.1	34.2	-	-	-	26.7	-12.1	24
Lodgewood	Crory	1	110	-	-3.26	2.43	-17.9	1.78	11.8	-	-3.3	2.46	-12.6	-0.08	8.25
Misery Hill	Ringsend	1	110	-16.5	6.22	13.5	-44.6	2.15	32.3	-16.6	3.9	13.1	-50.1	1.05	36.3

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Misery Hill	Trinity	1	110	9.35	-5.67	9.11	26.1	-3.43	19.4	9.5	-3.35	8.39	29.4	-2.75	21.7
Macetown	Snugborough	1	110	-1.96	-0.36	2.01	-5.63	-0.94	4.72	-	-	-	-	-	-
Macetown	Corduff	1	110	-13	0.31	13.1	-19.6	-0.75	16.2	-13.8	1.19	14	-24.6	-0.26	20.3
Mcdermott	Wolfe Tone	1	110	6.15	2.55	6.17	22.4	7.11	20.5	6.13	2.54	6.15	25.2	8.18	23.1
Meath Hill	Louthb	1	110	-23.7	-6.63	24.9	-34.6	-17.6	32.1	-27.8	-11.1	30.3	-53.1	-18.6	46.5
Maynooth A	Timahoe	1	110	-	-	-	11.5	-1.19	10.4	4.21	5.94	4.09	-4.72	21.9	10.7
Maynooth A	Grfrat T	1	110	12.1	0.22	12.2	33.8	4.8	28.5	4.08	-0.12	4.12	28.2	1.36	23.6
Maynooth A	Griffinrath	1	110	12.1	0.18	12.2	34	4.14	28.1	4.1	-0.02	4.14	28.4	0.78	23.3
Maynooth B	Ryebrook	1	110	85	33.1	51.2	88.2	24.8	43.6	87.3	32.3	52.3	109	26.6	53.6
Maynooth B	Rinawade	1	110	13	-8.87	19.6	22	-4.34	21.7	9.13	1.4	5.19	9.13	1.37	4.4
Maynooth B	Blake T	1	110	0.95	-8.42	8.56	28.2	2.75	23.4	-11.4	-4.31	9.03	-8.89	4.27	6.2
Milltown	Ringsend	1	110	-7.69	-0.3	7.7	-19.2	0.38	17.9	-7.67	-0.29	7.67	-21.6	0.12	20.1
Milltown	Ringsend	2	110	-6.21	0.64	5.78	-15.2	0.65	13.3	-6.19	0.64	5.76	-17.1	0.3	14.9
Macroom	Clashavoon	1	110	-2.44	-9.62	5.09	-25.5	-4.76	11.8	17.8	-16.1	12.3	-3.56	-9.21	4.49
Moneteen	Mungret A	1	110	10.8	6.59	28	10.8	6.6	28	10.8	6.59	28	10.8	6.6	28
Moneteen	Mungret B	2	110	10.8	6.61	28.1	10.8	6.61	28.1	10.8	6.6	28	10.8	6.61	28.1
Moneypoint	Tulbrk T	1	110	38.8	-9.24	22.4	28.8	2.39	13.8	15.5	-2.06	8.78	19	2.95	9.16
Marina	Trabeg	1	110	-30.2	9.48	17.8	-53	-7.49	24.4	-34.5	8.83	20	-58.7	-7.02	27
Marina	Trabeg	2	110	-35	11.6	20.7	-61.5	-8.09	28.3	-40.1	10.8	23.3	-68.1	-7.55	31.3
Moy	Glenree	1	110	0.48	-4.2	4.03	67.4	-19.9	57.1	-	-	-	-	-	-
Moy	Tawnaghmore	1	110	-	-0.45	0.23	-55.4	18.8	26.9	-	-0.49	0.25	-55.9	17.4	27
Moy	Tawn_B	2	110	-	-0.41	0.39	-49.7	15	42.2	-	-0.44	0.42	-100	28.4	84.5
Bancroft	Ckm_Country	1	110	-44.2	-6.15	40.9	-47.7	-6.42	41.5	-44.1	-6.15	40.9	-48.5	-6.67	42.2
Newbridge	Portlaoise	1	110	-17.5	1.17	16.8	-17.2	5.25	14.6	-	-	-	-	-	-
Newbridge	Blake T	1	110	5.64	7.16	6.7	-1.63	0.03	1.03	17.5	3.31	13.1	38.6	-0.89	24.3
North Quays	Ringsend	1	110	-10.8	0.37	8.44	-21.9	-1.84	16.1	-10.8	0.38	8.42	-24.6	-2.44	18.2
Oughtragh	Outagh T	1	110	-10.6	1.27	10.1	-23.3	-3.13	19.1	-10.1	1.23	9.73	-27.3	-3.53	22.4
Philipstown	Portlaoise	1	110	-15.1	3.58	11.4	4.73	-0.88	3.03	-22.7	-0.12	12.7	2.64	3.56	2.11
Pollaphuca	Stratf T	1	110	-	-	-	30	-10.5	46.7	34	-21.3	59	34	-10.8	52.5
Poolbeg	Ringsend	3	110	49.9	-25.7	23.6	99.9	5.98	39.4	49.7	-25.6	23.5	116	7.51	45.8
Poolbeg	Ringsend	4	110	48.4	-24.9	22.5	96.8	5.87	37.6	48.2	-24.8	22.4	113	7.36	43.7
Platin	Oldbridge	1	110	4.89	-12.5	12.8	25.6	-5.78	21.3	25.8	-10.7	15.7	37.7	-0.12	18

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Ringsend	Whitebank	1	110	0	-2.15	1.72	-60.9	28.7	47.7	0	-2.14	1.71	-60.9	22.1	46
Richmond	Lanesboro_A2	2	110	-5.54	0.29	5.61	-21.9	-5.01	18.3	-	0.18	4.91	-24	-5.92	20.1
Raffeen	Trabeg	1	110	38.1	-16.6	21.3	75.5	-17.1	35.2	46.6	-15.8	25.3	92.1	-18.3	42.7
Rinawade	Dunfir_T	1	110	3.82	-10.3	11.1	12.8	-5.8	11.6	-	-	-	-	-	-
Ratrussan	Shankill	1	110	13.6	-9.84	17.7	16.8	-4.17	15.5	16.6	-13.2	22.3	0.5	2.08	1.91
Shannonbridg	Dallow T	1	110	24.8	-6.83	14.5	35.9	5.11	17.3	7.19	-1.99	4.19	18.5	25.1	14.8
Shannonbridg	Ikerin T	1	110	-6.63	9.33	6.43	-24.2	7.91	12.1	-	-	-	-	-	-
Shannonbridg	Somrst T	1	110	-7.36	-1.67	7.63	-5.55	5.22	6.86	6.98	-7.61	10.4	16.5	-5.81	15.8
Sligo	Srananagh	1	110	-6.16	-3.14	6.98	8.97	-5.82	8.84	-5.34	2.68	5.69	3.61	-5.47	5.33
Sligo	Srananagh	2	110	-5.69	-2.94	6.47	8.3	-5.42	8.19	-5.18	2.59	5.52	3.5	-5.33	5.18
Sorne Hill	Trillick	1	110	-	-	-	18.9	-3.47	15.6	-	-	-	13.2	-12.6	14.8
Somerset	Somrst T	1	110	-11	0.45	10.5	-22.1	-5.27	18.5	-10.2	0.42	9.7	-25.8	-5.99	21.5
Srananagh	Cath Fall	2	110	24.6	-18.7	17.4	-3.53	0.13	1.68	23.8	-15.7	16	-13.2	1.03	6.31
Stratford	Stratf T	1	110	-5.93	-0.12	13.2	-22.7	-4.26	51.4	-5.91	-0.12	13.2	-25.6	-5.04	57.9
Singland	Ardnacrusha	1	110	40.4	-8.98	23.3	72.3	-12	34.9	48.3	-26.8	31	50.1	-26.5	27
Snugborough	Corduff	1	110	-37.9	-3.15	16	-41.6	-3.66	17.5	-77.5	-12.6	33	-77.5	-12.4	33
Trabeg	Raffeenb	2	110	-54.3	6.29	30.7	-111	-34.9	55.3	-60.3	3.57	33.9	-121	-40	60.8
Timahoe	Derryiron	1	110	0	0	0	11.5	-0.24	7.34	11.2	1.55	6.32	-4.78	22.3	10.9
Tullabrack	Tulbrk T	1	110	-3.8	-1.02	3.75	-2.36	-4.26	3.96	-3.79	-1.02	3.74	-6.56	-3.97	6.23
Cauteen	Killonan2	1	110	-6.71	-5.56	4.9	25.5	3.46	12.2	8.04	-8.01	6.37	24.1	5.88	11.8
Cauteen	Tipperary	1	110	6.7	15.3	9.39	26.2	-5.5	12.8	-8.05	17.7	10.9	12.2	-3.4	6.03
Tralee	Outagh T	1	110	-4.84	6.71	5.14	-4.3	14.8	8.08	-19.3	12.5	14.3	-18.7	27.8	17.5
Thurles	Ikerin T	1	110	16.8	-8.72	10.6	39.8	-1.92	19	13.4	-9.22	9.16	14	17.8	10.8
Thornsberry	Derryiron	1	110	-2.57	2.5	3.63	-0.74	-6.57	5.46	2.52	9.66	5.61	32.1	11.7	16.3
Rosspile	Wexford	1	110	33.5	-8.59	19.4	35.4	-15.8	18.4	20.1	-4.94	11.6	70.6	-29.9	36.5
Coomataggart	Ballyvouskil	1	110	-	0.2	0.1	46.6	-28.7	24.8	-	0.2	0.1	32.7	-26.6	19.1
Woodhouse	Knocknamona	1	110	-	-	-	-10.2	-10.1	11.6	-	-1.52	1.23	-7.13	-11.5	10.9
Barnahelyb	Raffeenb	2	110	-3.69	-0.86	3.83	-4.78	-0.98	4.03	-3.68	-0.86	3.82	-5.37	-1.14	4.54
Bellacorick	Srahnakilly	1	110	0	-4.73	2.43	-51.4	34.6	28	-	-5.07	2.6	-36	20.5	18.8
Bellacorick	Croaghaun	1	110	-	-	-	-15	12	9.13	-	-0.14	0.08	-10.5	7.79	6.22
Ckm_Country	Fassaroe_T	1	110	9.84	0.16	9.37	29.8	2.79	24.3	9.81	0.15	9.34	33.5	3.63	27.4
Clogher	Croaghonagh	1	110	0	-15.2	8.31	-41.6	26	26.8	0	-15.5	8.45	-29.1	24.5	20.8

Table H-1: Power flows

From	To	No.	kV	2022						2031					
				Summer Valley			Winter Peak			Summer Valley			Winter Peak		
				MW	MVAR	%	MW	MVAR	%	MW	MVAR	%	MW	MVAR	%
Lanesboro_A2	Sliabh Bawn	1	110	6.34	-8.15	10.4	-37	8.57	30.8	14.1	-19.8	13.7	-45	-17.6	23
Shannonbridg	Derrylahan	1	110	-	-	-	-	-	-	-	-	-	-	-4.26	3.05
Shannonbridg	Timoney	1	110	-	-	-	-	-	-	-18.8	13.5	13	-41.3	18.7	21.6
Stonestown	Dallow T	1	110	-	-	-	-	-	-	-2.53	-0.61	1.46	-1.93	-22.1	10.6
Timoney	Ikerin T	1	110	-	-	-	-	-	-	-3.35	10.1	6	7.67	-12.9	7.14
Derryiron	Laurencetown	1	110	-	-	-	-	-	-	-	-	-	-	-0.11	0.05
Raffeenb	Castletreasu	1	110	-	-	-	-	-	-	-	-	-	-	-5.73	4.62

The Oval, 160 Shelbourne Road,
Ballsbridge, Dublin 4, D04 FW28, Ireland
+353 (0) 1 627 1700 | eirgrid.ie

Castlereagh House, 12 Manse Road,
Belfast, BT6 9RT, Northern Ireland
+44 (0) 28 9079 4336 | soni.ltd.uk