CP1604 Coolkeeragh- Strabane Upgrade

Needs Report

January 2026

Version history					
Version	**Date**	**Description**	**Prepared by**	**Checked by**	**Approved by**
1.0	25/06/2025	First draft	Bronagh McCaffrey	Niall McClements	
1.1	30/01/2026	Final draft	Finian Hagan	Niall McClements, Michael McClure	

Disclaimer

While all reasonable care has been taken to prepare this document, we can make no guarantee to the quality, accuracy and completeness of the information herein. We do not accept responsibility for any loss associated with the use of this information. Use of this document and the information it contains is at the user's own risk.

Information in this document does not amount to a recommendation as regards to any possible investment. Before taking a business decision based on the content of this document, we advise that interested parties seek separate and independent opinion in relation to the matters covered by this document.

Published November 2025.

Castlereagh House, 12 Manse Road, Belfast, BT6 9RT, Northern Ireland.

Contents

1 Introduction

This Needs report describes issues with transmission network capacity in the corridor between Coolkeeragh and Strabane. There are three 110 kV circuits in this area, and all are at risk of overloading by 2030 in the absence of pre-fault constraint as renewable generation continues to develop in the north and west of Northern Ireland.

Tomorrows Energy Scenarios Northern Ireland (TESNI) 2020 and its accompanying System Needs Assessment[1] (SNA) highlighted the risk to all of these circuits under three different energy scenarios, identifying a need for transmission reinforcement in the corridor. The risk continued to be highlighted in *Shaping Our Electricity Future*[2], and increasing transmission capacity between Coolkeeragh and Strabane was identified as critical to meeting renewable energy targets.

Tomorrow's Energy Scenarios (TES) 2023 set out a number of different scenarios into how a target of net zero emissions could be achieved in Northern Ireland. All of the scenarios see a need for a considerable increase in renewable generation capacity beyond that assumed in both TESNI 2020 and *Shaping Our Electricity Future*. It is expected that these scenarios will see the overload risk on the 110 kV circuits between Coolkeeragh and Strabane increase.

[1] Tomorrow's Energy Scenarios, System Needs Assessment - Northern Ireland | SONI | 2020
[2] Shaping Our Electricity Future | EirGrid, SONI | 2023

2 The Northern Ireland transmission network

The Northen Ireland transmission network is shown below in figure 2.1 below. The network consists of a double circuit 275 kV ring in the east around Lough Neagh, with a spur to Coolkeeragh in the north-west. Underlying this is 110 kV infrastructure, most prominent in northern and western areas where there is a meshed ring connecting into 275 kV substations at Coolkeeragh, Kells and Tamnamore.

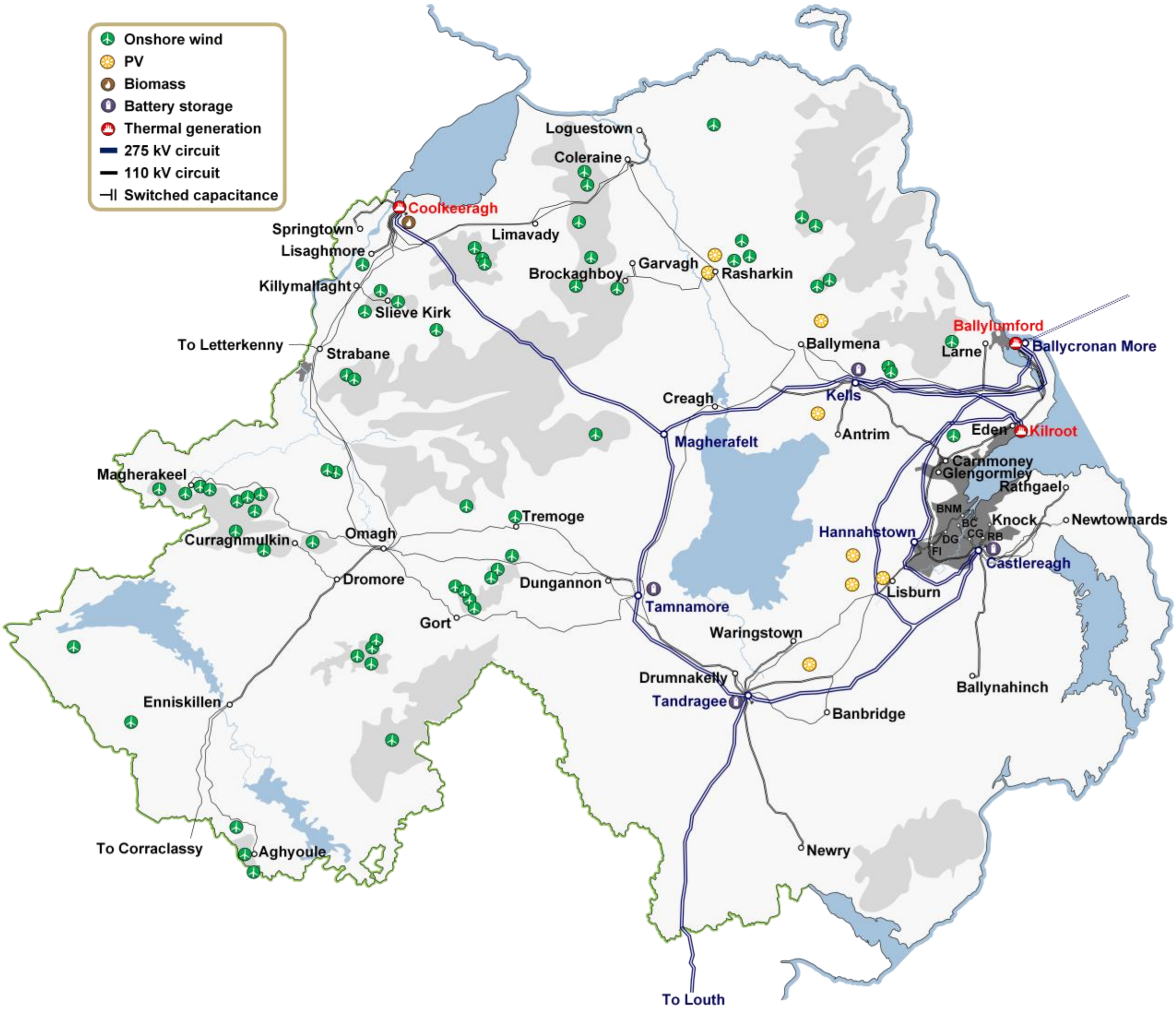

Figure 3.1: The Northern Ireland transmission system in 2025

Currently there is approximately 1600 MW of renewable generation capacity, both large scale and small scale, installed in Northern Ireland. As indicated in Figure 2.1, most of this renewable generation to date has been connected in the north and west of Northern Ireland. The capacity of renewable generation installed in Northern Ireland enables up to half of the electricity demand being supplied from renewable energy sources.

3 Development of the Northern Ireland transmission network

Development of the transmission network considers the long-term needs and the economics of various development options. SONI must take account of statutory targets whilst also considering how electricity may be generated and used, and the impact that has on the transmission network as it is today.

3.1 Statutory targets and policies

The Climate Change Act (Northern Ireland) 2022[3] established a target of supplying 80% of electricity demand from renewable energy sources (RES-E). It also set a target of net zero emissions in Northern Ireland by 2050.

3.1.1 Shaping Our Electricity Future

SONI set out a plan-led approach to supporting a secure transition to at least 80% RES-E by 2030 via our Shaping Our Electricity Future roadmap in 2023. A key pillar of this roadmap is the development of the transmission system and network. The roadmap identified areas of the transmission network requiring reinforcement to deliver 80% RES-E in Northern Ireland. One area identified was the corridor between Coolkeeragh and Strabane.

3.1.2 Tomorrows Energy Scenarios

Given the uncertainties over how generation and demand will change in the long term as the energy system transitions to deliver net zero emissions, SONI uses scenario planning to assess the impact of multiple potential energy futures on the transmission system. SONI first published its set of scenarios, TESNI, in 2020, and the accompanying TESNI SNA in 2021. The SNA highlighted the impact of the scenarios on the transmission network for a number of study years, highlighting areas of needs for network reinforcement.

SONI and EirGrid jointly published their most recent set of scenarios, TES 2023[4] , in May 2024. These scenarios investigate potential pathways to meet the energy demands of the future and are the first to consider the target of net zero emissions by 2050. The accompanying SNA is not yet published at this time.

[3] Revised Regional Strategic Planning Policy - Renewable and Low Carbon Energy | NI Direct | 2023
[4] SONI and EirGrid, TES 2023, https://cms.soni.ltd.uk/sites/default/files/2024-11/TES-2023-Final-Full-Report.pdf

3.2 Renewable generation development

Table 3.1 lists the location of connected and committed large scale renewable generation in Northern Ireland in 2025 by county.

Table 3.1: Connected and committed renewables in Northern Ireland by county, 2025

County	Installed renewable generation capacity (MW)		
	Onshore wind	PV	Other
Antrim	141	155	
Armagh	3	9	
Derry/Londonderry	471		18
Down		5	10
Fermanagh	99		
Tyrone	518		
Total	**1232**	**169**	**28**

Table 3.2 compares the installed capacity of renewable generation today to that assumed for 2030 in *Shaping Our Electricity Future* and in 2035 for the four scenarios in TES 2023. As shown, there is a significant increase in renewable generation capacity required from today to meet 80% RES-E and further progress towards net zero emissions.

Table 3.2: Renewable generation scenarios in Northern Ireland

Scenario	Installed renewable generation capacity (MW)		
	Onshore wind	PV	Other
2025	1232	169	28
SOEF 80% RES-E	2450	620	630
TES 2023 Constrained Growth 2035	2548	787	630
TES 2023 Gas Evolution 2035	1971	638	680
TES 2023 Self Sustaining 2035	3054	1677	1630
TES 2023 Offshore Opportunity 2035	2204	999	2130

3.3 Grid development framework

To ensure transmission system reliability and security, predicted power flows of the network are compared with the requirements of the Transmission System Security and Planning Standards (TSSPS[5]).

The TSSPS establishes a set of design criteria for the transmission system. This includes setting the minimum level of redundancy that should be incorporated into the design to deal with credible faults and outages. The standard includes checking for any circuits that would be overloaded or where voltages would fall below statutory levels.

SONI assesses the present and future transmission system against these standards and, when breaches are forecast, establishes plans to address these breaches.

When a potential breach of the TSSPS is identified (operationally or through SONI's planning studies, including the Ten-Year Transmission Forecast Statement and Tomorrow's Energy Scenarios), SONI will study this in detail including any other related issues. Consistent with good practice, as set out in the TSSPS, SONI will initially seek ways that would allow the potential breach to be managed operationally and put into place any changes to operational practice as may be required. Should this not be sufficient at mitigating the breach, SONI will initiate a project to develop the transmission system to resolve the constraint.

The planning of new transmission development projects by SONI follows a three-part process, shown in Figure 3.1. The process includes stakeholder and public participation in the development of projects.

Figure 3.1: SONI's Grid Development Process

This Needs Report for the Coolkeeragh to Strabane Upgrade provides evidence of the need for development, and forms part of Part 1 of the grid development process.

[5] Transmission System Security and Planning Standards, SONI, 2023, https://cms.soni.ltd.uk//sites/default/files/2024-09/Transmission-System-Security-and-Planning-Standards-June-2023.pdf

4 Area of study

This Needs report concerns the corridor between Coolkeeragh and Strabane. The transmission network in the area between Coolkeeragh and Strabane is shown in Figure 4.1.

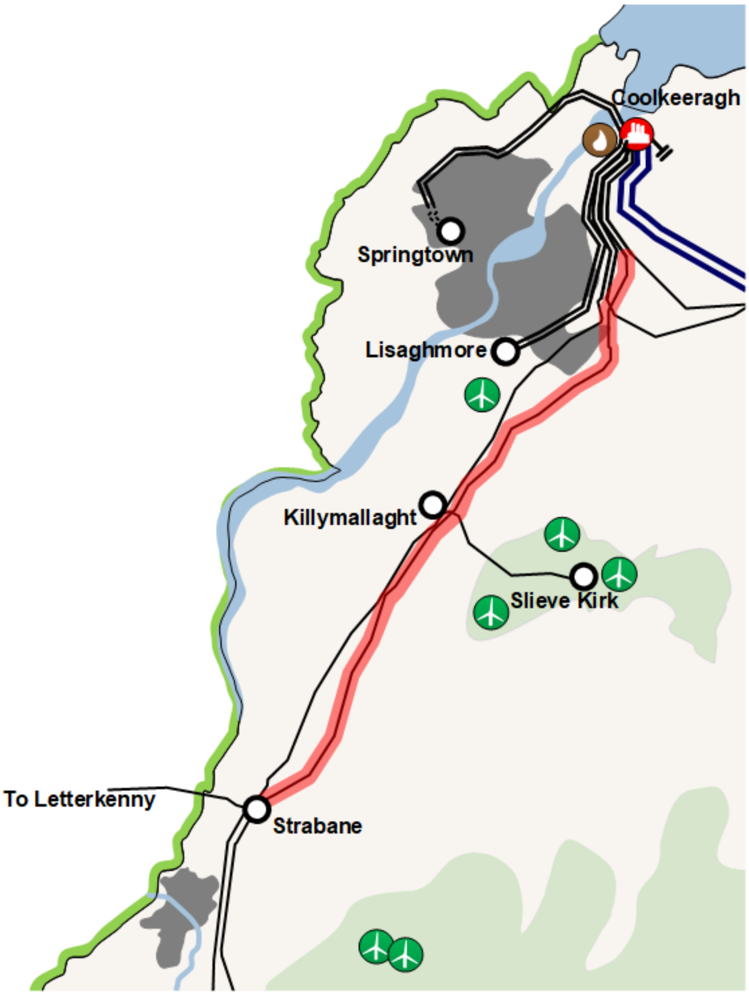

Figure 4.1: Coolkeeragh to Strabane corridor

There are three 110 kV circuits in the corridor between Coolkeeragh and Strabane and they are described in the following subsections.

4.1 Coolkeeragh to Strabane 110 kV circuit

The 110 kV circuit between Coolkeeragh and Strabane is composed of two distinct sections. From Coolkeeragh 110 kV substation, the circuit shares a double circuit tower line with the 110 kV circuit between Coleraine and Coolkeeragh to a point near Mobuoy. The section between Coolkeeragh and Mobuoy is 4.8 km long. The conductor on this section is All Aluminium Alloy Conductor (AAAC) upas conductor and is rated at 166/158/143 MVA in winter, autumn and summer respectively. The conductor has a Design Operating Temperature (DOT) of 65°.

From Mobuoy, the circuit splits off onto a double circuit tower line (22.2 km length) with a ACSR Lynx conductor, rated at 124/119/109 MVA in winter, autumn and summer respectively. Both sides of the double circuit are operated in parallel as a single circuit arrangement, and as such the capacity of this section of the circuit is effectively doubled. This section is highlighted in red in Figure 4.1, with a view of this arrangement highlighted in Figure 4.2.

Overall, the rating of the whole circuit is limited by the section strung with upas conductor.

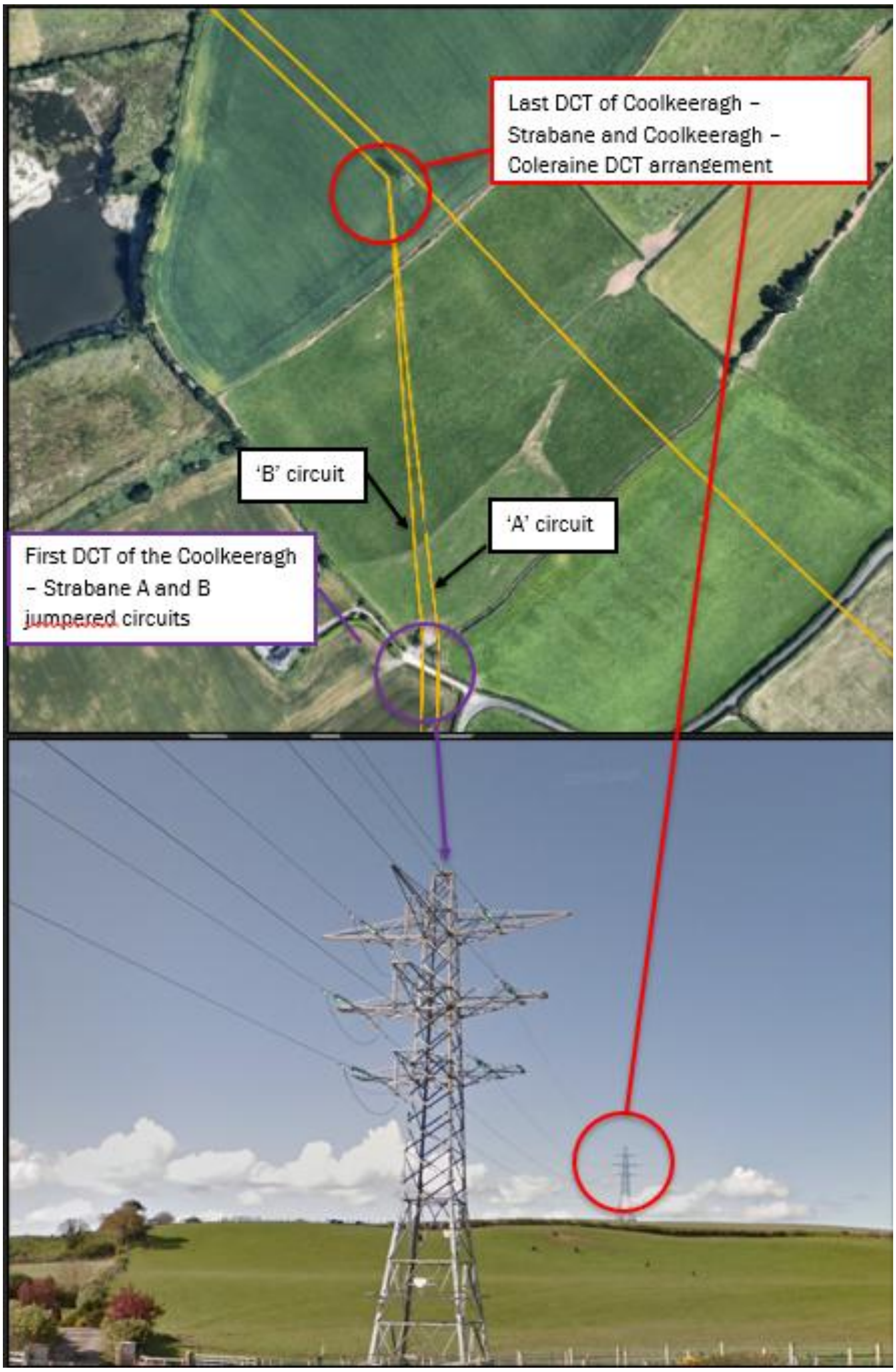

Figure 4.2: Focus on the parallel circuit arrangement at Mobouy

4.2 Coolkeeragh to Killymallaght 110 kV circuit

The 110 kV circuit between Coolkeeragh and Killymallaght circuit also comprises two distinct sections. The first section is between Coolkeeragh and Gorticross (5.8 km length) which shares a double circuit towerline with the Coolkeeragh- Limavady circuit. Between Gorticross and Killymallaght the line is a twin wood pole portal arrangement (8.7km length). The whole circuit has AAAC upas circuit and is rated at 166/158/143 MVA in winter, autumn and summer respectively with a DOT of 65°.

4.3 Killymallaght to Strabane 110 kV circuit

The 110 kV circuit between Killymallaght and Strabane is one single section (11km length). The circuit is strung with AAAC upas conductor and is rated at 166/158/143 MVA in winter, autumn and summer respectively with a DOT of 65°.

4.4 Strabane Main 110 kV substation

Strabane is a 6-bay 110 kV mesh substation, connecting five 110 kV circuits and two 110/33 kV transformers. Under the current arrangement, one of the transformers and the 110 kV circuit to Letterkenny share a bay.

4.5 Killymallaght 110 kV substation

Killymallaght is a single busbar 110 kV substation that was built to connect Slieve Kirk and a single 110/33kV transformer cluster to the transmission grid. The single busbar is landlocked and cannot be extended.

Killymallaght is connected to Coolkeeragh and Strabane via single circuits turned in from portal lines.

5 Analysis

5.1 Transmission network loading

The most onerous contingency affecting the Northern Ireland transmission system is the loss of the 275 kV double circuit between Coolkeeragh and Magherafelt 275 kV. When this contingency occurs, any generation at Coolkeeragh Power Station and any renewable generation operating in the north and west areas must flow across the 110 kV network towards Kells and Tamnamore GSPs. This combination of conventional generation and renewable generation at Killymallaght, Strabane and Slieve Kirk leads to the potential for overloads on the existing Coolkeeragh – Killymallaght – Strabane 110 kV circuits.

This corridor was originally highlighted in TESNI 2020 SNA as being at risk of overloading in 2030 with the Coolkeeragh – Strabane 110 kV circuit being the most heavily loaded circuit within the corridor. This risk was also identified in 2030 in *Shaping Our Electricity Future*, which identified the uprating of some circuits in this corridor as candidate reinforcements. With the SNA for TES 2023 not yet published, we have used the results from TESNI SNA 2020. Figures 5.1, 5.2, and 5.3 show the N-1 loading for all three 110 kV circuits in the Coolkeeragh to Strabane corridor for each of the three scenarios analysed in 2030. The results suggest that reinforcement of the Coolkeeragh to Strabane corridor will be required to facilitate both additional renewable generation capacity, and to support the decarbonisation of other energy sectors such as heat and transport.

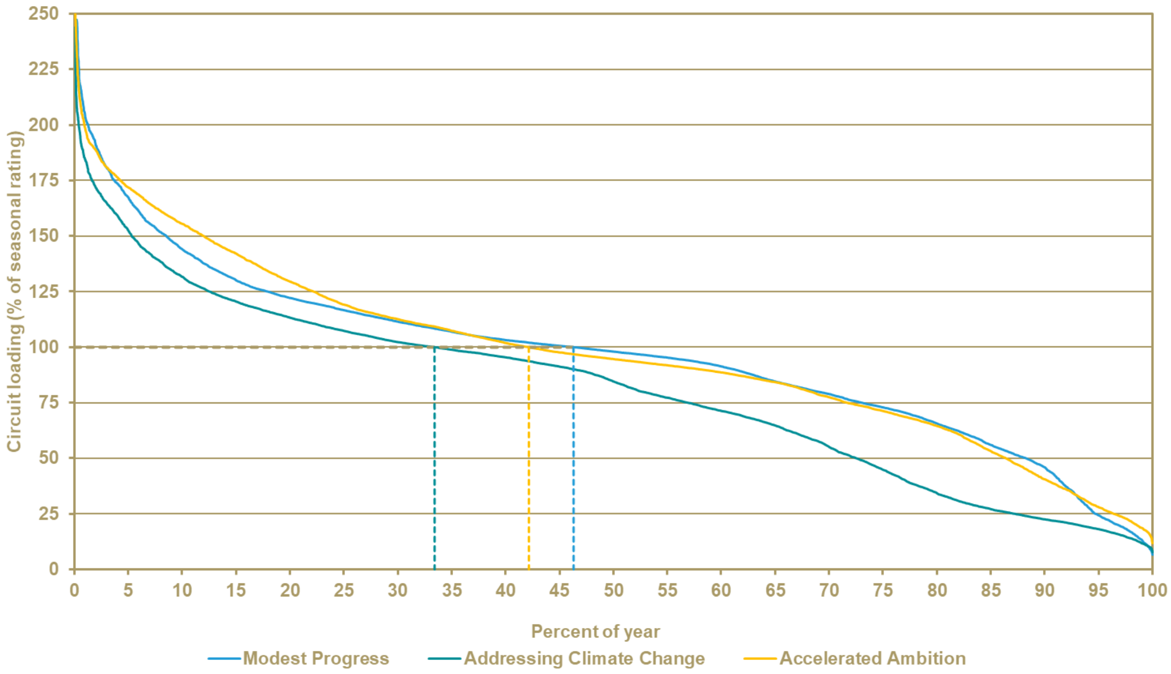

Figure 5.1: N-1 loading on the Coolkeeragh to Strabane 110 kV circuit in 2030

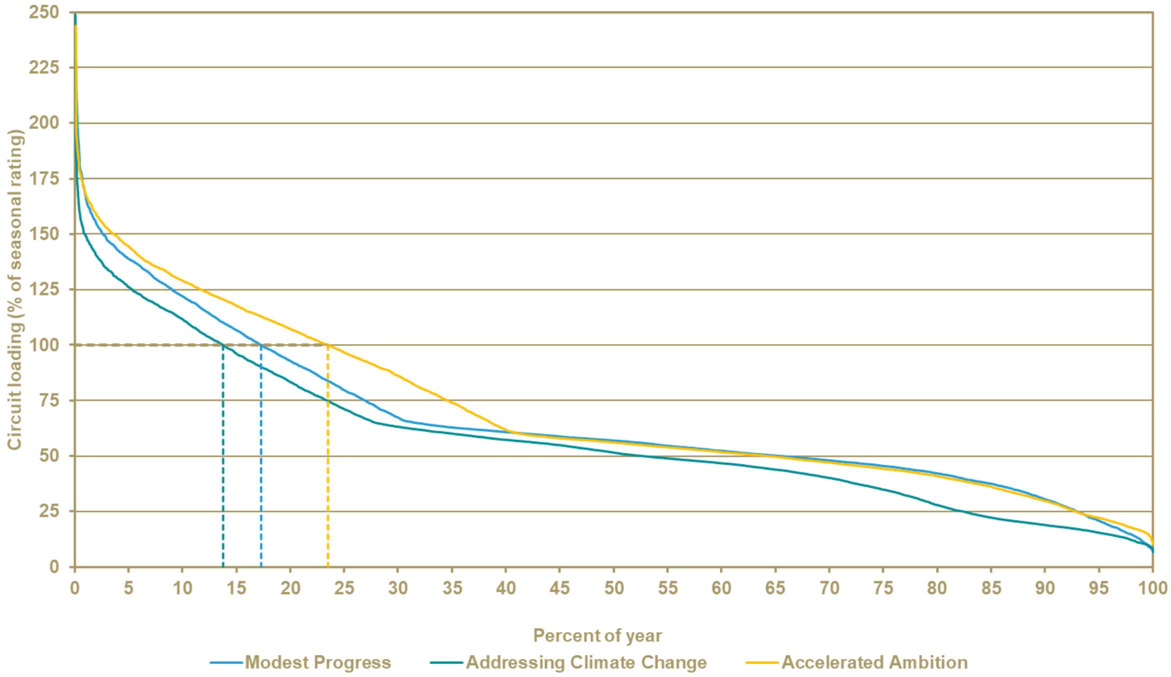

Figure 5.2: N-1 loading on the Coolkeeragh to Killymallaght 110 kV circuit in 2030

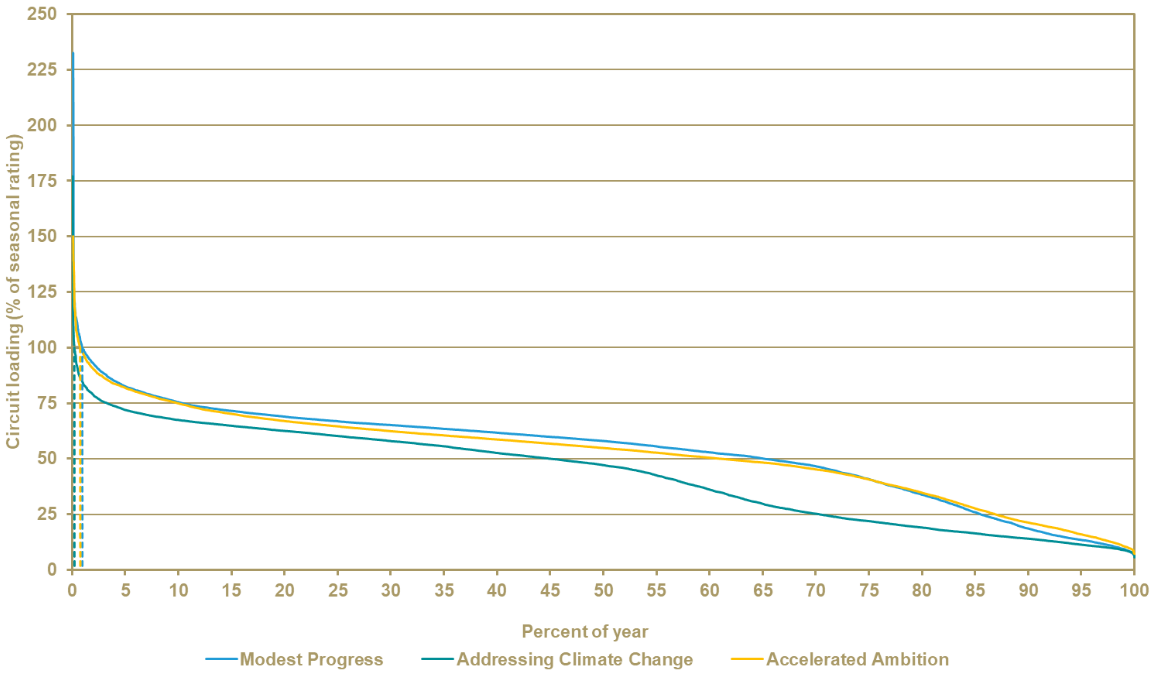

Figure 5.3: N-1 loading on the Killymallaght to Strabane 110 kV circuit in 2030

6 Conclusion

A clear need has been identified to reinforce the existing Coolkeeragh – Killymallaght – Strabane 110 kV circuits to manage the level of wind generation in the west of Northern Ireland.

There is a need to address the existing and expected congestion on the 110 kV network with the increasing connection of renewable generation, to allow our statutory energy targets to be achievable in Northern Ireland. It is recognised that other significant reinforcements will also be required to address the level of renewables expected for the renewables target, as shown in *Shaping Our Electricity Future*.

As demonstrated in TESNI 202 SNA, the Coolkeeragh - Strabane 110 kV circuit has the potential to be overloaded to approximately 250% of its seasonal rating (max rating of 166 MVA in Winter). Analysis also confirmed that this circuit will be overloaded for 45% of the year even for the Modest Progress scenario in 2030. Both the Coolkeeragh – Killymallaght and Killymallaght – Strabane circuits are also at risk of overload in this scenario.

The loss of the 275 kV double circuit between Coolkeeragh and Magherafelt will result in overloads on the local 110 kV network as power flows move from west to the east. This system reinforcement is needed now and to meet our renewables targets. With increased onshore renewable generation in the north and west beyond what already exists, this congestion will significantly increase. This will result in a significant level of wind generation constraint and cost to the consumer.

It is considered prudent that system reinforcement is required to support the existing network between Coolkeeragh – Killymallaght - Strabane.