
Connect West

Needs Report

December 2025



Version history

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1 Introduction

This Needs report describes issues with transmission network capacity in the Mid Tyrone area of Northern Ireland. 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 (SNA) highlighted the risk to all of these circuits under three different energy scenarios, identifying a need for transmission reinforcement in the Mid Tyrone area. The risk continued to be highlighted in *Shaping Our Electricity Future*, and transmission network reinforcement in this area was identified as critical to meeting renewable energy targets.

Tomorrow's Energy Scenarios 2023 set out a number of different scenarios of how a target of net zero emissions could be achieved in Northern Ireland by 2050, including delivery of a net zero power system ahead of that date. 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 in the Mid Tyrone increase.

2 The Northern Ireland transmission network

The Northern 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.

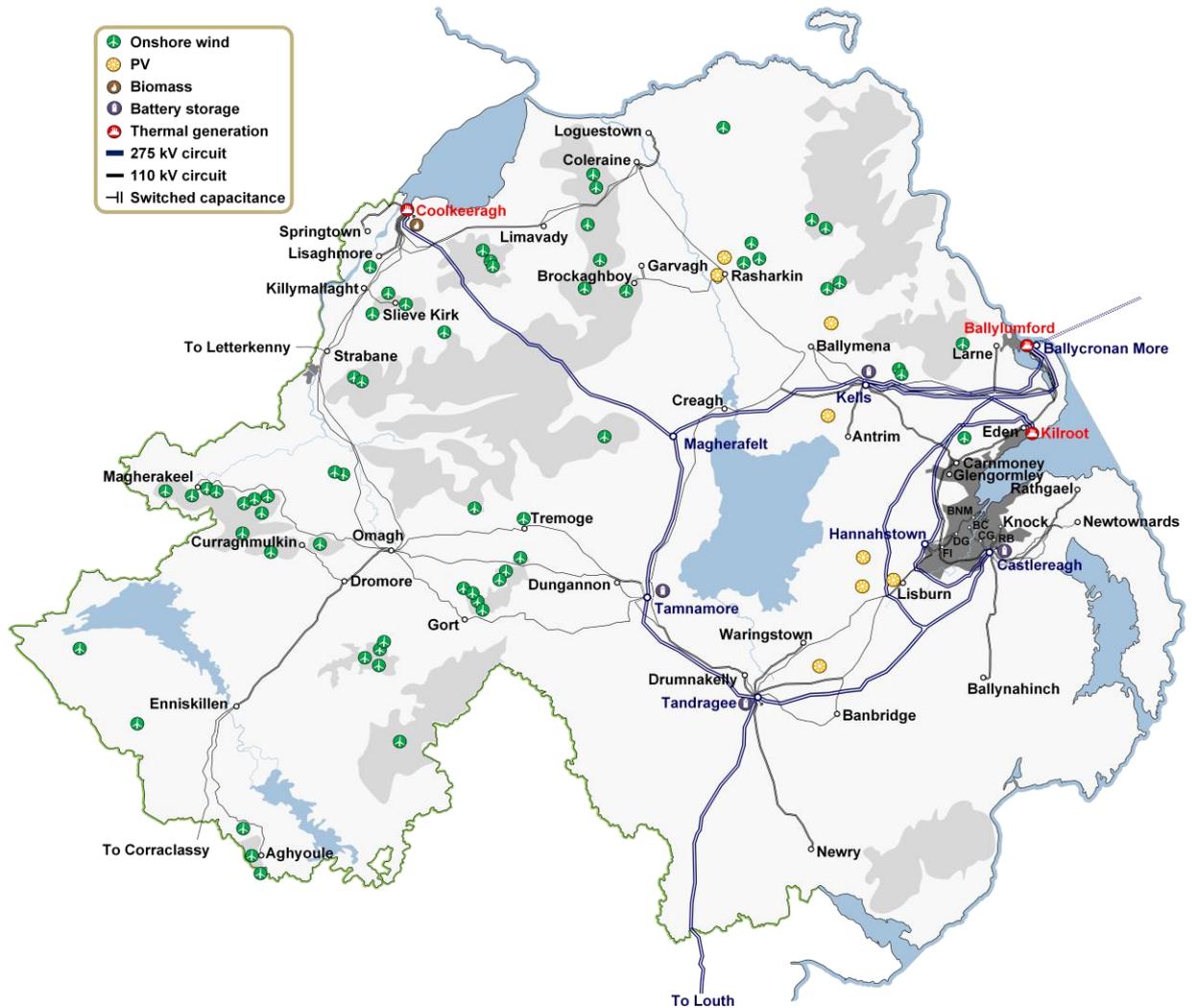


Figure 1: The Northern Ireland transmission system in 2025

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) 2022¹ 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 Mid Tyrone area.

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 the net zero emissions target, 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 2023², 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.

¹ [Revised Regional Strategic Planning Policy - Renewable and Low Carbon Energy | NI Direct | 2023](#)

² 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 (TSSPS³).

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 Connect West provides evidence of the need for development, and forms part of Part 1 of the grid development process.

³ 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 area in Mid Tyrone. The transmission network in the area between Omagh and Tamnamore is shown in figure 4.1 below.

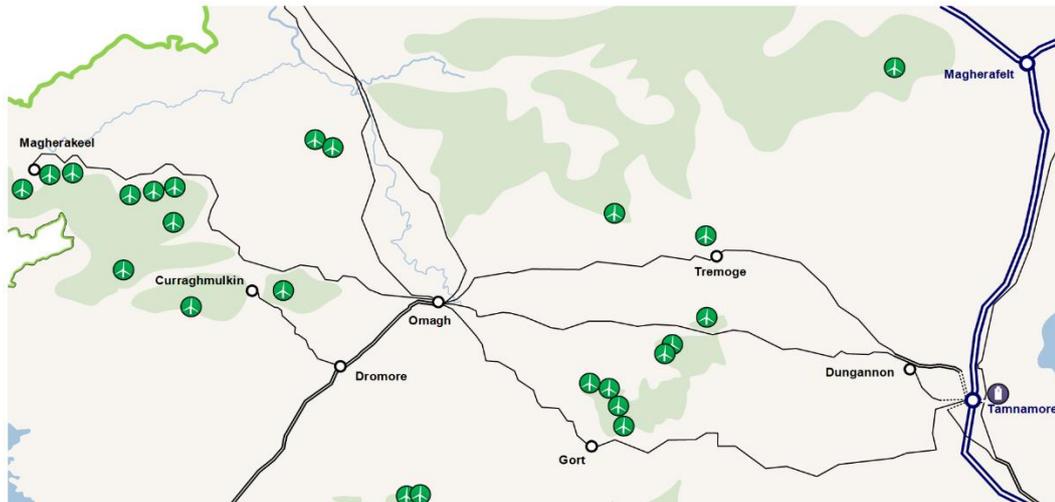


Figure 4.1: Mid Tyrone area

There are three 110 kV circuits in the corridor between Omagh and Tamnamore, described in the following subsections.

4.1 Omagh to Tremoge to Tamnamore 110 kV circuit

The 110 kV circuit from Omagh to Tamnamore via Tremoge cluster was built in 1993, originally as a circuit between Omagh and Dungannon. In 2015, the circuit was extended from Dungannon into Tamnamore, and the conductor was updated. A short section of cable was required to connect into Tamnamore. The circuit currently has a capacity of 193/191/186 MVA in winter, autumn and summer respectively. Tremoge cluster was connected into the circuit in 2016 and currently has 120 MW of renewable generation connected out of a potential 180 MVA of capacity.

4.2 Omagh to Tamnamore 110 kV circuit

The 110 kV circuit between Omagh and Tamnamore was constructed in 1952, originally as a circuit between Omagh and Dungannon. In 2015 the circuit was extended from Dungannon into Tamnamore, and the conductor was updated. A short section of cable was required to connect into Tamnamore. The circuit currently has a capacity of 193/191/186 MVA in winter, autumn and summer respectively.

4.3 Omagh to Gort to Tamnamore 110 kV circuit

The 110 kV circuit from Omagh to Tamnamore via Gort was built in 2017 and is rated at 200 MVA year-round. Gort cluster currently has 120 MW of renewable generation connected out of a potential 180 MVA of capacity.

5 Analysis

5.1 Transmission network loading

Figures 5.1, 5.2 and 5.5 show the hourly loading across the year 2030 for the three scenarios from TESNI 2020 on the Tamnamore to Tremoge, Omagh to Tamnamore and Gort to Tamnamore 110 kV circuits respectively. With the SNA for TES 2023 not yet published, we have used the results from TESNI SNA 2020. As demonstrated in table 3.1, however, there is likely to be additional increases to renewable generation capacity and the loading on these circuits is expected to increase.

Additionally, planned capacity increases at Gort and Tremoge clusters will facilitate up to 180 MVA of renewable generation at each substation, placing further pressure on the Tremoge to Tamnamore and Gort to Tamnamore 110 kV circuits.

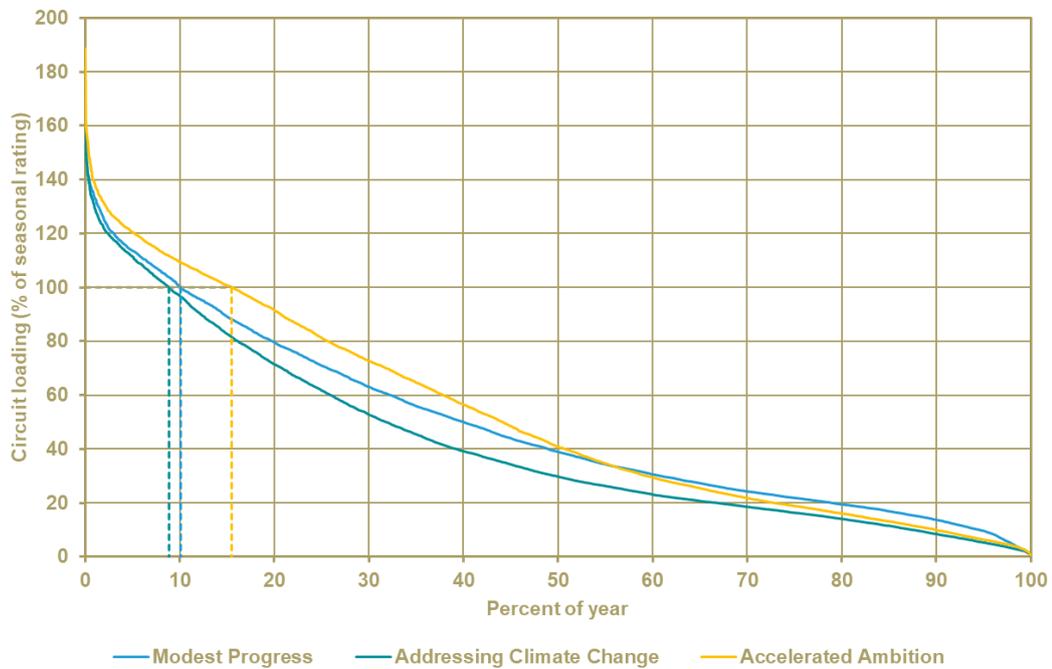


Figure 5.1: N-1 loading on the Tremoge to Tamnamore 110 kV circuit in 2030

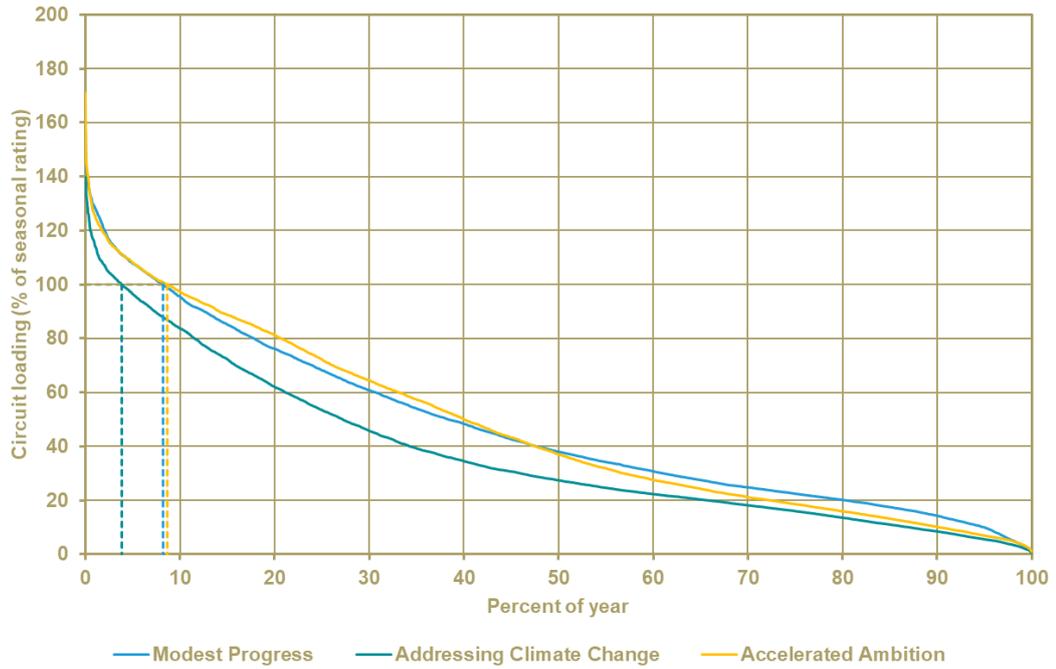


Figure 5.2: N-1 loading on the Omagh to Tamnamore 110 kV circuit in 2030

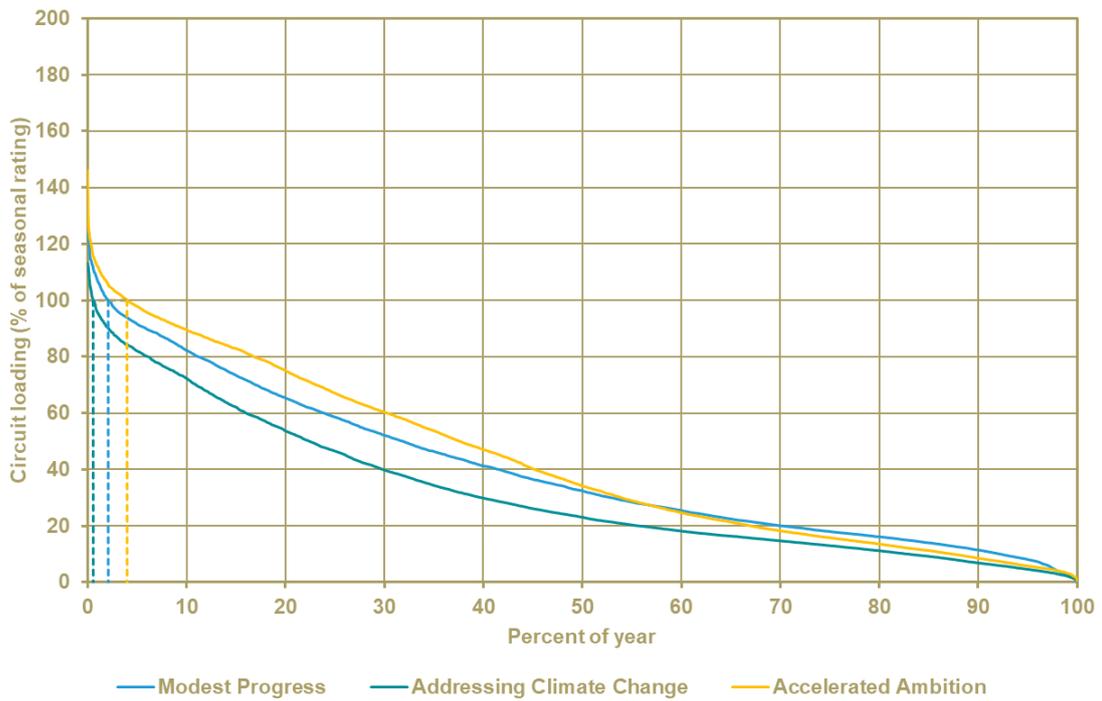


Figure 5.3: N-1 loading on the Gort to Tamnamore 110 kV circuit in 2030

5.2 Phase angle

Figure 5.4 shows the voltage phase angle difference between Coolkeeragh and Magherafelt for the loss of the 275 kV double circuit for every hour in 2030 for the three scenarios in TESNI 2020.

Following a fault on this double circuit, it is not possible to reclose if the phase angle difference exceeds 20° . As shown in figure 5.4, depending on the scenario, this situation arises between 20% and 40% of the year. In the event of the loss of the 275 kV double circuit between Coolkeeragh and Magherafelt, this means there is a significant portion of the year where the double circuit could not be reclosed, leaving the transmission system vulnerable and unstable.

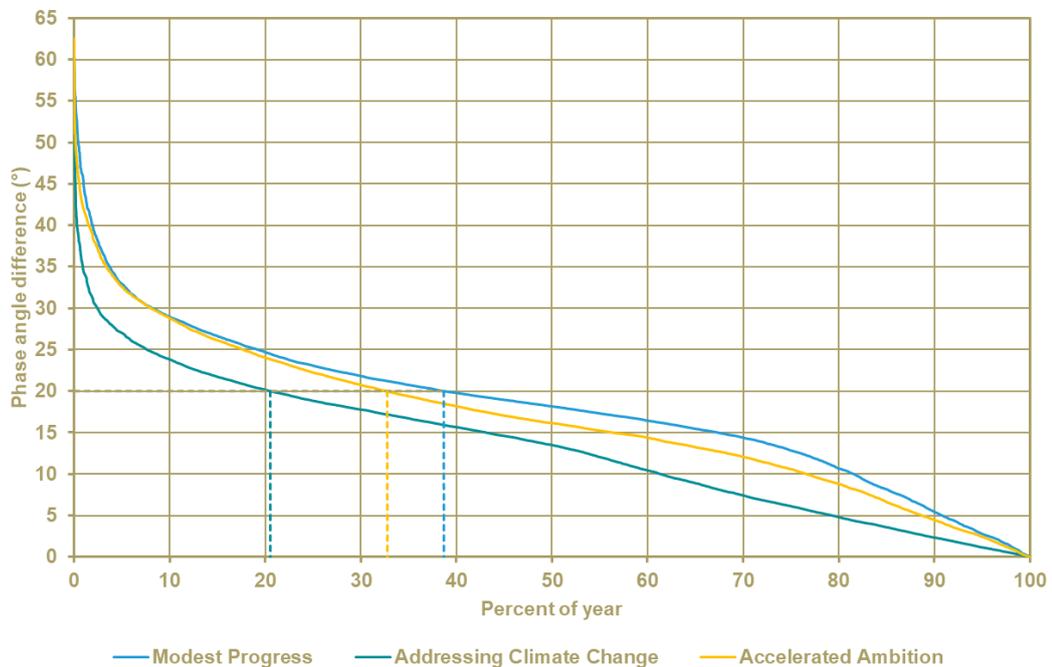


Figure 5.4: N-1 phase angle difference between Coolkeeragh and Magherafelt in 2030

6 Conclusion

A need has been identified to reinforce the transmission network in the Mid Tyrone in area order to facilitate the integration of additional renewable generation capacity.

The main constraint on all generation in the north and west of Northern Ireland is the loss of the 275 kV double circuit between Coolkeeragh and Magherafelt. Following that contingency, all generation in the area is displaced onto the 110 kV system for transmission to the main load centres in the east of Northern Ireland. In high wind conditions this 110 kV network is at risk of overloading; this risk is currently managed through the pre-fault constraint of wind generation. However, this reduces the economic operation of the power system and the economic viability of the wind generation. Without transmission network reinforcement in the Mid-Tyrone area, the ability to integrate additional renewable generation capacity to support the transition to net zero emissions by 2050, as set out in the Climate Change Act (Northern Ireland) 2022, will be reduced.

Additionally, the circuits connecting Gort and Tremoge cluster substations to Tamnamore are at risk of overload under high wind conditions if the generation planning to connect at these clusters is realised. Both sites have a potential capacity of up to 180 MVA of generation. In the analysis described here only Gort has close to its capacity connected, yet both circuits to Tamnamore are at overload risk.

As well as the generation connected to Gort and Tremoge, the three 110 kV circuits between Omagh and Dungannon/Tamnamore provide a path to the 275 kV system for renewable generation connected at Omagh, Magherakeel, Drumquin and Enniskillen. Loss of any of these 110 kV circuits under high wind conditions leaves the remaining two circuits liable to overload; management of this will require constraint of all generation in the west of Northern Ireland.

A preliminary preferred option to resolve the needs highlighted in this report will be identified in the **Connect West Options Report**. This will develop a list of options for reducing network congestion on the transmission system in Mid Tyrone and, through multicriteria analysis of technical performance, economic performance, deliverability and social and environmental impact a preliminary preferred option will be taken to the Utility Regulator for Transmission Network Pre-construction Project (TNPP) approval, and progression to Part 2 of SONI's Grid Development Framework.