Transmission Constraint Groups
Valid from 17th May 2012

Key Updates from V1.2 to V1.3:
• *Update to Active SONI TCGs: System Stability*
• *Update to Active SONI TCGs: North West Generation*
• *Update to Active SONI TCGs: Kilroot Generation*
• *Addition of Active EirGrid TCGs: Hydro Smolt Protocol*

1. Operating Reserve Requirements

Category	All Island Requirement % Largest In_Feed	EirGrid Minimum[1] (MW)	SONI Minimum (MW)
POR[2]	75%	120 / 75	50
SOR	75%	120 / 75	50
TOR 1	100%	120 / 75	50
TOR 2	100%	120 / 75	50

1. EirGrid Lower values apply from 22:30 -08:30 inclusive
2. Minimum values of POR in each jurisdiction must be supplied by dynamic sources

Operating Reserve Definitions

	Delivered By	Maintained Until
Primary (POR)	5 seconds	15 seconds
Secondary (SOR)	15 seconds	90 seconds
Tertiary 1 (TOR1)	90 seconds	5 minutes
Tertiary 2 (TOR2)	5 minutes	20 minutes

Source of Reserve

	EirGrid	SONI
Dynamic Reserve	Synchronised Generating Units	
Static Reserve	Turlough Hill Units when in pumping mode Interruptible Load (35MW 07:00 – 00:00)	Moyle Interconnector (75MW)

2. Tie Line Limits

Tie line flow limits after reserve execution in either jurisdiction

Tie line flows in both directions have physical limits, the maximum flow that can be sustained without breaching system security rules (line overloads, voltage limits etc) after a credible transmission event.
The limits are referred to as the Total Transfer Capacity (two values one N-S and one S-N)
When determining minimum system cost, RCUC respects the TTC values by not allowing the reserve holding in either jurisdiction + the tie line flow to exceed the TTC
Present values (normal operation) N-S TTC 450 MW
S-N TTC 400 MW

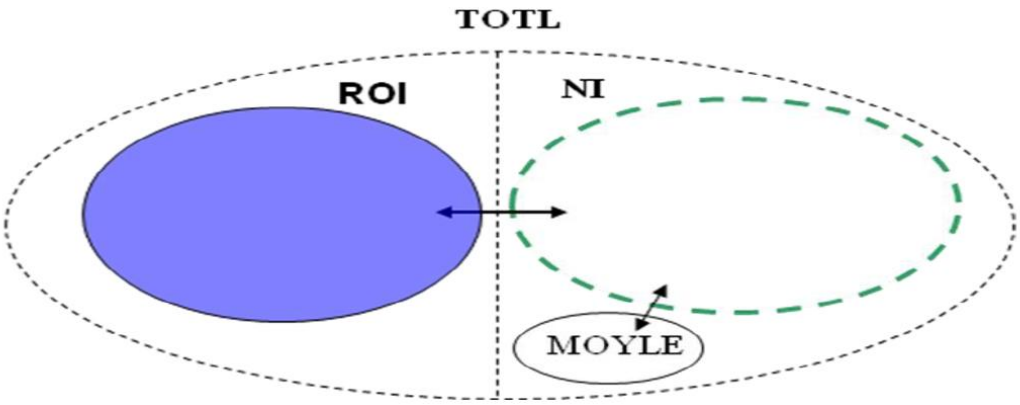
Transmission Constraint Groups

• TOTL is of MW type which contains all units on the island and is used to balance total generation with total demand

• ROI is of MWR type which contains all EirGrid units and is used to control the flow S-N

• NI is of MWR type which contains all the SONI units (including Moyle) and is used to control the flow N-S

• Moyle is of MW type which contains the Moyle interconnector units and is used to limit it's import to NI and export to GB



Most Common TCGs

The most common constraints that are modelled are:

• North – South Tie line export / import constraint: MWR type
• Moyle Import/Export constraint: MW type
• Requirement to keep a minimum number of units on in an area: NB type
• Requirement to limit the output of the generators in an area to limit short circuit levels or overloads: MW type or NB type
• Requirement to enforce the minimum output from the generators in an area to support the voltage or to avoid overloads: MW type or NB type
• Requirement to limit the output of stations due to salmon spawning: MW type

Active System TCGs

Name	TCG Type	Limit Type	Limit	Resources	Description
Inter-Area Flow	ROI	X:<=	400 MW (There is a margin of 20MW on this limit for system safety)		Ensures that the total MW transferred between Republic of Ireland and Northern Ireland does not exceed the limitations of the North-South tie line. It takes into account the rescue/reserve flows that could occur immediately post fault inclusive of operating reserve requirements. This is required to ensure the limits of the existing North South tie line are respected.
Inter-Area Flow	NI	X:<=	450 MW (There is a margin of 20MW on this limit for system safety)		Ensures that the total MW transferred between Northern Ireland and Republic of Ireland does not exceed the limitations of the North-South tie line. It takes into account the rescue/reserve flows that could occur immediately post fault inclusive of operating reserve requirements. This is required to ensure the limits of the existing North South tie line are respected.
Non-Synchronous Generation	NONSYG	B	At least 0MW and no more than 50% of system demand	Wind, MOYLE, THILL	Ensures that non synchronous generation (DC interconnectors, wind, Turlough Hill) remains less than 50% of system demand

Active SONI TCGs

Name	TCG Type	Limit Type	Limit	Resources	Description
System Stability	NB	N:>=	3 units at all times	C30, B31, B32, B10, BPS4, BPS5, BPS6, K1, K2	There must be at least 3 high-inertia machines on-load at all times in NI. Required for dynamic stability
Replacement Reserve	MW	X:<=	211 MW	AGU IPOWER, CGT8, BGT1, BGT2, KGT1, KGT2, KGT3, KGT4	Combined MW output of OCGTs must be less than 211MW (out of a total of 311MW) in NI at all times 100MW Required for replacement reserve

North West Generation	NB	N:>=	1 Unit	C30	Coolkeeragh CCGT must remain on load when the NI system demand is above 1000 MW to ensure system security in the North West
Kilroot Generation	NB	N:>=	1 or 2 units depending on NI system demand	K1, K2	There must be at least one Kilroot unit on load when the NI system demand exceeds 1400 MW and 2 units are required above 1550 MW. This TCG is required to ensure voltage stability in the Belfast area and to prevent the requirement for an inter area flow reduction in a post fault scenario
Ballylumford Generation	MW	X:<=	1194MW Dec - Feb, 1024 MW Mar - Nov		The output from Ballylumford Power Station must be limited seasonally due to a circuit breaker restriction in the NI substation
Moyle Interconnector	MW	B	-295 <MW< 450	Moyle Interconnector	This applies to all units registered as Moyle Interconnector units. It ensures that all flows do not exceed an import of 450MW to Northern Ireland and an export of 295MW to Scotland. This is required to ensure that the limits are respected

Active EirGrid TCGs

Name	TCG Type	Limit Type	Limit	Resources	Description
System Stability	NB	N:>=	5 Units	AD1, AD2, DB1, HNC, HN2, MP1, MP2, MP3, PBC, TB3, TB4, TYC, WG1	There must be at least 5 high-inertia machines on-load at all times in ROI. Required for dynamic stability
Replacement Reserve	MW	X:<=	489 MW	AT11, AT12, AT14, ED3, ED5, MRC, NW5, RP1, RP2, TP1, TP3	Combined MW output of OCGTs must be less than 489MW (out of a total of 789MW) in ROI at all times Required for replacement reserve
Dublin Generation	NB	N:>=	3 by night 2 by day	DB1, HNC, HN2, PBC	There must be at least 2/3 large generators on-load at all times in the Dublin area Required for voltage control

South West Generation	NB	N:>=	2 by night 3 by day	AD1, AD2, AT11, AT12, AT14, SK3, SK4, TB1, TB2, TB3, TB4, WG1	There must be at least 2/3 generators on-load at all times in the South West area Required for voltage stability
Cork Generation	MW	X:<=	880 MW	AD1, AD2, AT11, AT12, AT14, MRC*, WG1 *MRC may be excluded depending on overload security criteria	This restricts the amount of Generation in the Cork area to 880MW Required due to transmission congestion
Moneypoint	NB	N:>=	1 Unit	MP1, MP2, MP3	There must be at least one Moneypoint unit on load at all times Required to support the 400kV network
Hydro Smolt Protocol	LEESMT ERNE ERNE12 ERNE34			ER1, ER2, ER3, ER4, LE1, LE2, LE3	Over the spring and early summer period as the water temperature in the rivers and lakes change, the hydro stations have to be dispatched in a very specific way to allow fish to safely move safely. This affects the generators in Erne and Lee.