

Price Differentials between GB and Northern Ireland

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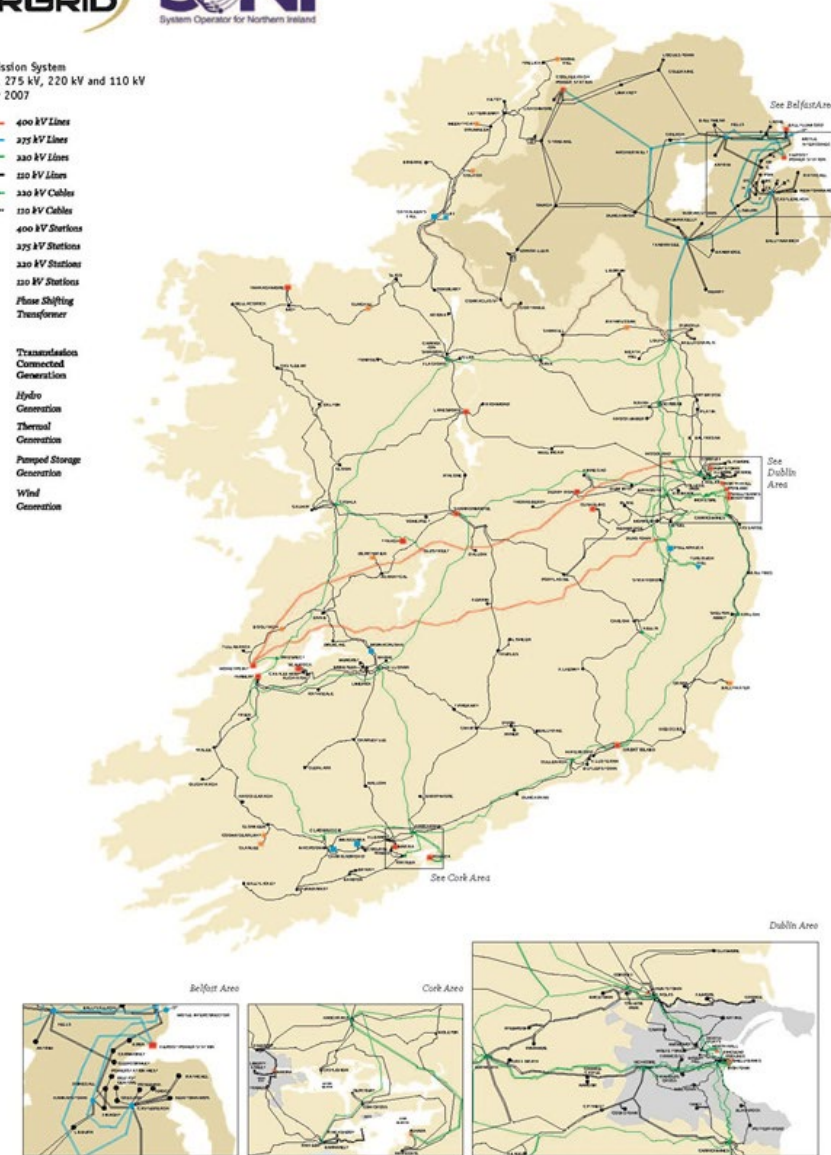
MONTEL

ISEM: The Integrated Single Electricity Market

- Ireland is operated as one electricity market distinct from GB
- Two system operators, Eirgrid for the Republic of Ireland and SONI for Northern Ireland
- The two jurisdictions have separate governments which can have some interesting consequences for the Single Electricity Market (SEM)



Transmission System
400 kV, 275 kV, 220 kV and 110 kV
October 2007



History of the SEM

- Since 2007, the Single Electricity Market has meant that Northern Ireland and the Republic of Ireland are operated in coordination with one another
- EU legislation aimed to create a liberalized internal energy market for Europe
- The Integrated Single Electricity Market (I-SEM) was proposed in 2014 and went live in 2018



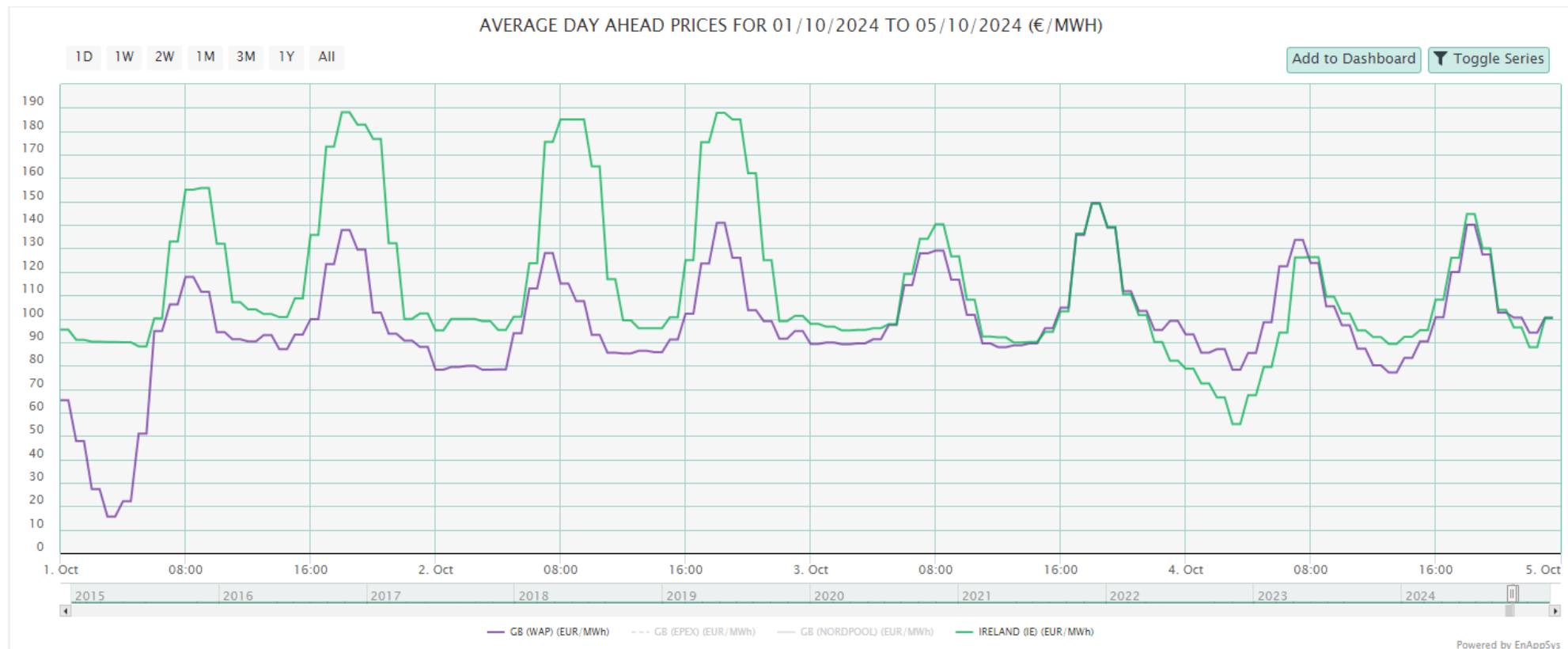
Brexit, or The Great De-Integration

- I-SEM is only connected with GB via interconnectors
- The UK leaving the EU resulted in I-SEM not being able to trade power freely with EU member states
- Therefore, I-SEM is not part of the single coupled markets in Europe (SDAC, SIDC)



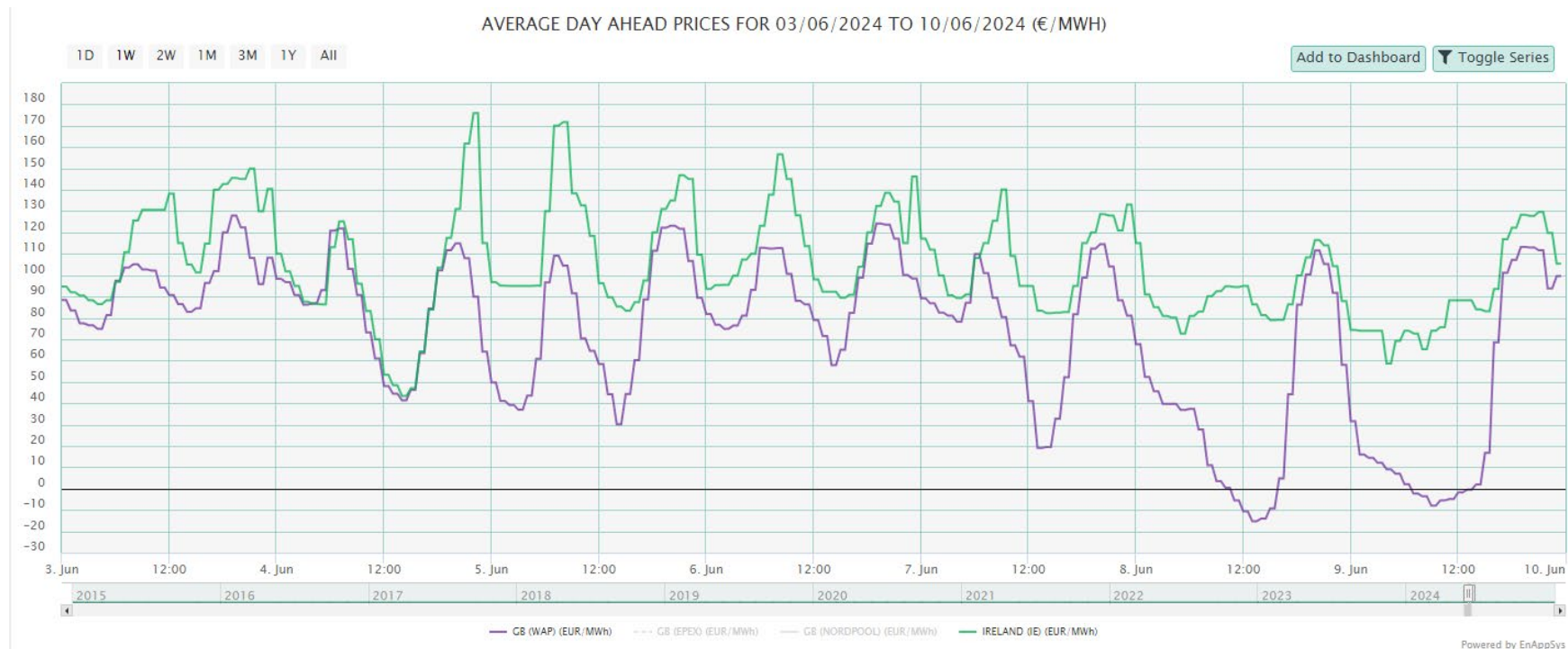
GB – I-SEM Day-Ahead Price Differentials

- Day-ahead power prices in the SEM frequently decouple from those in GB, particularly when renewables are low



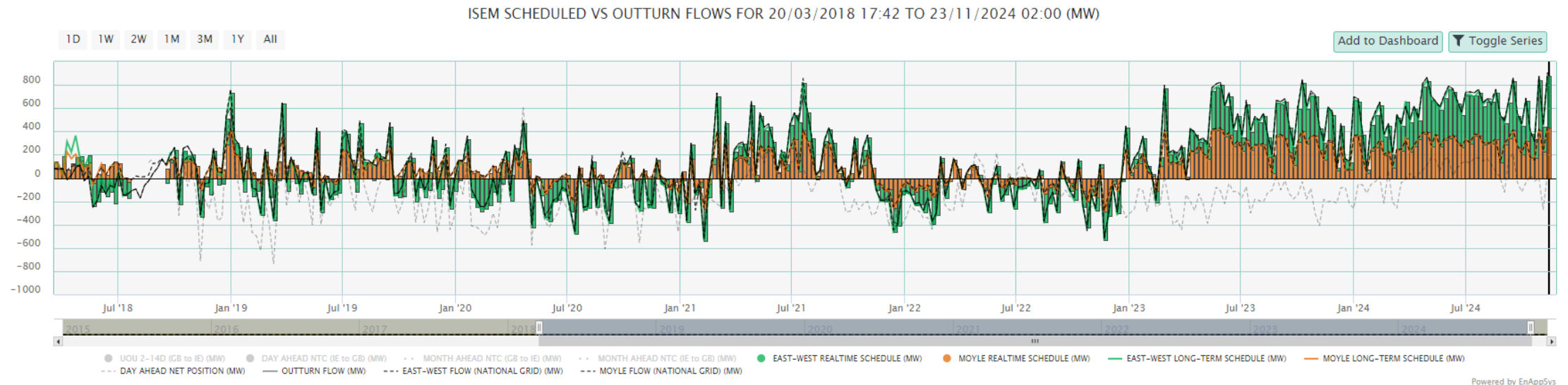
GB – I-SEM Day-Ahead Price Differentials

- When GB prices drop to negative levels, prices in the SEM do not follow
- Instead, Irish prices remain high, and the interconnectors shift to a full importing position to bring as much cheap power from GB into the SEM as possible



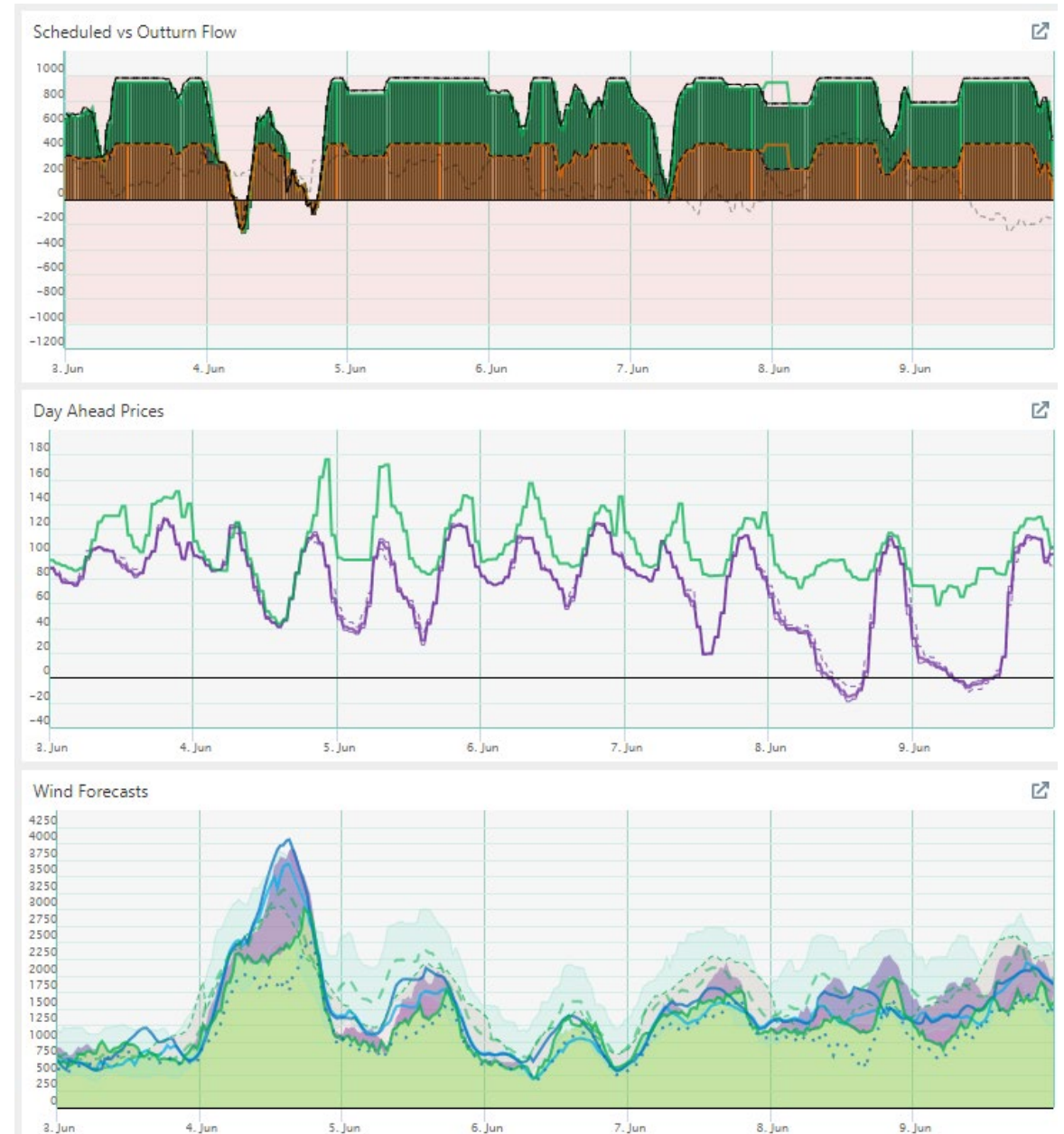
Limited Interconnection Capacity

- Moyle and East-West Interconnector are the only cables linking the SEM to other markets
- Both connect to GB giving a total of 1GW capacity
- Originally intended to allow excess Irish renewables to flow into GB, more recently it is regularly in a net import position
- Total interconnection capacity represents 22% of peak GB demand, whereas it is only 14% for I-SEM, so more reliance on conventional generation for demand peaks in I-SEM



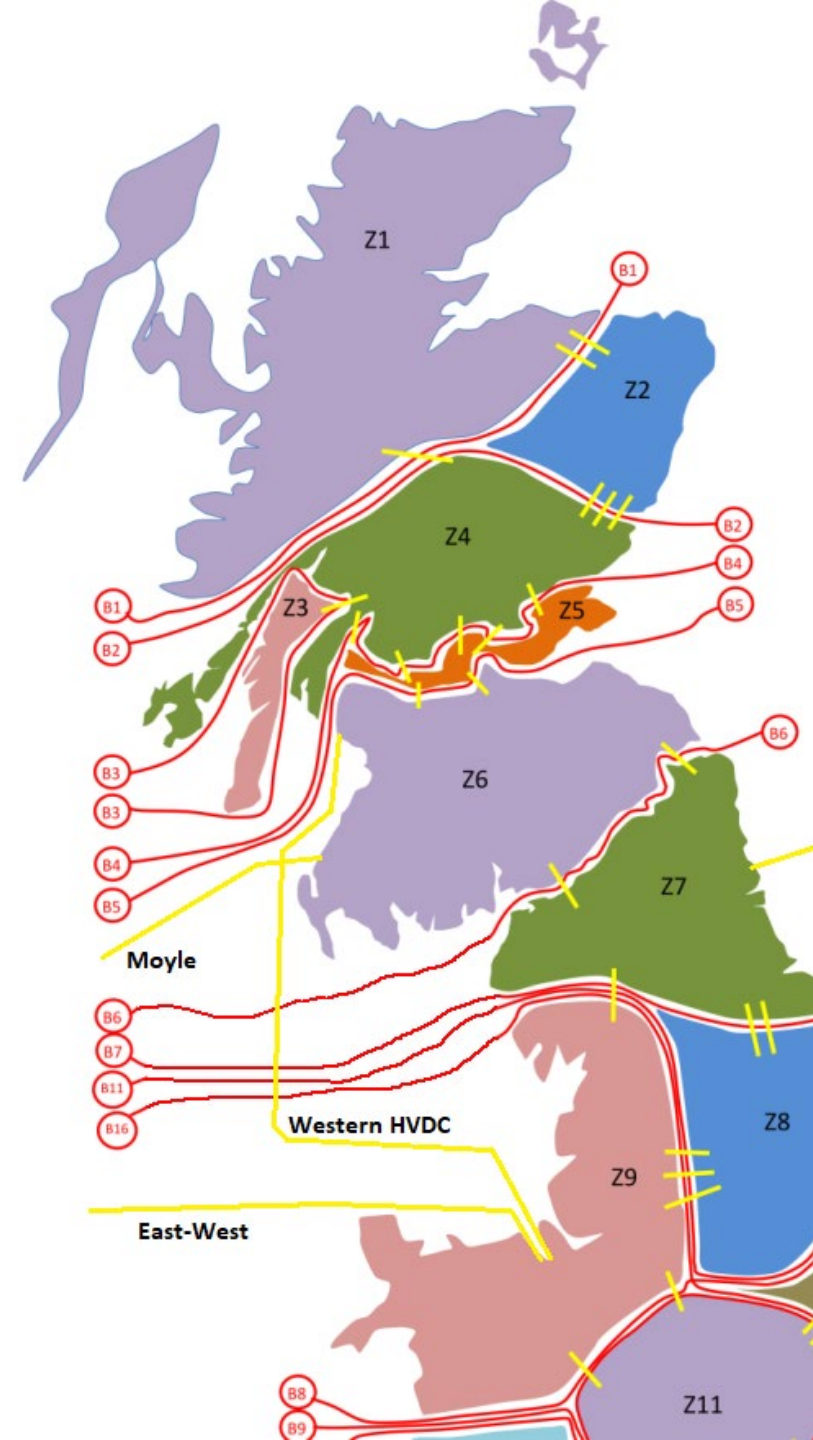
The Canary in the Coal Mine

- Cheap power flowing in from the continent brings GB prices negative
- Interconnectors flow power from GB into the SEM at full capacity
- Cheap imports mean that that local renewables must be bid down in the balancing mechanism in order to balance supply and demand
- Why are Irish renewables being displaced by imports from GB?



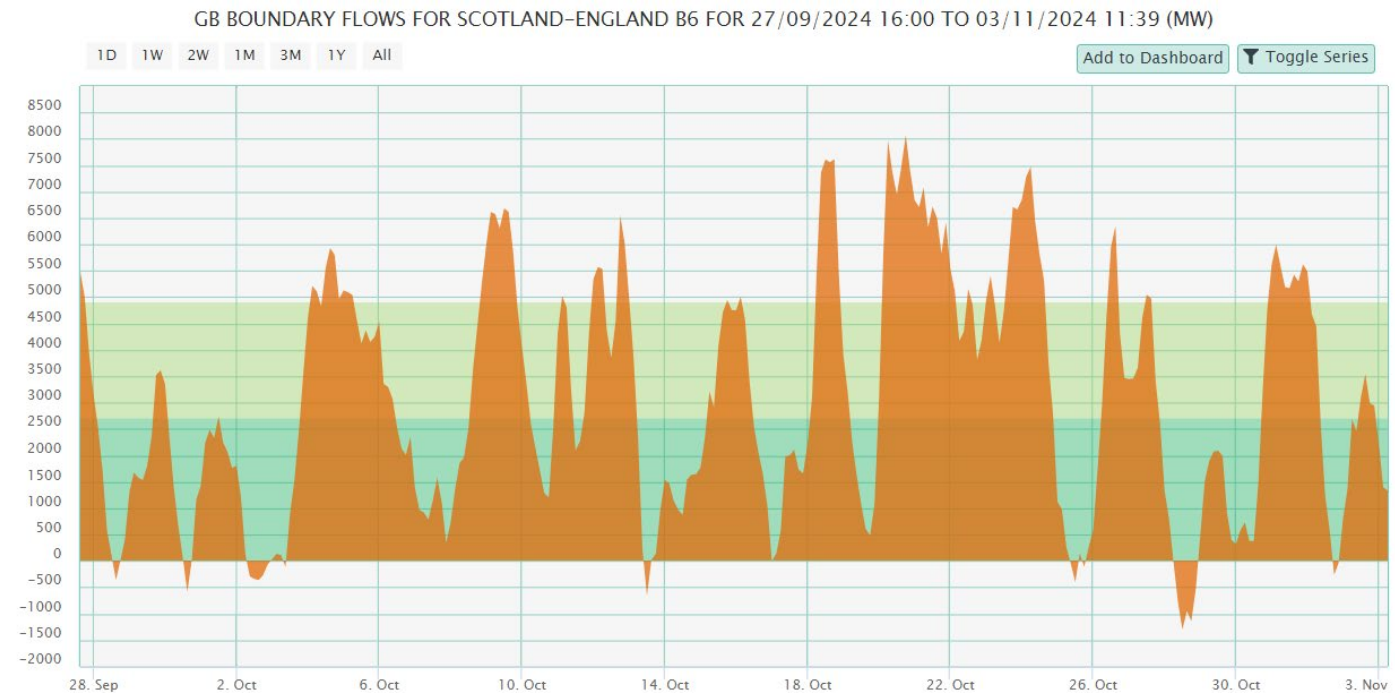
GB B6 Boundary Constraint

- Moyle lands in Zone 6 in Scotland
- The B6 Boundary is a bottleneck in GB
- If Moyle flows were rebalanced to flow into Scotland, it could worsen the bottleneck at the B6 boundary



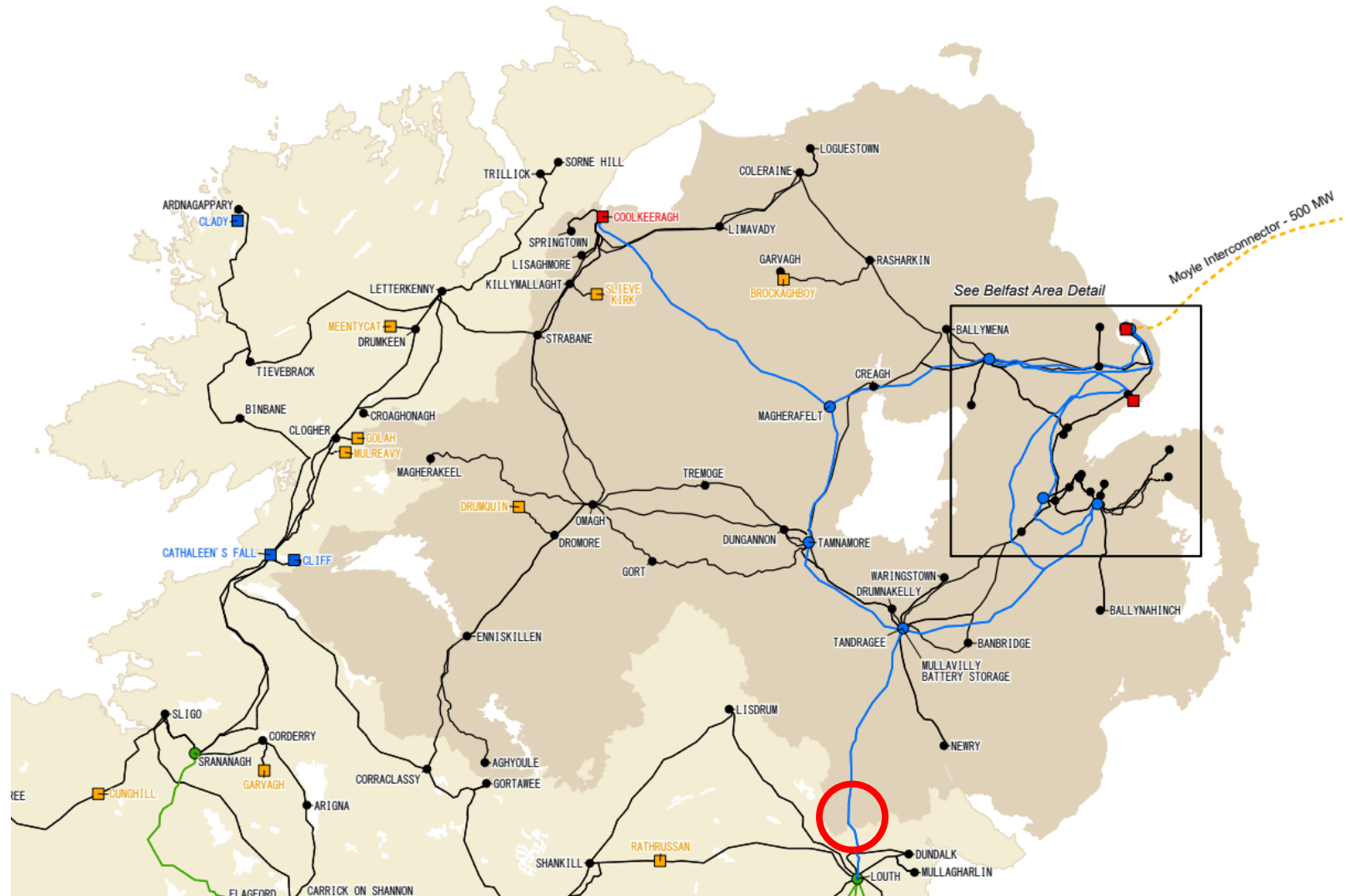
GB B6 Boundary Constraint

- Exports through the B6 boundary often exceed transfer capacity when it is windy in Scotland
- Exporting additional power into Scotland would potentially make this worse and increase overall balancing costs in GB

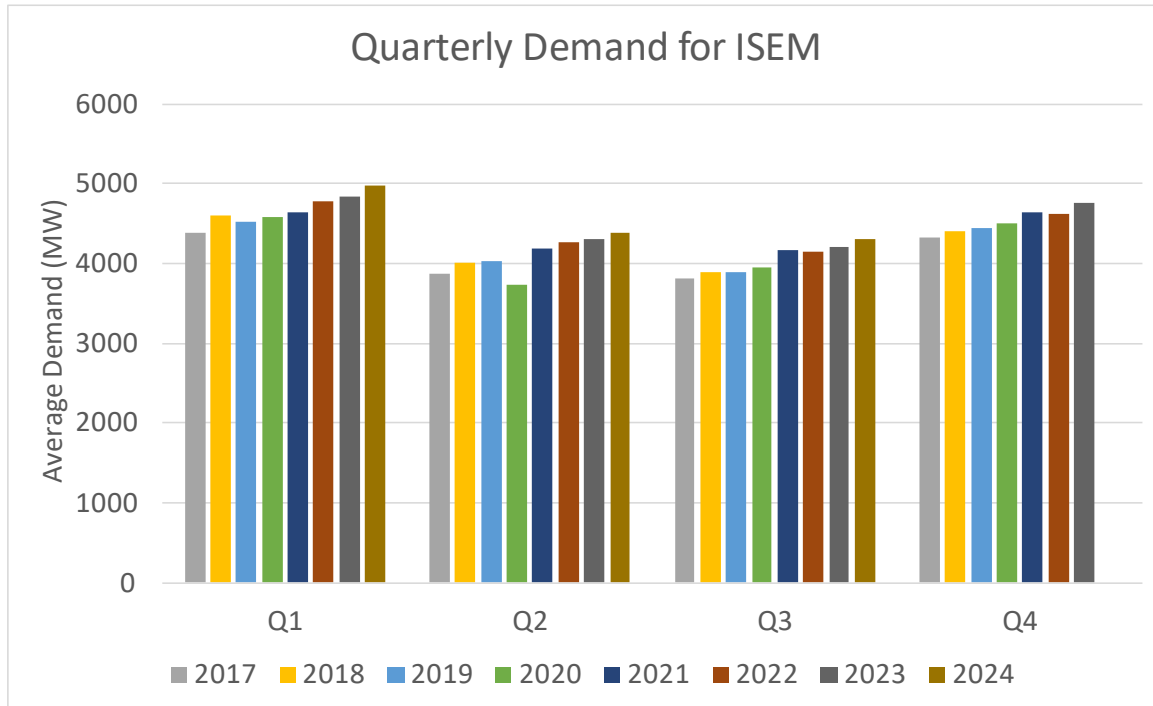


Limited flows on North-South line

- Only one primary cable (275kV) connects Northern Ireland to the Republic
- Two other auxiliary cables exist but they cannot operate without the primary cable
- Capacity of 1.5GW, but only 450MW permitted to flow through from NI to RoI due technical reasons



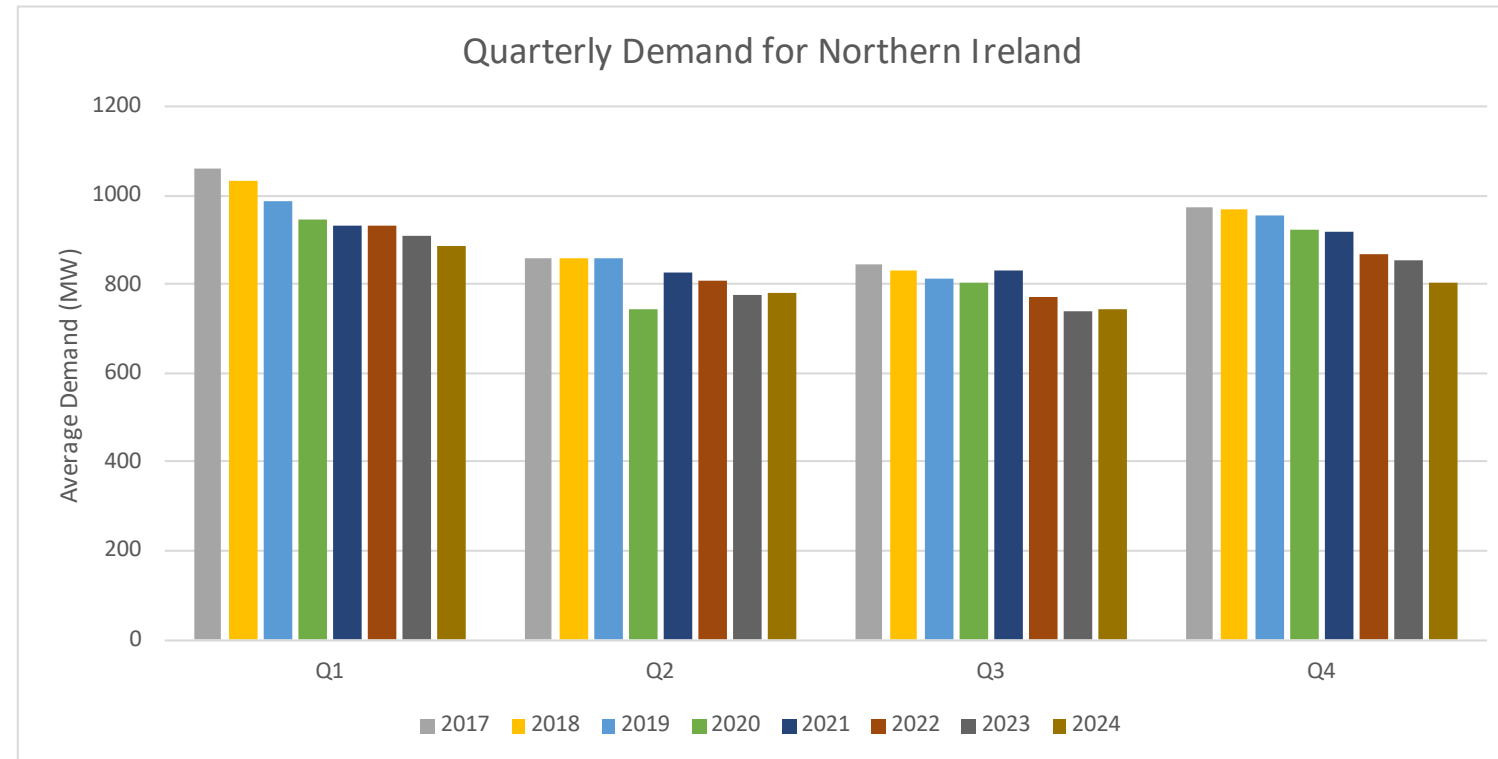
Demand on the Rise



- Low corporation tax rate of 12.5% has attracted global technology companies to base their European operations in Ireland
- For reference, US corporation tax is at 21%, with Trump proposing a cut to 15%
- Over 80 datacentres have been built, with tech giants Google, Amazon and Meta planning further expansion
- Datacentres now make up more of national demand than all residential homes
- Internal constraints worsening as gap between areas of high and low demand widens

Demand Decreasing in Northern Ireland

- Datacentre buildout primarily in the Republic
- Peak demand in Northern Ireland ~1.4GW last winter
- During times of full import, over one third of Northern Ireland Demand is covered by Moyle



Northern Ireland Constraints

- Certain generating units are required to be on load due to system constraints

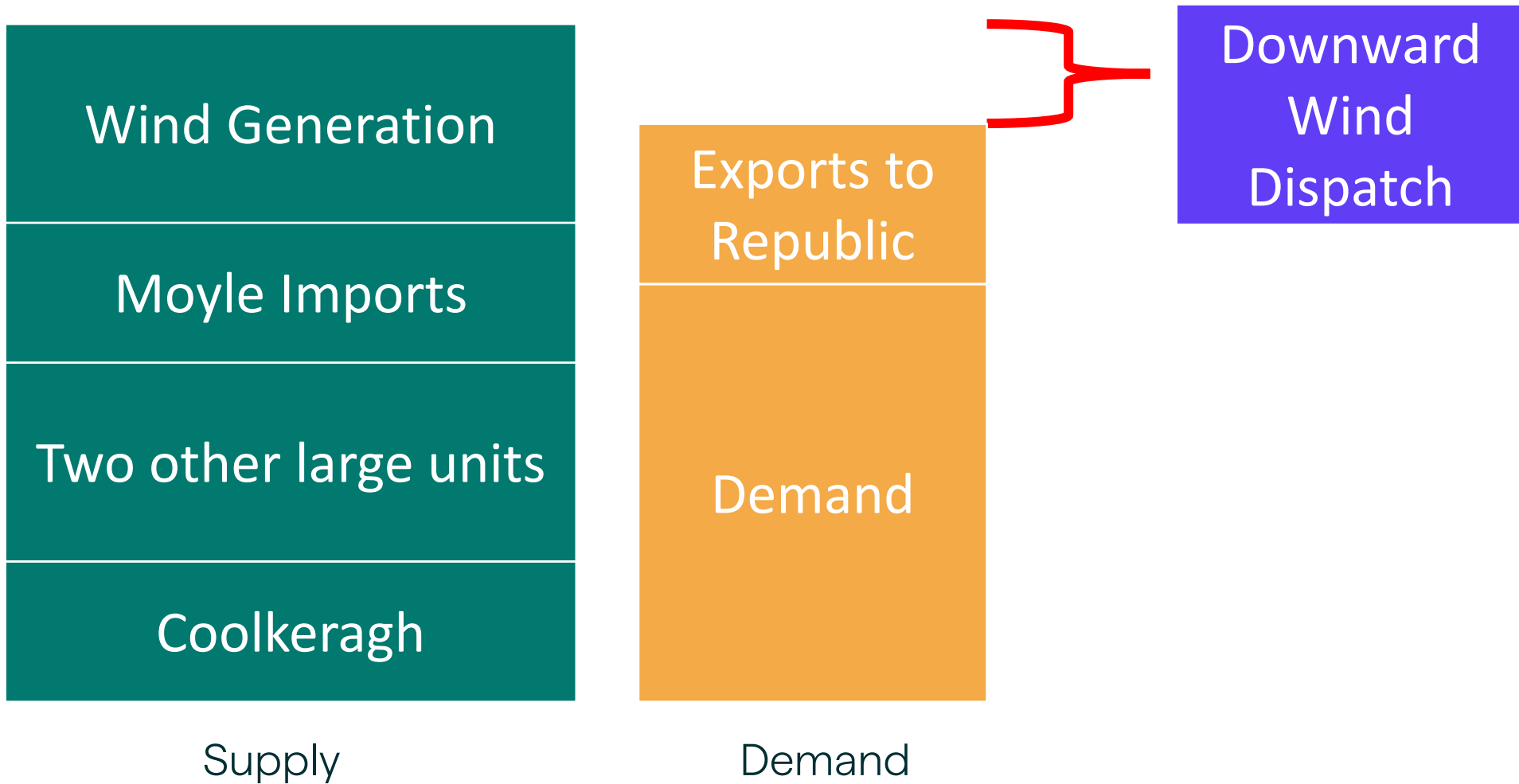
Name	TC G Type	Limit Type	Limit	Resources	Description
System Stability (S_NBMIN_MINNIU)	NB	N:>=	3 Units at all times	B10, B31, B32, C30, KGT6	There must be at least 3 machines on-load at all times in Northern Ireland. Required for dynamic stability.

Northern Ireland Constraints

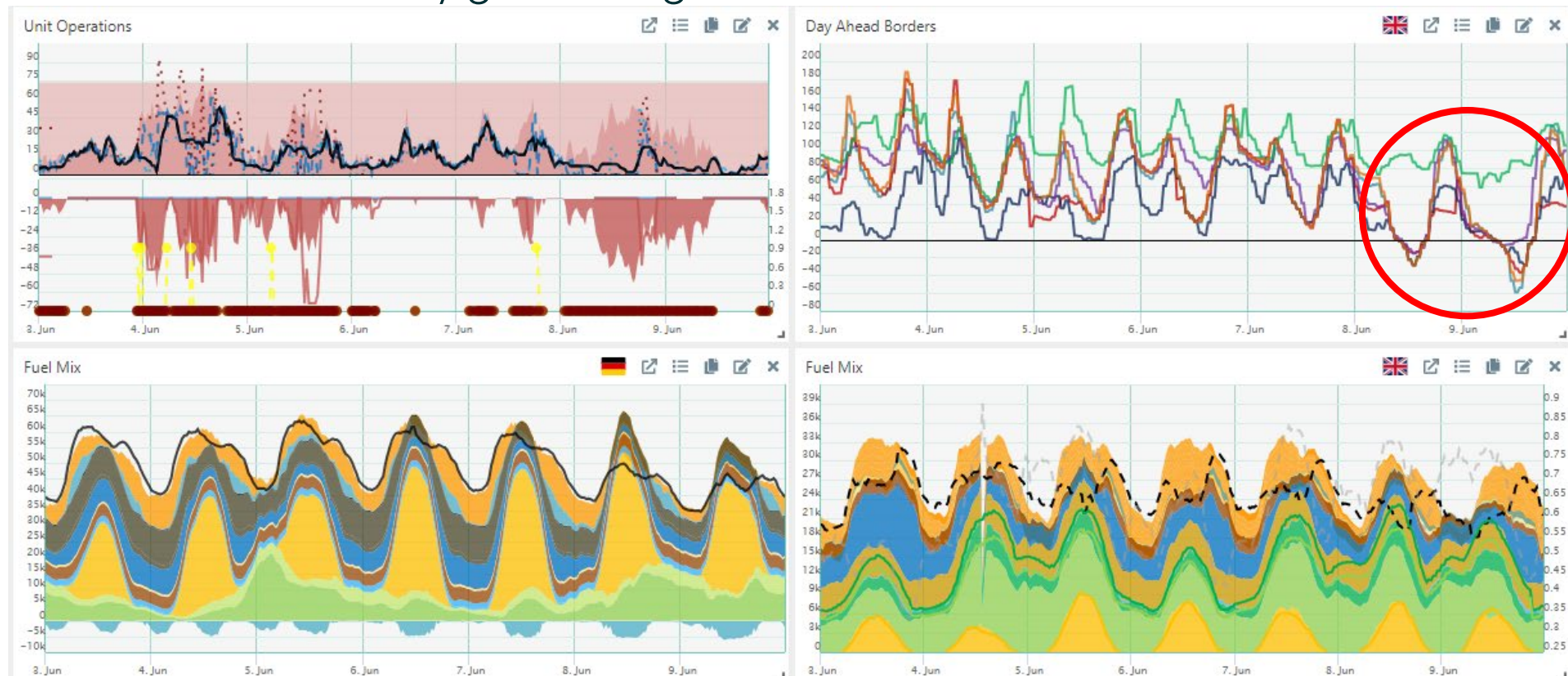
- Certain generating units are required to be on load due to system constraints
- Coolkeeragh CCGT often required to be running at all times

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System Stability (S_NBMIN_MINNIU)	NB	N:>=	3 Units at all times	B10, B31, B32, C30, KGT6	There must be at least 3 machines on-load at all times in Northern Ireland. Required for dynamic stability.
System Stability (S_NBMIN_MINNI3)	NB	N: >=	Minimum 1 at all times	C30	Security of supply.

Determining Balancing Actions

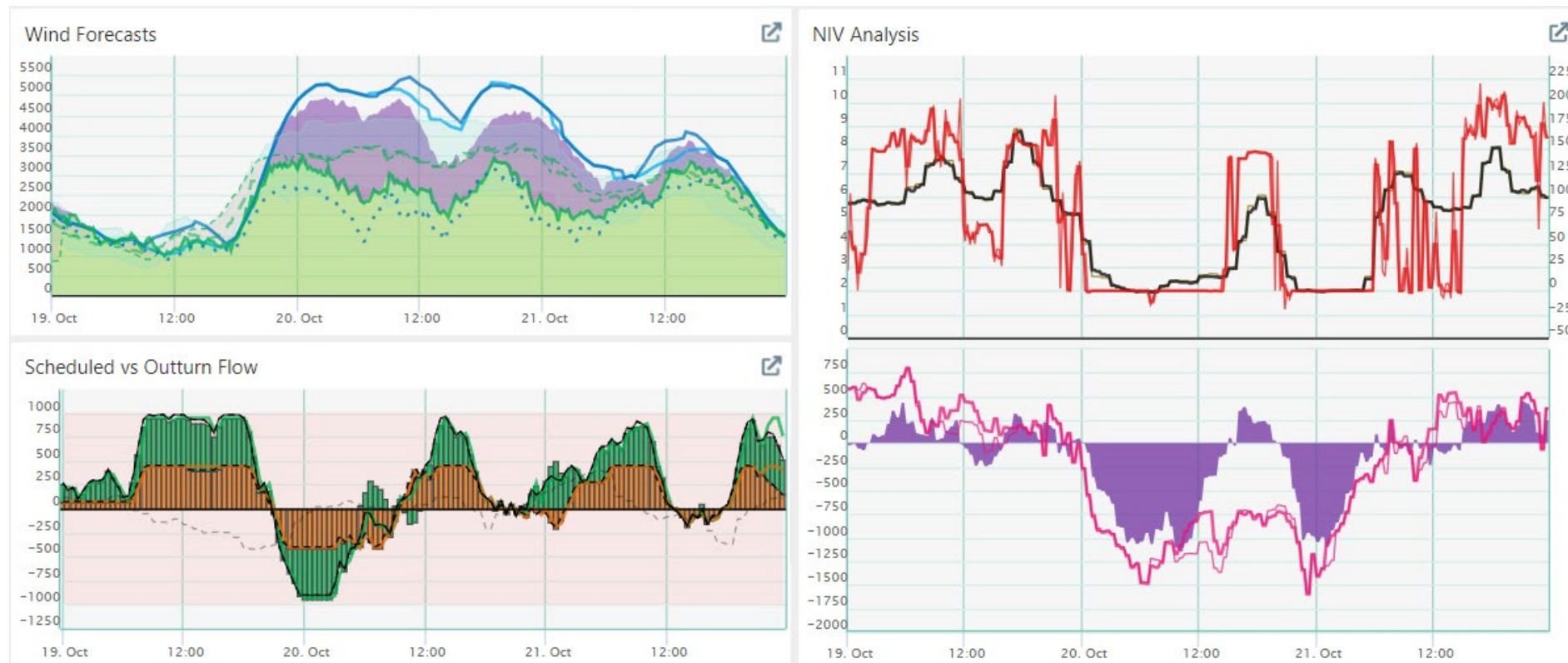


- As an example, Slieve Kirk Wind Farm, the largest in Northern Ireland, is turned down
- Renewables dominate fuel mixes of GB and Germany, with day-ahead prices dropping to negative levels
- I-SEM imports as much as it can, but still requires a large proportional component of its demand to be met by gas-fired generation



Balancing Prices

- Wind assets priced into the BM at €0/MWh
- In order for balancing prices to go negative, all available downward wind volumes must be taken first and then negative dispatchable bids can be taken



In Summary

- Limited interconnection capacity with I-SEM results in Northern Ireland seeing wholesale power prices at a premium compared to GB as cheap European renewables cannot feed through
- Constraints in GB market make it difficult to rebalance Moyle interconnector back to Scotland
- Constraints in Northern Ireland mean that wind power can be turned down even during times of import
- Downward balancing of wind results in balancing prices of €0/MWh