22/01/2023

Enduring Connection Policy 2.2

Constraints Analysis for Wind and Solar - 12 Area Webinar

EirGrid

Agenda

- ECP 2.2 Constraints Analysis – Background
- Key Metric - Total Dispatch Down
- Study Scenarios and Installed Wind and Solar
- Study Assumptions
- ECP 2.2 Analysis Process
- Results
- Key Messages

ECP 2.2 Constraints Analysis - Background

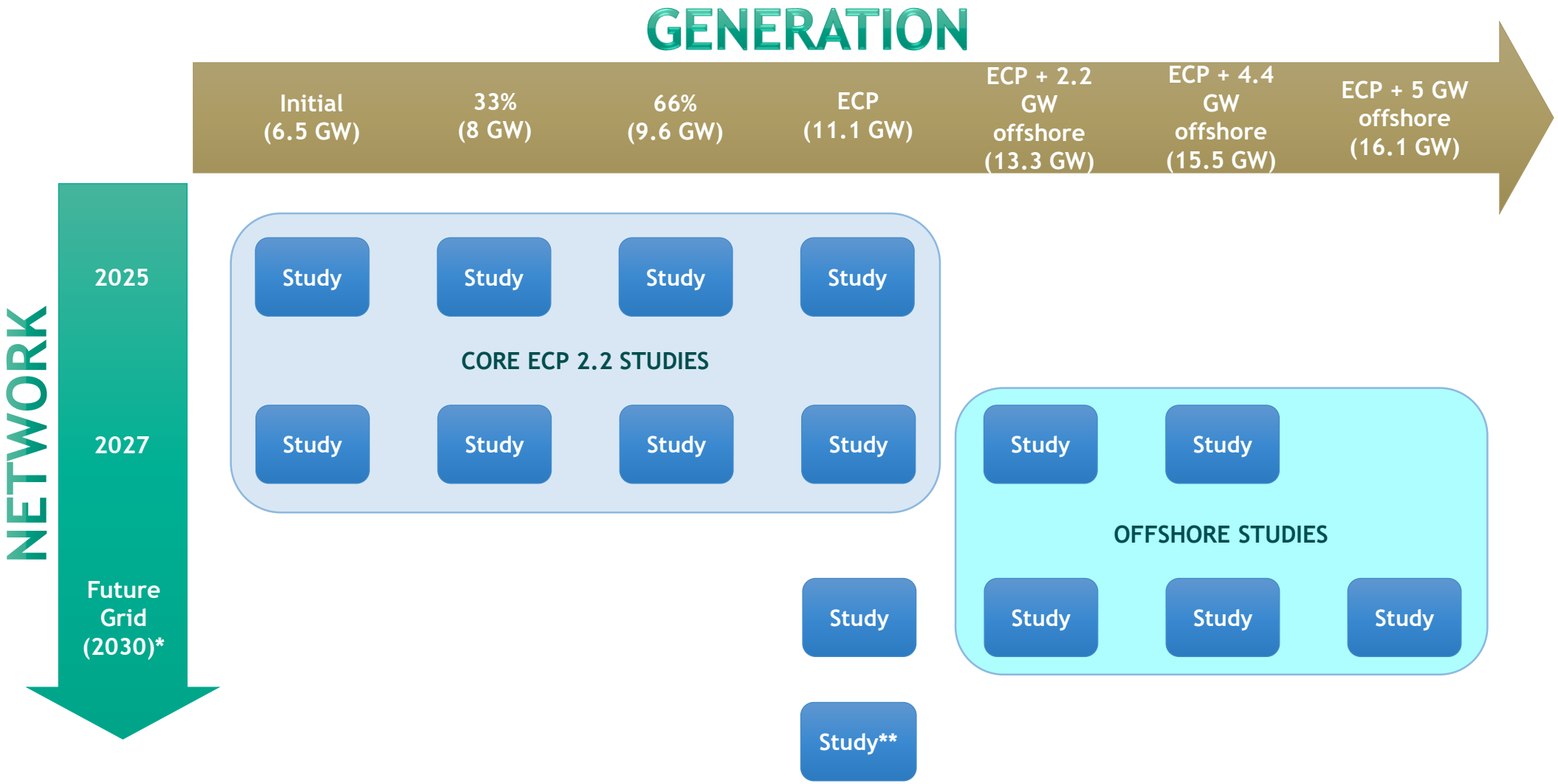
- ECP 2.2 is the second of three batches of connection offers planned under the CRU's Enduring Connection Policy 2 for offering grid connections to new renewable generators in Ireland.
- A total of 6GW of connection offers are rolled out in 3 phases starting from 2021 where, ECP 2.1 provided 2GW of connection offers, ECP 2.2 is the second phase with a total generation capacity of 2.7 GW
    - 0.36 GW wind
    - 1.77 GW solar
    - 0.55 GW battery
- EirGrid is required to provide ECP 2.2 customers with constraints information, reported as Total Dispatch Down .
- ECP 2.2 constraints analysis has been carried out in line with the CRU decision: CRU/20/060 on ECP 2 and 12 regional constraints reports are published in Q4 2022

Key Metric: Total Dispatch Down

- A key metric is the Total Dispatch Down:
  - Sum of Oversupply Dispatch Down, Curtailment & Constraint

Type of Dispatch Down	Definition	Application of dispatch down type in ECP 2.2 constraint studies
Oversupply	Dispatch down applied for energy balancing when generation exceeds demand + interconnector export	Applied According to Article 12 ie. non-priority generation dispatched down ahead of priority generation
Curtailment	Dispatch Down applied to ensure operational limits are met	Applied to all priority and non-priority generation pro-rata
Constraint	Dispatch Down applied to manage network constraints	Applied to all priority and non-priority generation at relevant nodes

Study Scenarios and Installed Wind and Solar



*The future Grid network is based upon the SOEF network, however, network projects that have received capital approval since the publication of SOEF have also been included.
**Additional maintenance sensitivity

Study Assumptions

- Demand – Shape based on historical year (HY) 2019
  - TER based GCS 2022-31
    - Median Demand
  - LEU based on GCS 2022-31
- Generation – data from Generation Connection team
  - Offers from Non-GPA, Gate 3, Pre-Gate, ECP 1, ECP 2.1, ECP 2.2

Table 1 : Total energy requirement (TER) in study years

Median	Calendar year TER (TWh)			Transmission Peak (GW)		
Year	Ireland	Northern Ireland	All-island	Ireland	Northern Ireland	All-island
2025	38.5	9.27	47.8	6.40	1.70	8.07
2027	41.3	9.74	51.0	6.57	1.77	8.30
2030	45.1	10.17	55.2	6.87	1.83	8.67

Table 2 : Installed capacity in study scenario

Gen Type (MW)	Initial	33%	66%	ECP	ECP + 2.2 GW offshore	ECP + 4.4 GW offshore	ECP + 5 GW offshore
Solar	1,389	2,442	3,496	4,549	4,549	4,549	4,549
Wind	5,072	5,581	6,090	6,599	6,599	6,599	6,599
Wind Offshore	-	-	-	-	2,197	4,394	4,994
Totals	6,461	8,023	9,586	11,148	13,345	15,542	16,142

Study Assumptions

Wind and Solar Profiles

- Wind profile from the year 2020 will be used in ECP 2.2.
- Each area profile is a recorded data from representative node in that area.

Solar Profile

- Solar North profile is from the recorded data for year 2020 from representative NI solar plant.
- Solar Middle and South profiles data is provided by the Industry.

Interconnectors

- 2025 – EWIC, Greenlink, Moyle(Export 400MW)
- 2027 – EWIC, Greenlink, Moyle(Export 400MW), Celtic
- 2030 – EWIC, Greenlink, Moyle(Export 450MW), Celtic
- NS 2 - included in 2027 and 2030

Reinforcements

- TYTFS (Planet) 2021, TDP 2022 and NDP based for Year 2025 and 2027
- 2030 – based on SOEF roadmap and additional capital approved projects after SOEF1

Wind Regions	2020 Capacity Factors
A	33%
B	35%
C	37%
D	36%
E	37%
F	37%
G	36%
H1	36%
H2	32%
I	36%
J	36%
K	35%
NI	30%
Offshore	45%

Solar	Capacity Factor
Solar North	11.2%
Solar Middle	12.3%
Solar South	12.3%

Operational Constraints

- Operational constraints
  - Based on the operational pathway in SOEF and DS3 Future arrangements from Future Operations team

Active System Wide Constraints	ECP 2.1 Assumptions	ECP 2.2 Assumptions
Non-Synchronous Generation	2024 - 80% 2026 - 85% 2030 - 95%	2025 - 85% 2027 - 85% 2030 - 95%
Operational Limit For RoCoF	2024 - 1 Hz/sec 2026 - 1 Hz/sec 2030 - 1 Hz/sec	2025 - 1 Hz/sec 2027 - 1 Hz/sec 2030 - 1 Hz/sec
Operational Limit For Inertia	2024 - 20,000 MWs 2026 - 17,500 MWs 2030 - 15,000 MWs	2025 - 20,000 MWs 2027 - 17,500 MWs 2030 - 17,500 MWs
Minimum Sets (IE, NI)	2024 - 4,3 2026 - 4,2 2030 - 2,2	2025 - 4, 2 2027 - 3, 2 2030 - 2, 2

Study Assumptions

Transmission Network

- 2025, 2027 – based on TYTFS publication

Transmission Maintenance

- Representative maintenance based on outage planning team's suggestions
- Includes 85 outages each for 1 month

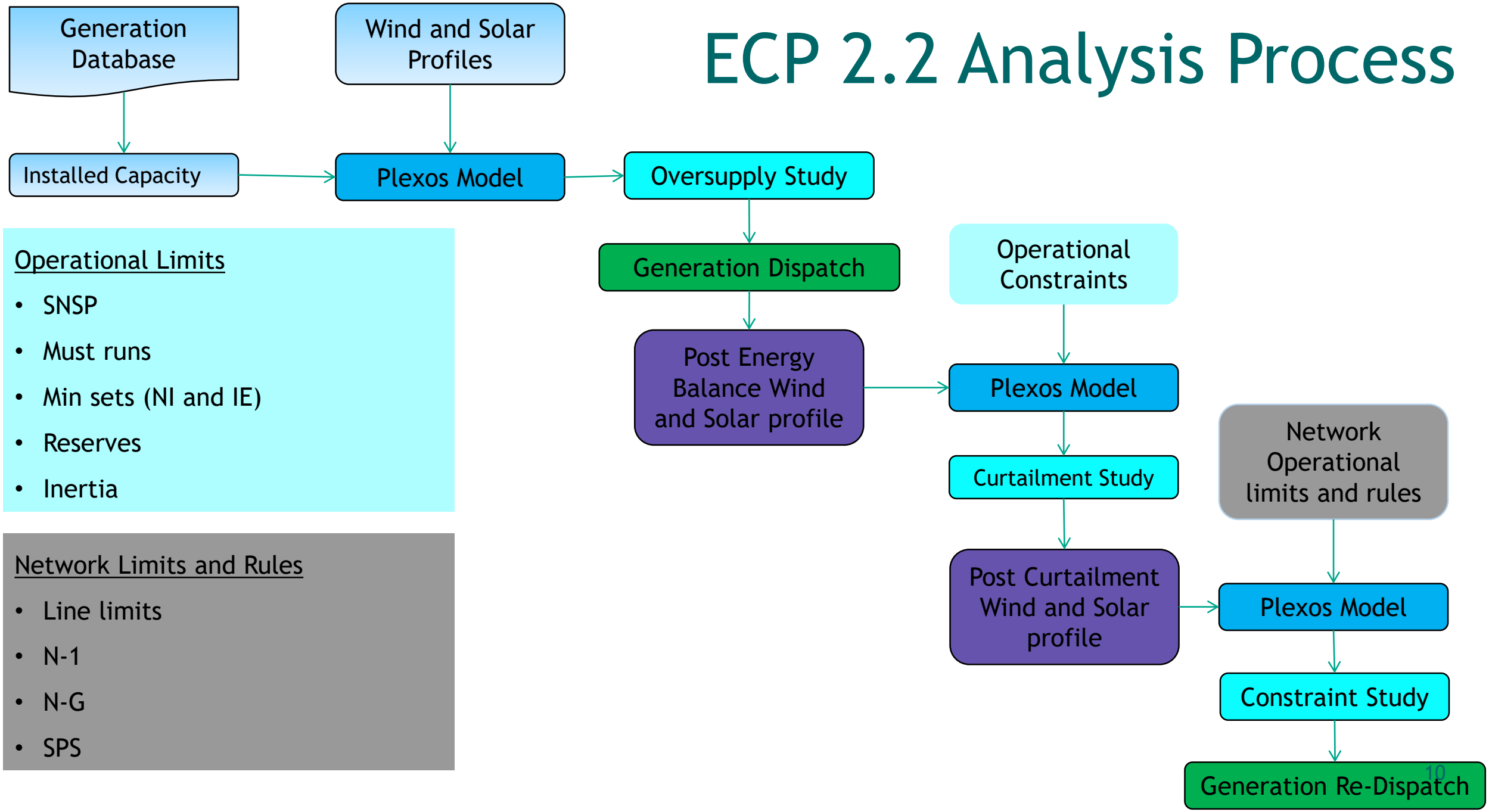
Fuel Cost

- From National Grid's (ESO) Future Energy Scenario (FES) 2022

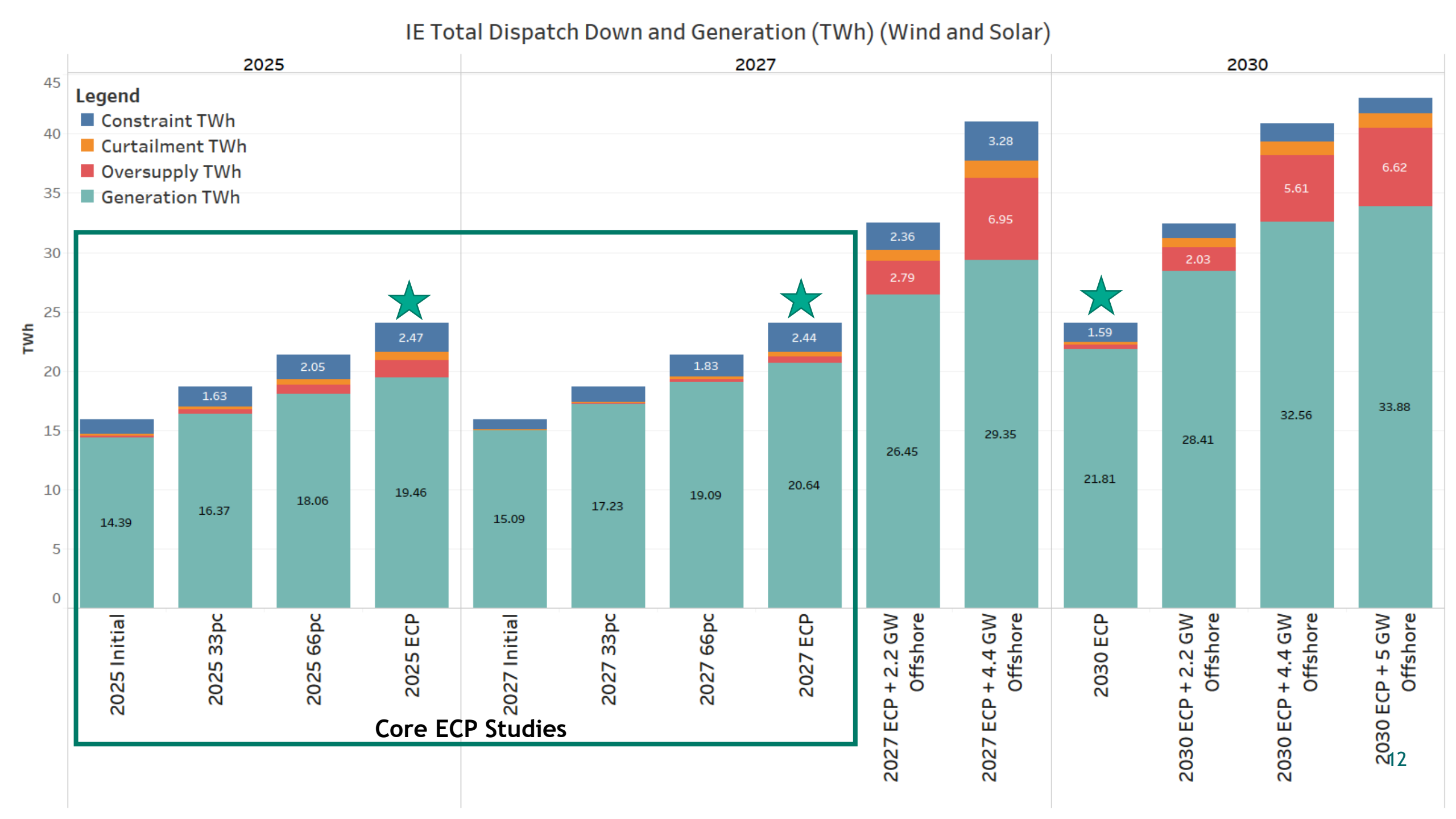
Batteries

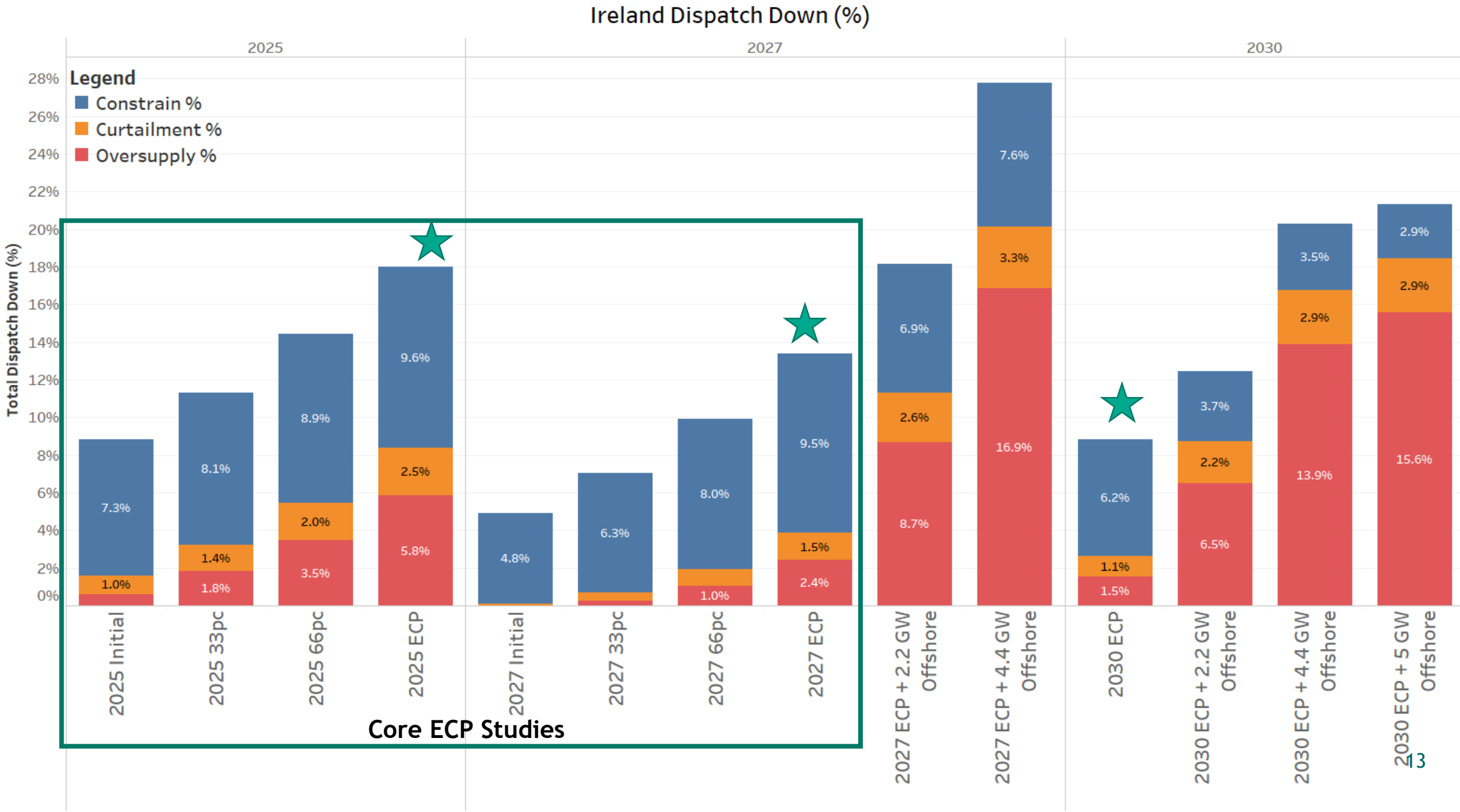
- Based on current offers and applications
- Would be used for maintaining reserve (POR, SOR, TOR1 & TOR2)
- 1 cycle per day limit
- Portion of the long duration storage to provide energy arbitrage.

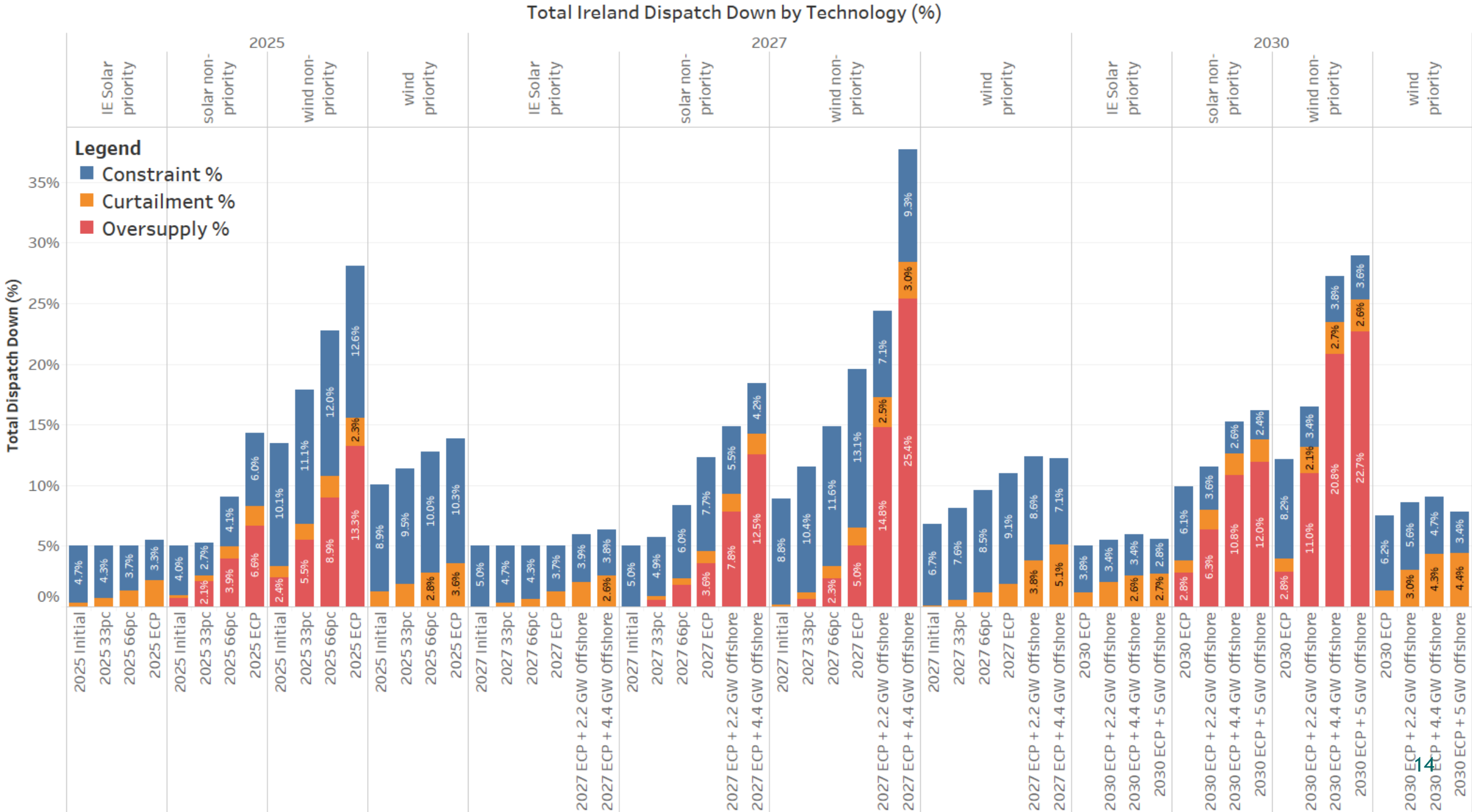
ECP 2.2 Analysis Process

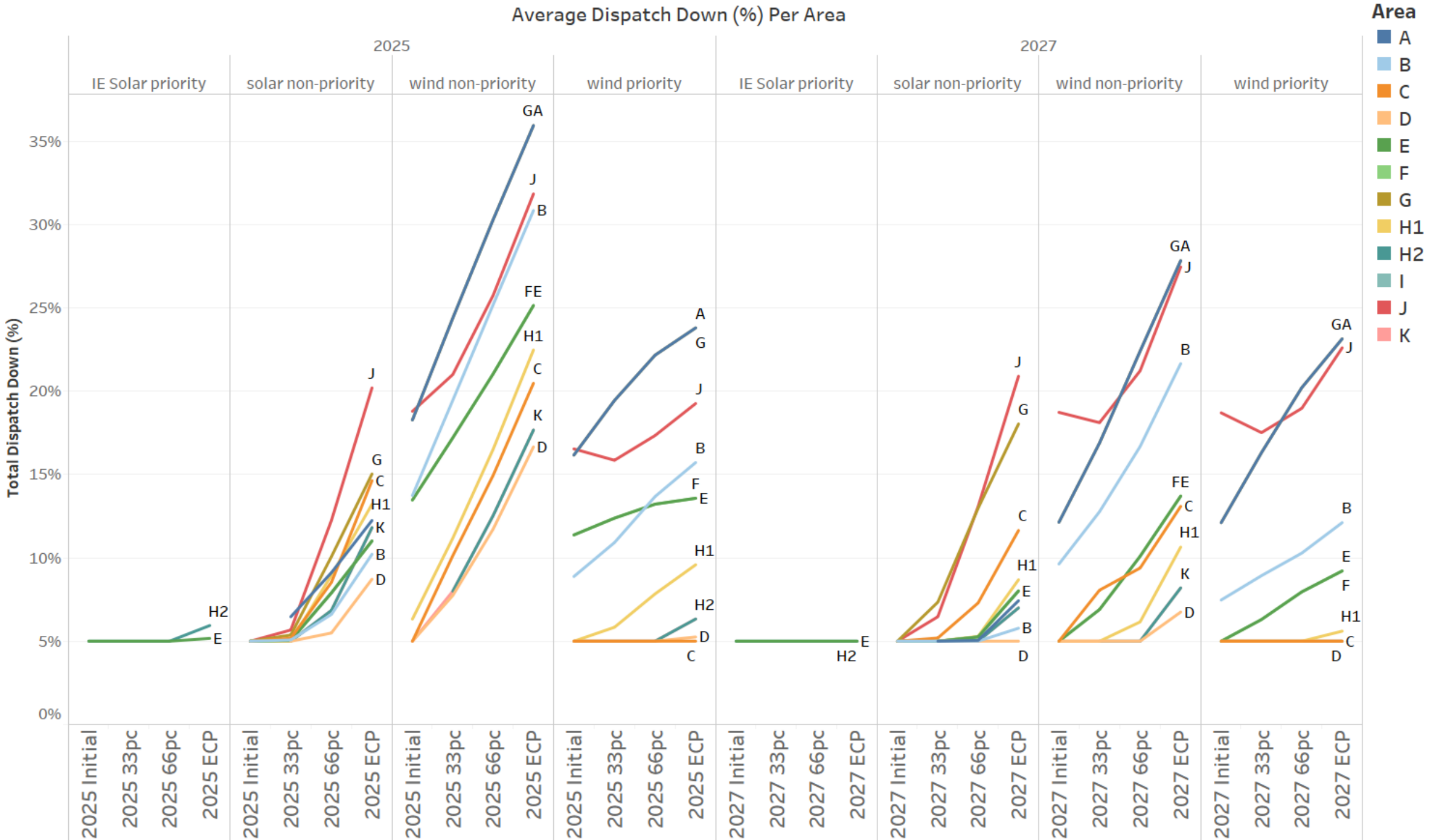


Results


IE Total Dispatch Down and Generation (TWh) (Wind and Solar)
2025
2027
2030
Legend
Constraint TWh
Curtailment TWh
Oversupply TWh
Generation TWh
TWh
45
40
35
30
25
20
15
10
5
0
14.39
1.63
16.37
2.05
18.06
2.47
19.46
15.09
1.83
17.23
2.44
19.09
20.64
2.36
2.79
26.45
3.28
6.95
29.35
1.59
21.81
2.03
28.41
5.61
32.56
6.62
33.88
2025 Initial
2025 33pc
2025 66pc
2025 ECP
2027 Initial
2027 33pc
2027 66pc
2027 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
Core ECP Studies

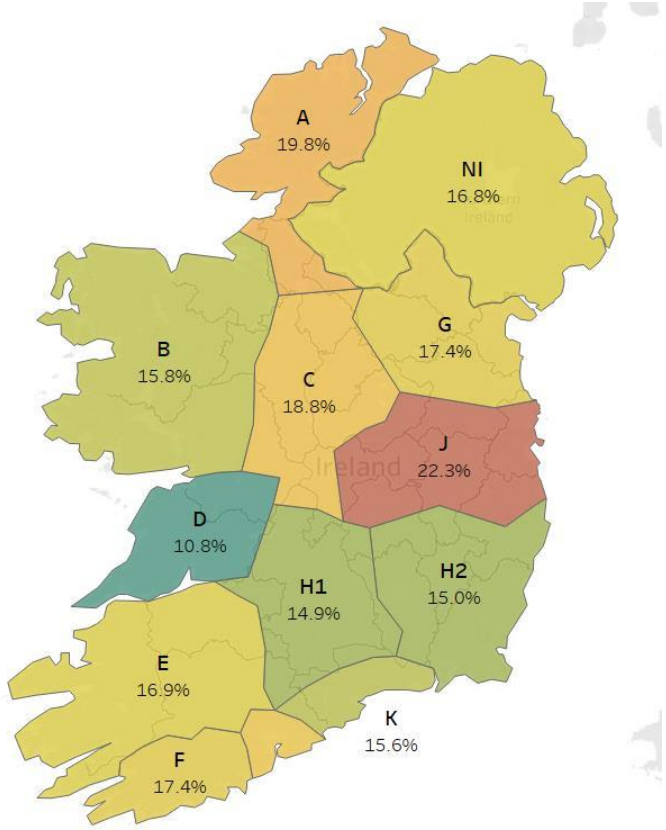

Ireland Dispatch Down (%)
2025
2027
2030
Legend
Constrain %
Curtailment %
Oversupply %
Total Dispatch Down (%)
28%
26%
24%
22%
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
7.3%
1.0%
8.1%
1.4%
1.8%
8.9%
2.0%
3.5%
9.6%
2.5%
5.8%
4.8%
6.3%
8.0%
1.0%
9.5%
1.5%
2.4%
6.9%
2.6%
8.7%
7.6%
3.3%
16.9%
6.2%
1.1%
1.5%
3.7%
2.2%
6.5%
3.5%
2.9%
13.9%
2.9%
2.9%
15.6%
2025 Initial
2025 33pc
2025 66pc
2025 ECP
2027 Initial
2027 33pc
2027 66pc
2027 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
Core ECP Studies


Total Ireland Dispatch Down by Technology (%)
2025
2027
2030
IE Solar priority
solar non-priority
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
0%
5%
10%
15%
20%
25%
30%
35%
2025 Initial
2025 33pc
2025 66pc
2025 ECP
2027 Initial
2027 33pc
2027 66pc
2027 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Average Dispatch Down (%) Per Area
Area
A
B
C
D
E
F
G
H1
H2
I
J
K
2025
2027
IE Solar priority
solar non-priority
wind non-priority
wind priority
Total Dispatch Down (%)
0%
5%
10%
15%
20%
25%
30%
35%
2025 Initial
2025 33pc
2025 66pc
2025 ECP
2027 Initial
2027 33pc
2027 66pc
2027 ECP

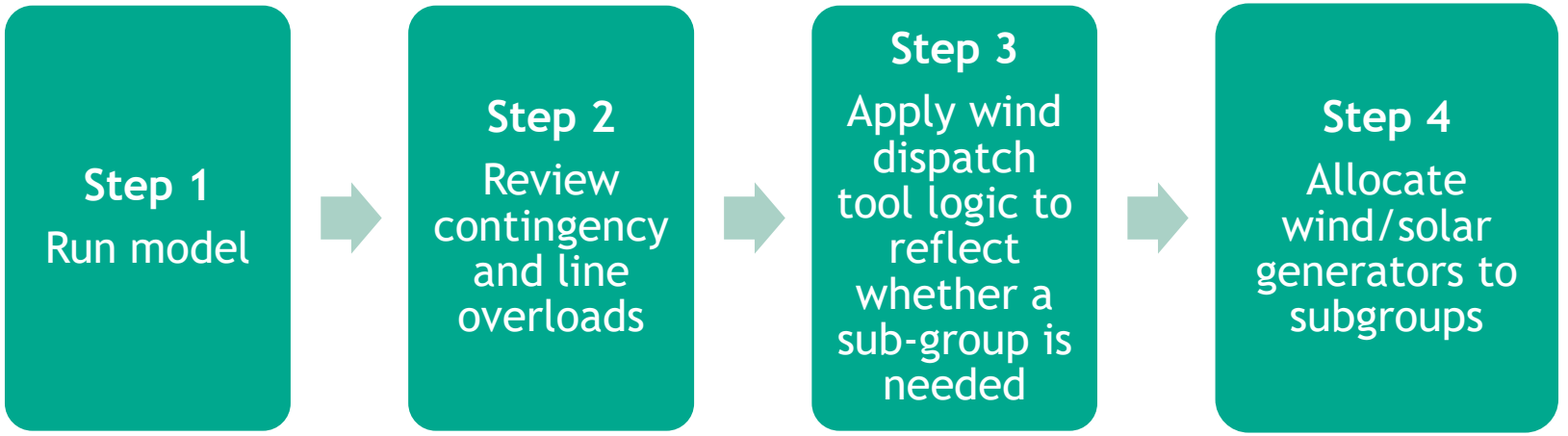
ECP 2.2 - Key Messages

- In the longer term scenarios, oversupply becomes a more significant component of total dispatch down with increasing renewable capacity.
- Higher dispatch down is observed for non-priority generators due to oversupply dispatch down.
- Area A, B, G and J has higher dispatch down in 2025 but reduces in 2027 due to increase in demand and network development.
- Solving network issues in the north west can increase power flow towards Dublin, but leads to congestion moving to the north east.
- At times, network issues in one area can affect the power flow in other area causing congestion in the second area.



*illustrative figure for total dispatch down

CONSTRAINT SUB-GROUP LOGIC



Caveats:

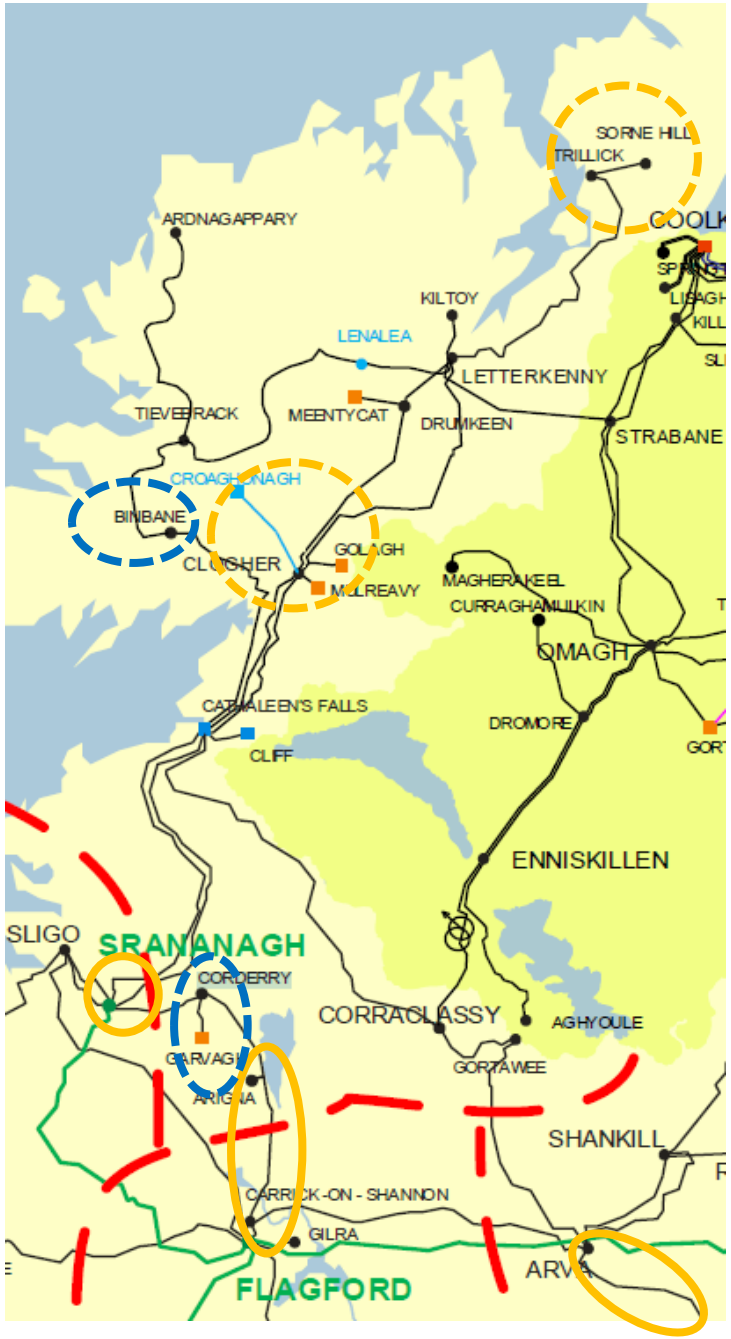
- Constraint groups are developed with the 2025/2027 studies.
- These sub-groups are not redefined for future years, this allows comparison across the study years.
- Constraint subgroupings are part of the ECP analysis to ensure balanced allocation of constraints, this is done to overcome the Plexos modelling limitations. e.g. Plexos is a cost optimisation model and may over constrain particular nodes for a given contingency.
- This study does not act to predict future wind dispatch tool sub-groups rather it aims to enable appropriate allocation of network constraints within the boundaries of the ECP 2.2 studies.
- Future iterations of the ECP constraint reports will re-assess these constraint groups.

CONSTRAINT SUB-GROUP LOGIC

ANALYSIS SAMPLE

- Contingencies observed in a sample instance in the region
  - Loss of Carrick on Shannon - Arigna_110_1
  - Loss of Arva - Navan_110_1
  - Loss of Srananagh T2102
- Generators are selected for dispatch down at same location differently for managing issues in the region.
- The generators may not always be dispatched down at the same node as the contingency for managing the contingency.

Available and Dispatch Down (MWh)							
	Croaghonagh wind not priority	Sorne Hill wind priority	Mulreavy wind priority	Binbane wind not priority	Corderry wind not priority	Sligo wind priority	Garvagh wind priority
Available	127.1	44.3	87.6	34.2	15.0	13.7	75.4
Dispatch down	127.1	44.3	87.6	0	15.0	13.7	11.6



Area Results

Area A, B, C and G and Network Uprates in the Area

- Power flows predominantly towards the East.
- Constraints increases with increase in flows.
- Bottleneck around the Flagford - Srananagh region, Drybridge region, and Galway region.
- Planned reinforcements improve the power flow in Area A, B North and C North but moves the bottleneck to the G North.

Table 1: Reinforcements in this area

Project Name	Study Year
Castlebar 110 kV station busbar uprate	2025
Flagford - Sliabh Bawn 110 kV circuit uprate	2025
Arva - Carrick-on-Shannon 110 kV line uprate	2025
Lanesboro – Sliabh Bawn Thermal Uprate	2025
Binbane - Cathaleen_s Fall 110 kV Circuit Thermal Capacity	2025
Glenree - Moy 110 kV Line Uprate	2025
Gorman - Platin 110 kV line uprate	2025
Drybride - Oldbridge - Platin 110 kV line uprate	2025
Louth - Rathrussan 110 kV No 1 Line Uprate	2025
North South 400 kV Interconnector - RoI*	2027
Castlebar-Cloon 110 kV Line Uprate	2027
Sligo 110 kV Station - Shrananagh 1 & 2 Bay uprates	2027
Cashla-Salthill 110 kV Thermal Uprate	2027
North Connacht 110 kV Project	2027
Dalton 110 kV Busbar	2027

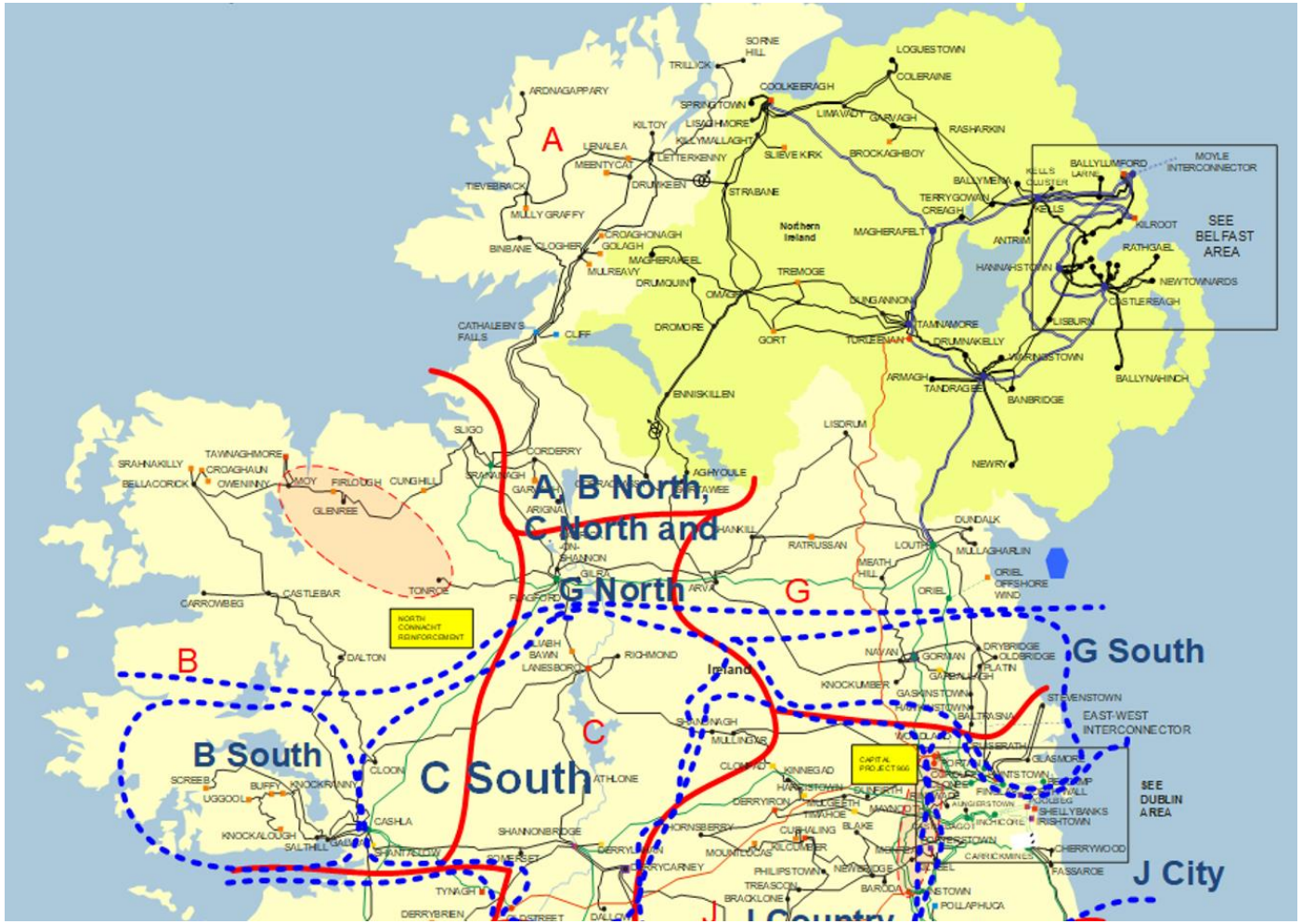
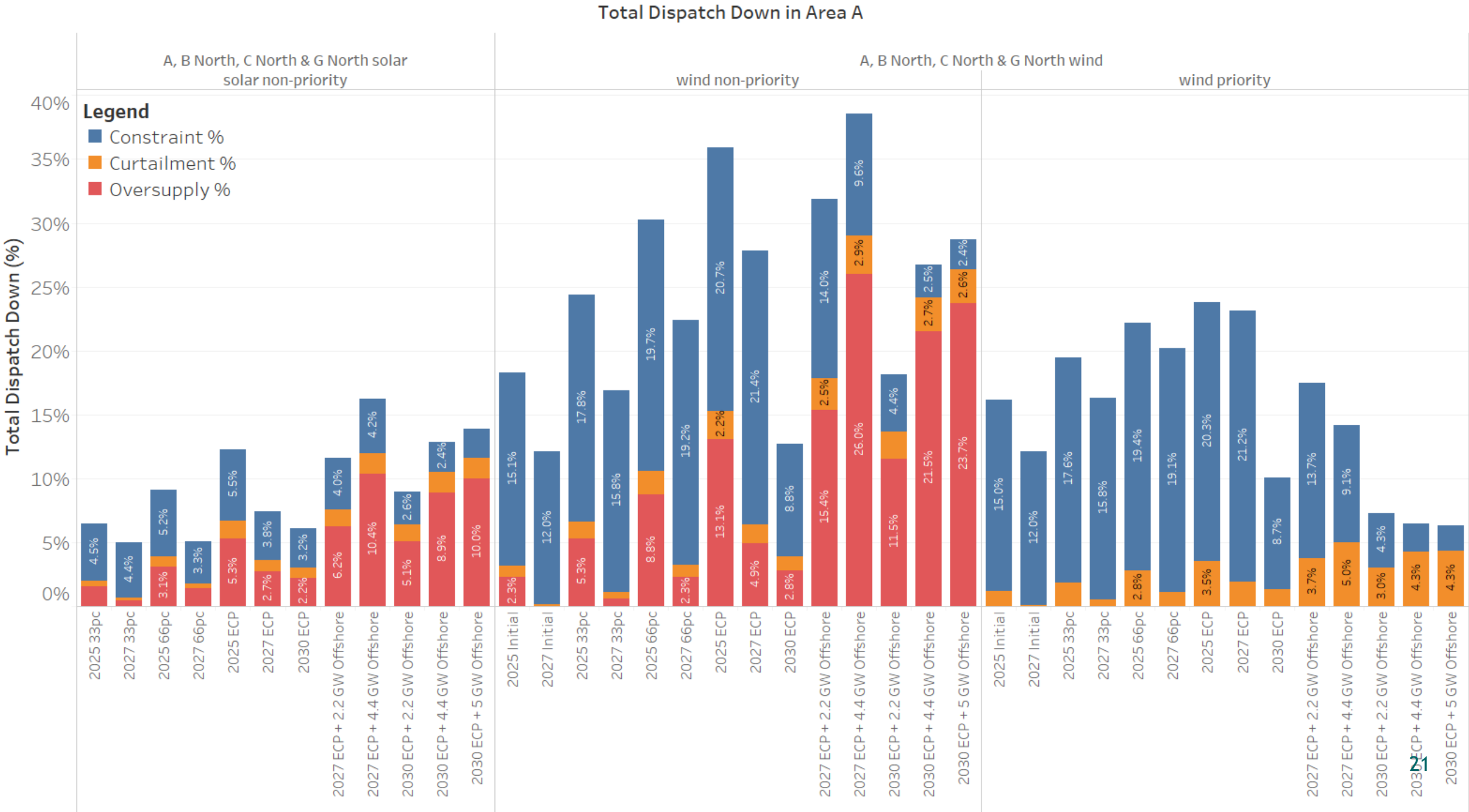
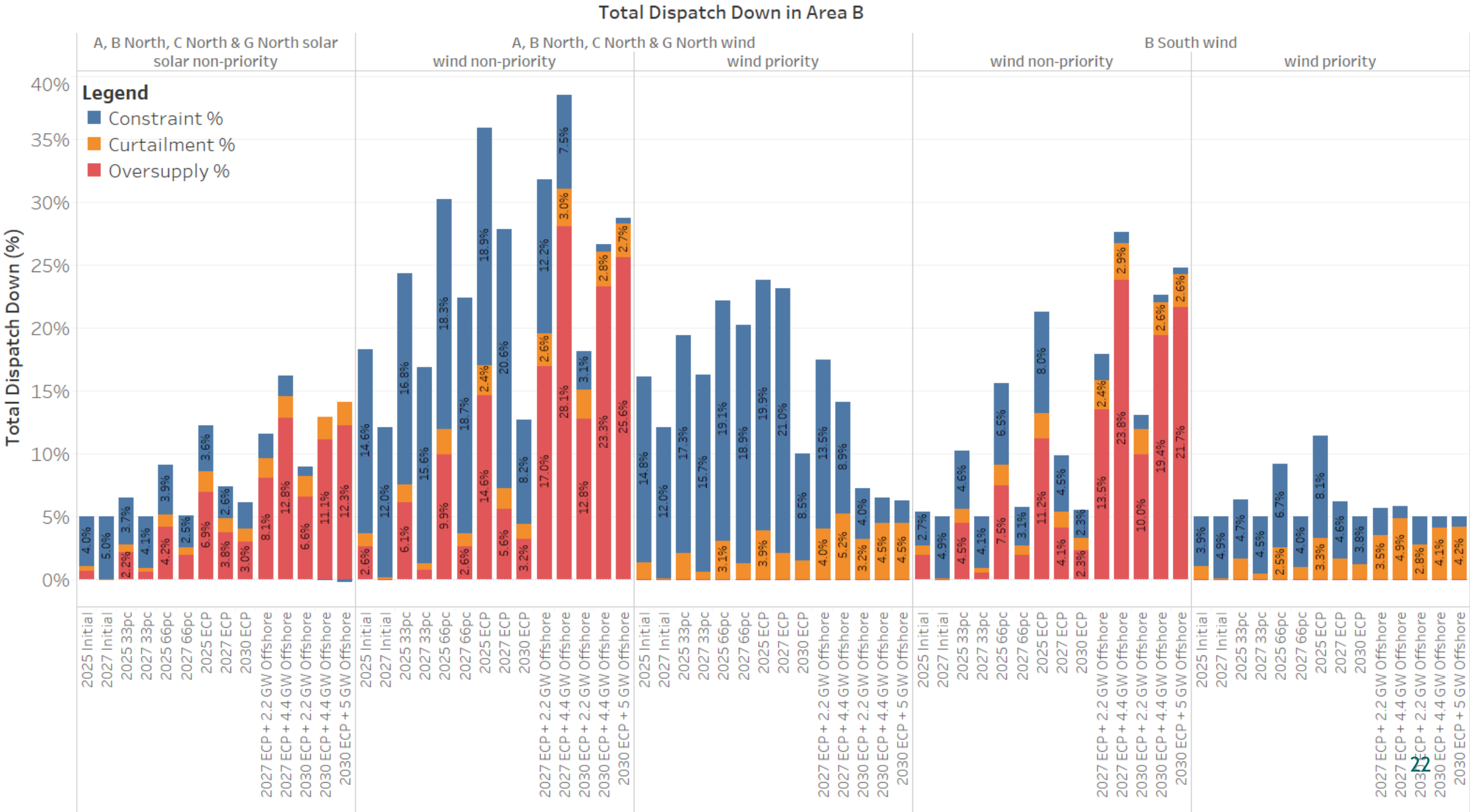
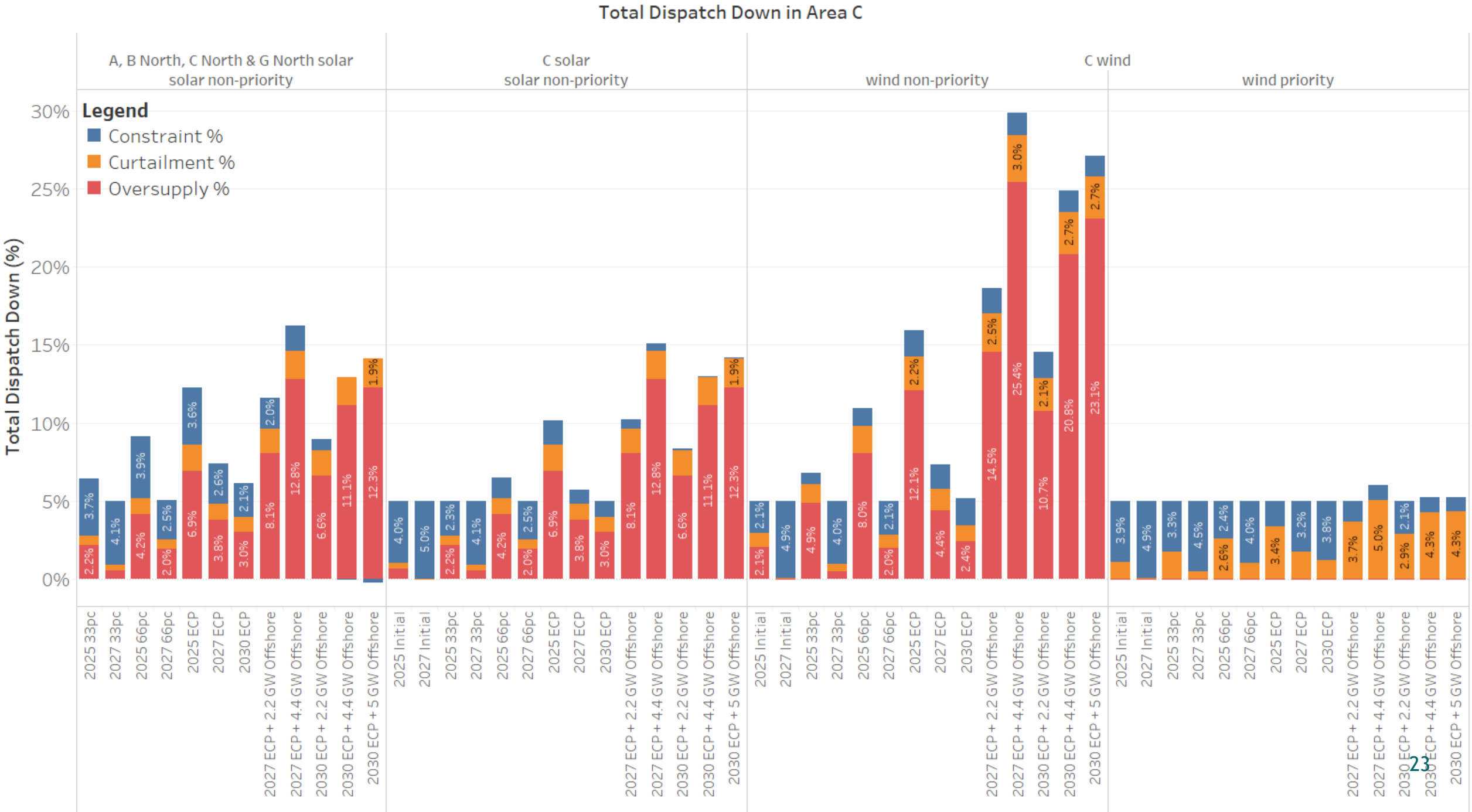
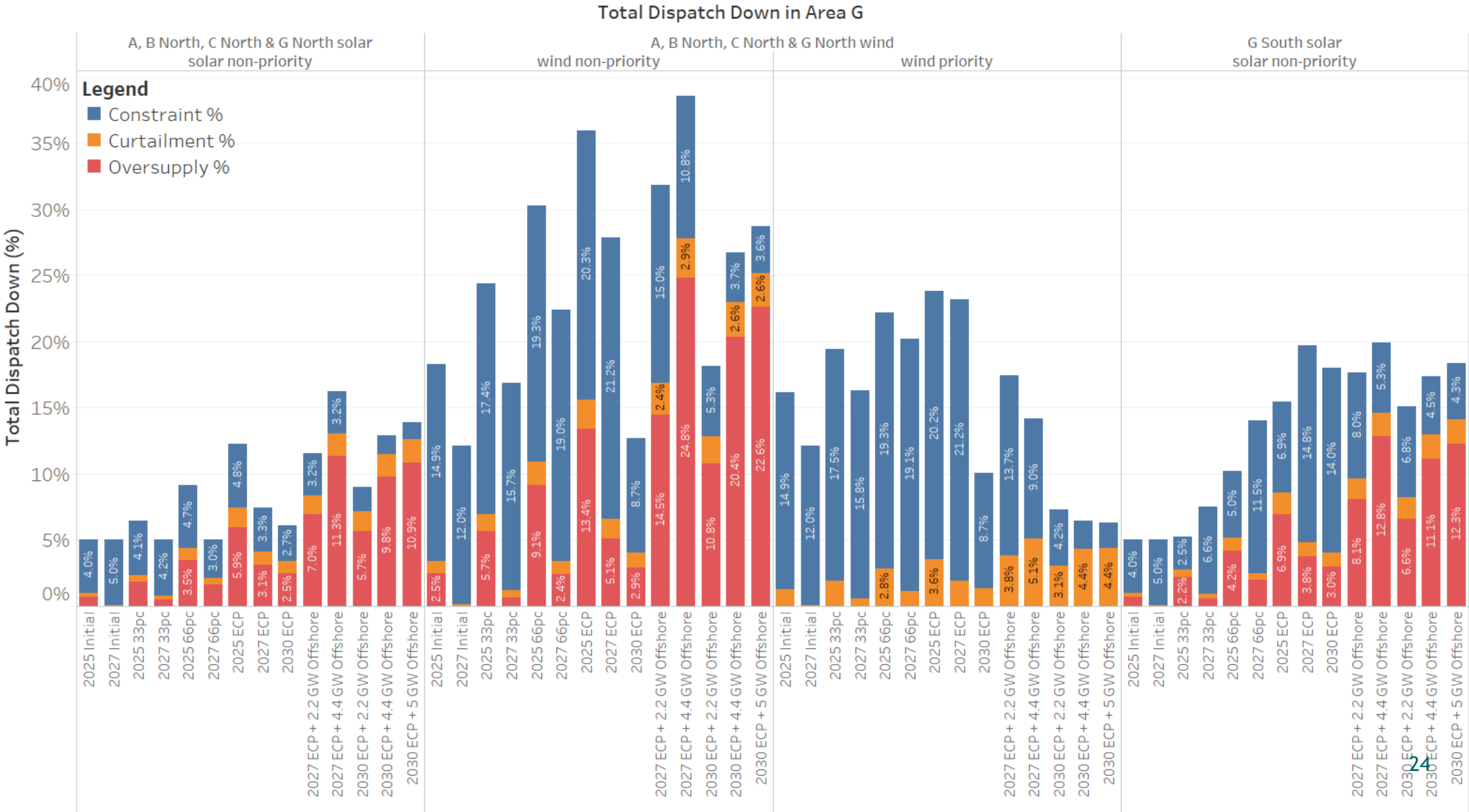


Figure: Area A, B, C and G map


Total Dispatch Down in Area A
A, B North, C North & G North solar
solar non-priority
A, B North, C North & G North wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
40%
35%
30%
25%
20%
15%
10%
5%
0%
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area B
A, B North, C North & G North solar
solar non-priority
A, B North, C North & G North wind
wind non-priority
wind priority
B South wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
40%
35%
30%
25%
20%
15%
10%
5%
0%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area C
A, B North, C North & G North solar
solar non-priority
C solar
solar non-priority
C wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
30%
25%
20%
15%
10%
5%
0%
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
2025 Initial
2027 Initial


Total Dispatch Down in Area G
A, B North, C North & G North solar
solar non-priority
A, B North, C North & G North wind
wind non-priority
wind priority
G South solar
solar non-priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
40%
35%
30%
25%
20%
15%
10%
5%
0%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore

Area D, H1 and J and Network Uprates in the Area

- Power flows predominantly towards the East.
- Constraints increase with increase in flows.
- Area J country is affected by loss of any section of the meshed circuit.
- Planned reinforcements improve the power flow in Area J.
- Area H1 is affected by the contingencies within H1 along with contingencies in areas surrounding H1.

Table 1: Reinforcements in this area

Project Name	Study Year
Laois Kilkenny (Coolnabacky) 400 kV Station - New Station & Associated Lines & Station Works	2025
Corduff - Ryebrook 110 kV line uprate	2025
Maynooth - Woodland 220 kV line uprate	2025
Thurles 110 kV Station - Statcom	2025
Belcamp Shellybanks 220 kV Cable	2025
Newbridge - Cushaling 110 kV line, Stations bay conductors and lead-in conductor uprate	2025
Coolnabacky - Portlaoise 110 kV line uprate	2027
Dunstown 400 kV Series Capacitor	2027
Oldstreet-Woodland 400 kV Series Capacitor	2027
Kinnegad 110 kV station, Derryiron 110 kV bay conductor uprate	2027
Newbridge - Portlaoise 110 kV Partial Thermal Uprate	2027
Derryiron - Thornsberry 110 kV Circuit Uprate	2027

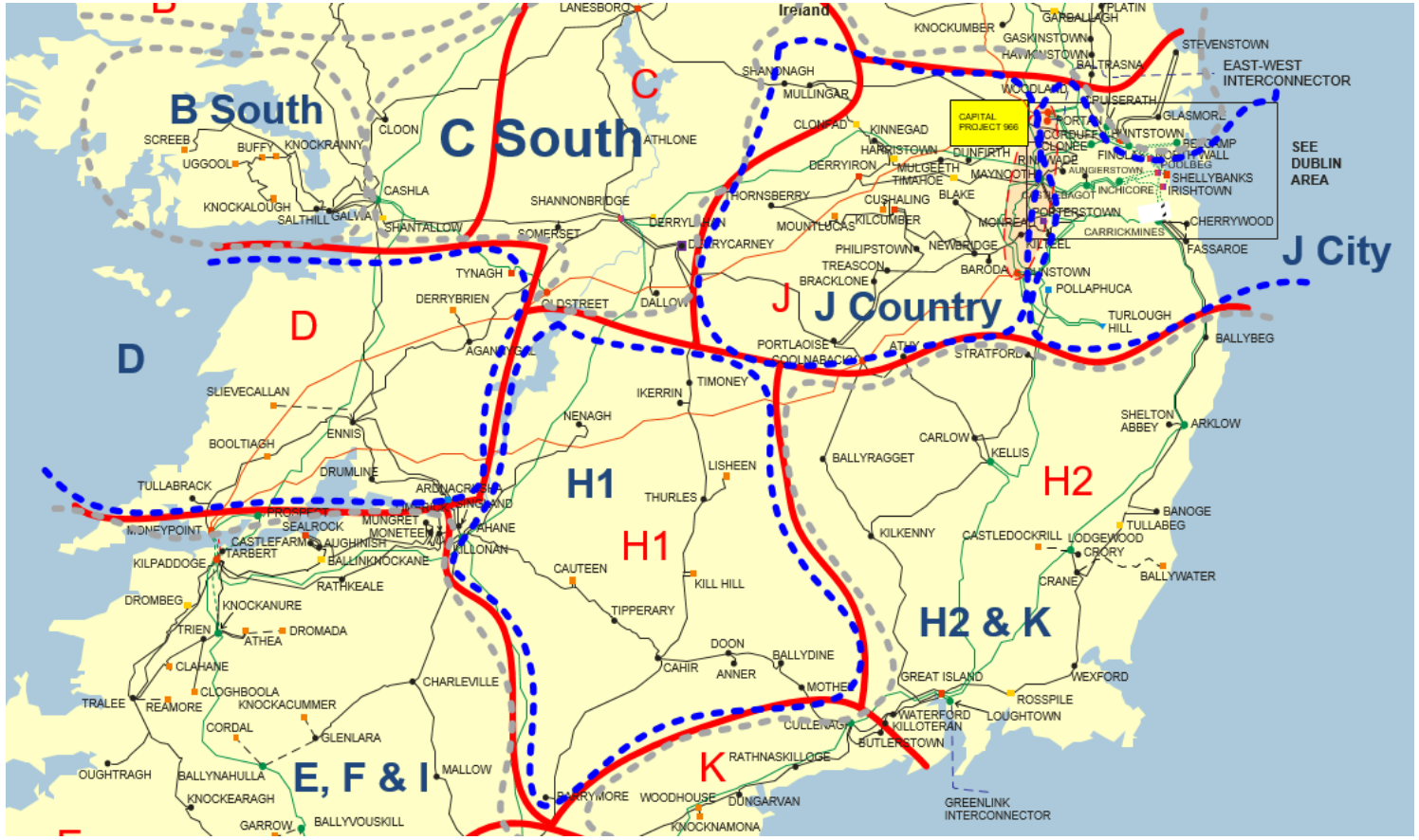
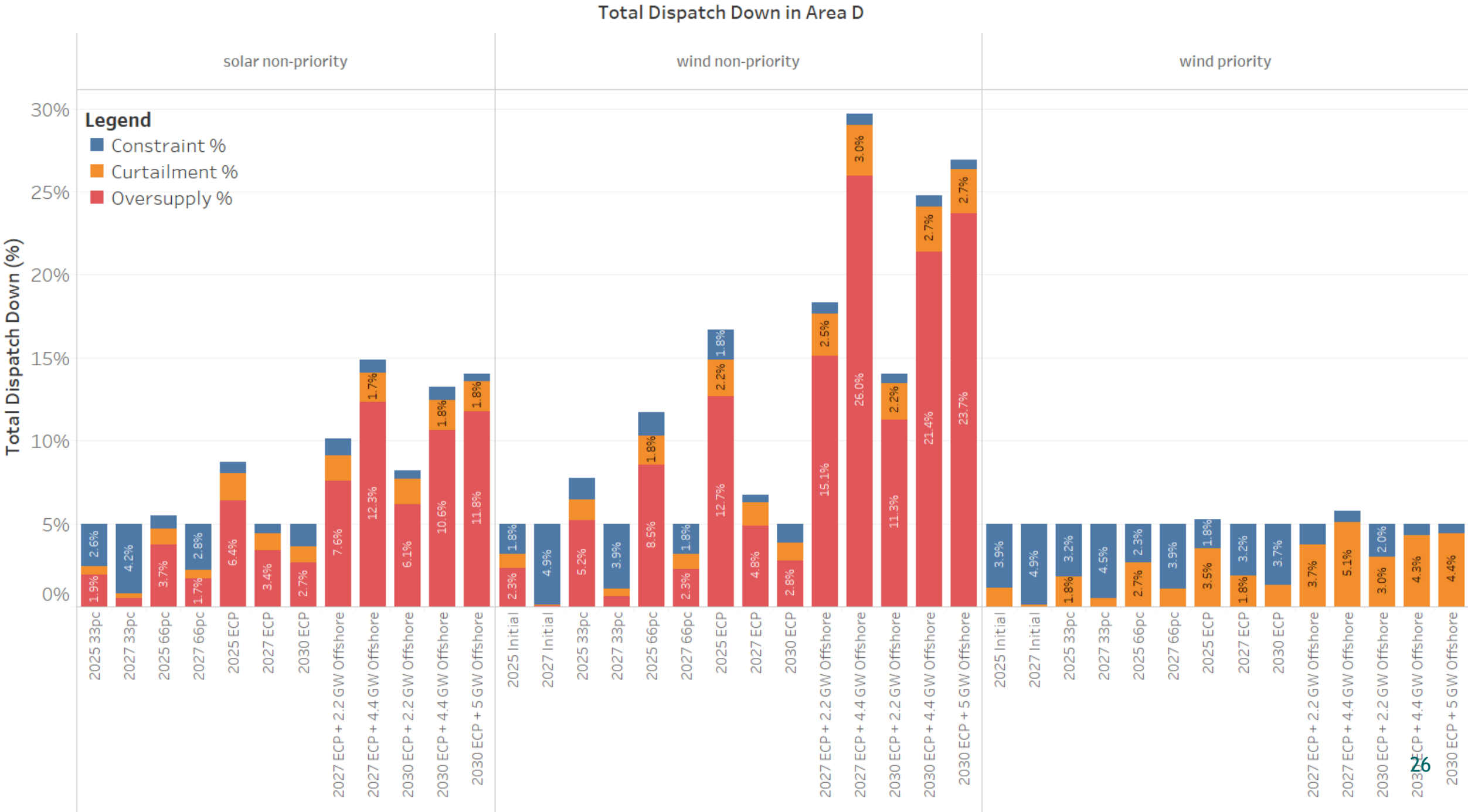
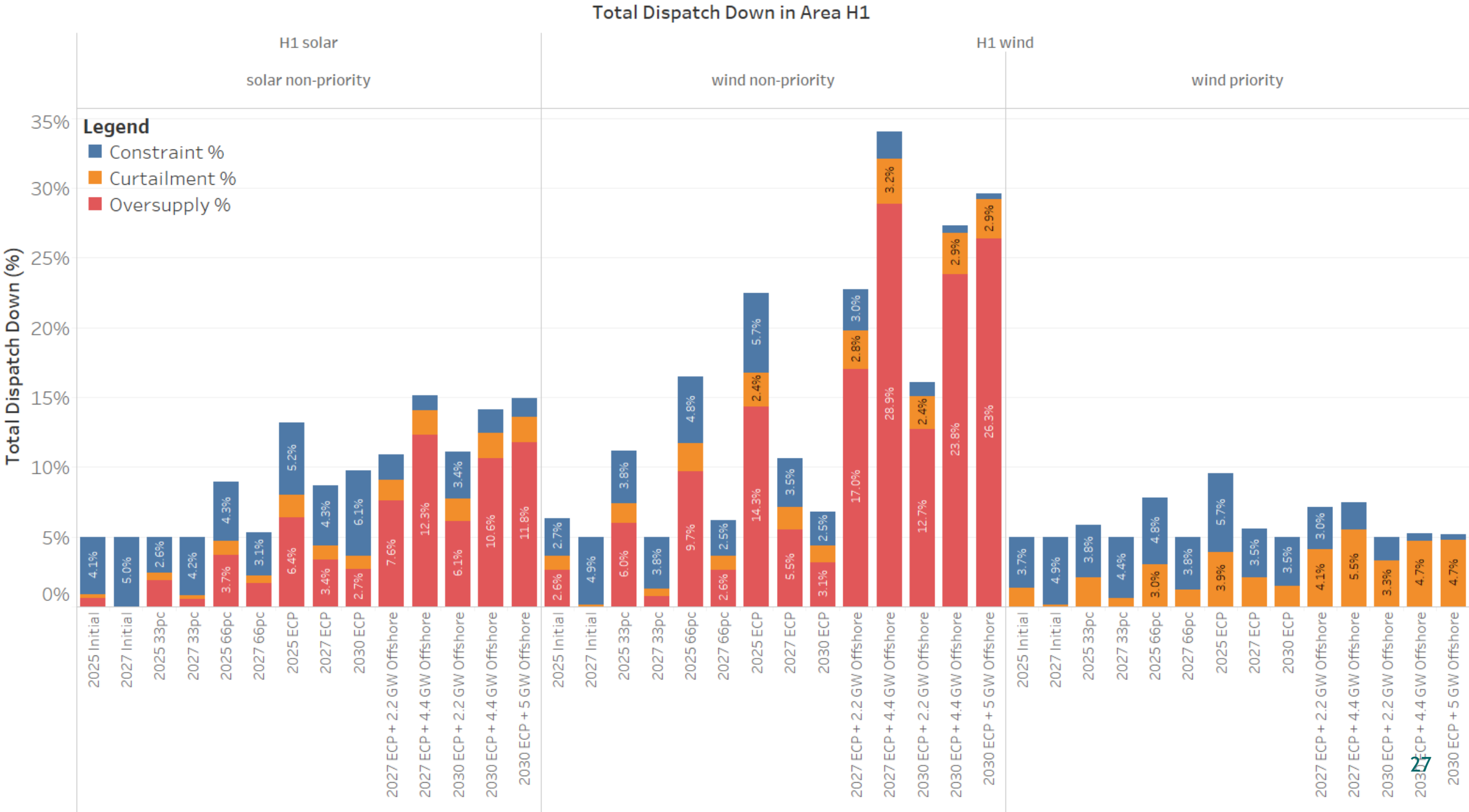
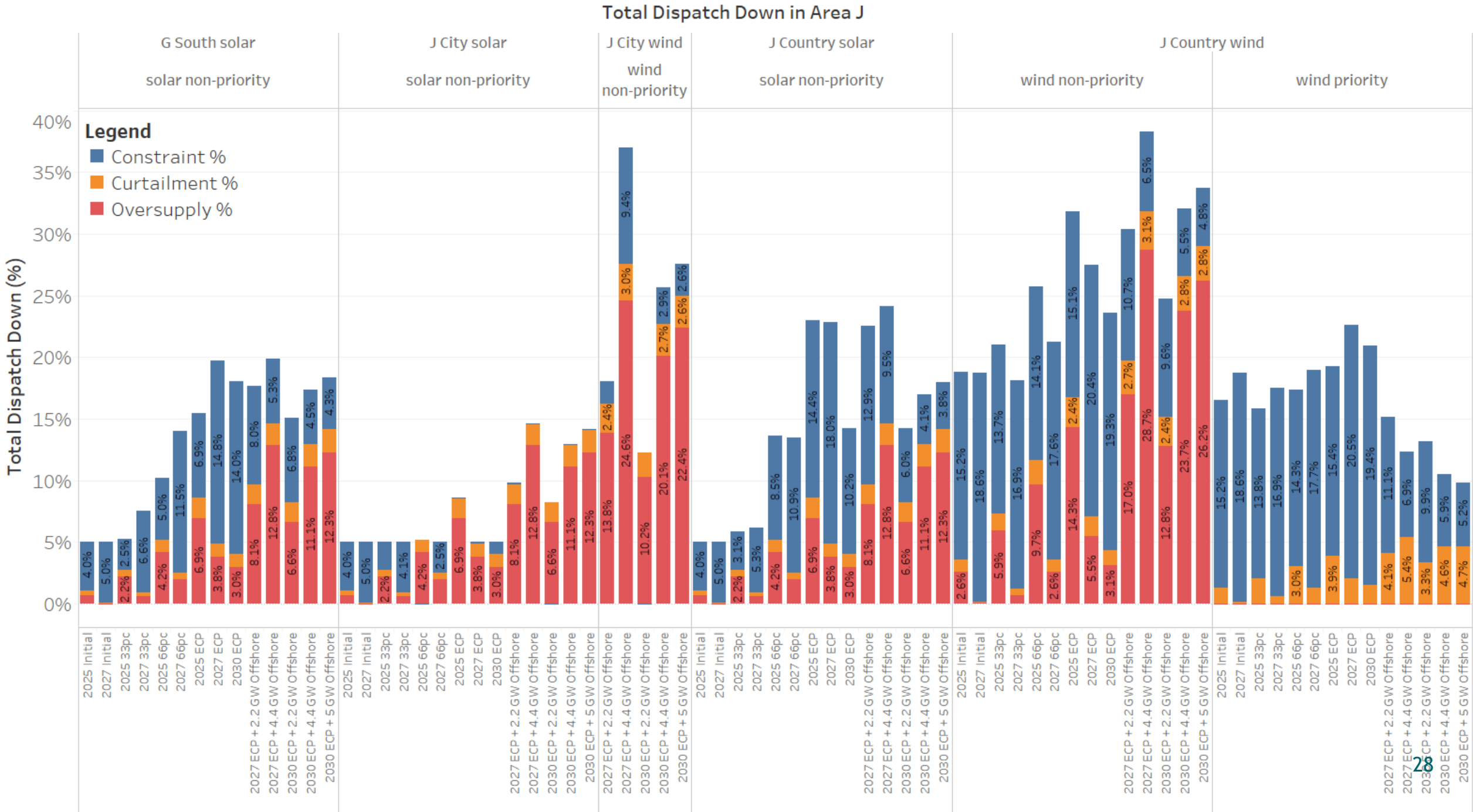


Figure: Area D, H1, and J


Total Dispatch Down in Area D
solar non-priority
wind non-priority
wind priority
Total Dispatch Down (%)
30%
25%
20%
15%
10%
5%
0%
Legend
Constraint %
Curtailment %
Oversupply %
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
2025 Initial
2027 Initial


Total Dispatch Down in Area H1
H1 solar
solar non-priority
H1 wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
35%
30%
25%
20%
15%
10%
5%
0%
4.1%
5.0%
2.6%
4.2%
4.3%
3.7%
3.1%
5.2%
6.4%
4.3%
3.4%
6.1%
2.7%
7.6%
12.3%
3.4%
6.1%
10.6%
11.8%
2.7%
2.6%
4.9%
3.8%
6.0%
3.8%
4.8%
9.7%
2.5%
2.6%
5.7%
2.4%
14.3%
3.5%
5.5%
2.5%
3.1%
3.0%
2.8%
17.0%
3.2%
28.9%
2.4%
12.7%
2.9%
23.8%
2.9%
26.3%
3.7%
4.9%
3.8%
4.4%
4.8%
3.0%
3.8%
5.7%
3.9%
3.5%
3.5%
3.0%
4.1%
5.5%
3.3%
4.7%
4.7%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area J
G South solar
solar non-priority
J City solar
solar non-priority
J City wind
wind non-priority
J Country solar
solar non-priority
J Country wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
40%
35%
30%
25%
20%
15%
10%
5%
0%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore

Area E, F, I, H2 and K - Network Uprates in the Area

- Power flows predominantly towards the East.
- Constraints increase with increase in flows.
- Area J country is affected by loss of any section of the meshed circuit.
- Planned reinforcements improve the power flow and reduce the dispatch down.
- Some areas are affected by the contingencies within that area as well as contingencies in areas surrounding it.

Table 1: Reinforcements in this area

Project Name	Study Year
Kilpaddoge - Knockanure 220 kV cable	2025
Clashavoon - Tarbert 220 kV line uprate	2025
Ballyvouskill Knockanure 220 kV Line Uprate	2025
Ballynahulla 220-110 kV Station - Statcom	2025
Ballyvouskill 220-110 kV Station - Statcom	2025
Great Island Kilkenny 110 kV Uprate	2025
Greenlink Interconnector	2025
Moneypoint Synchronous Condenser	2025
Moneypoint 400 kV Series Capacitor	2027
Cross Shannon 400 kV Cable	2027
Crane - Wexford 110 kV Circuit Thermal Capacity	2027
Knockraha Short Circuit Rating Mitigation	2027
Bandon Dunmanway 110 kV circuit thermal capacity	2027

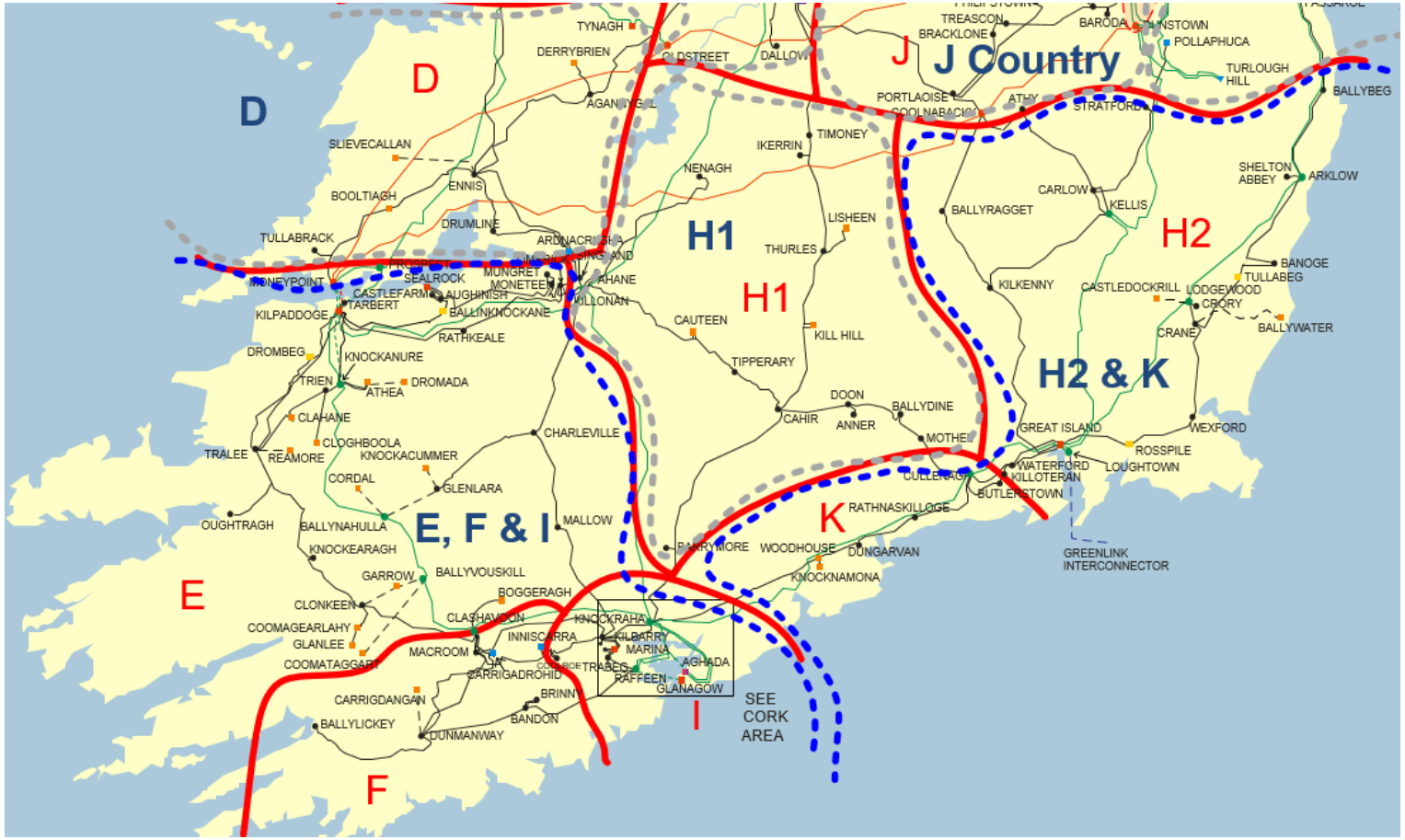
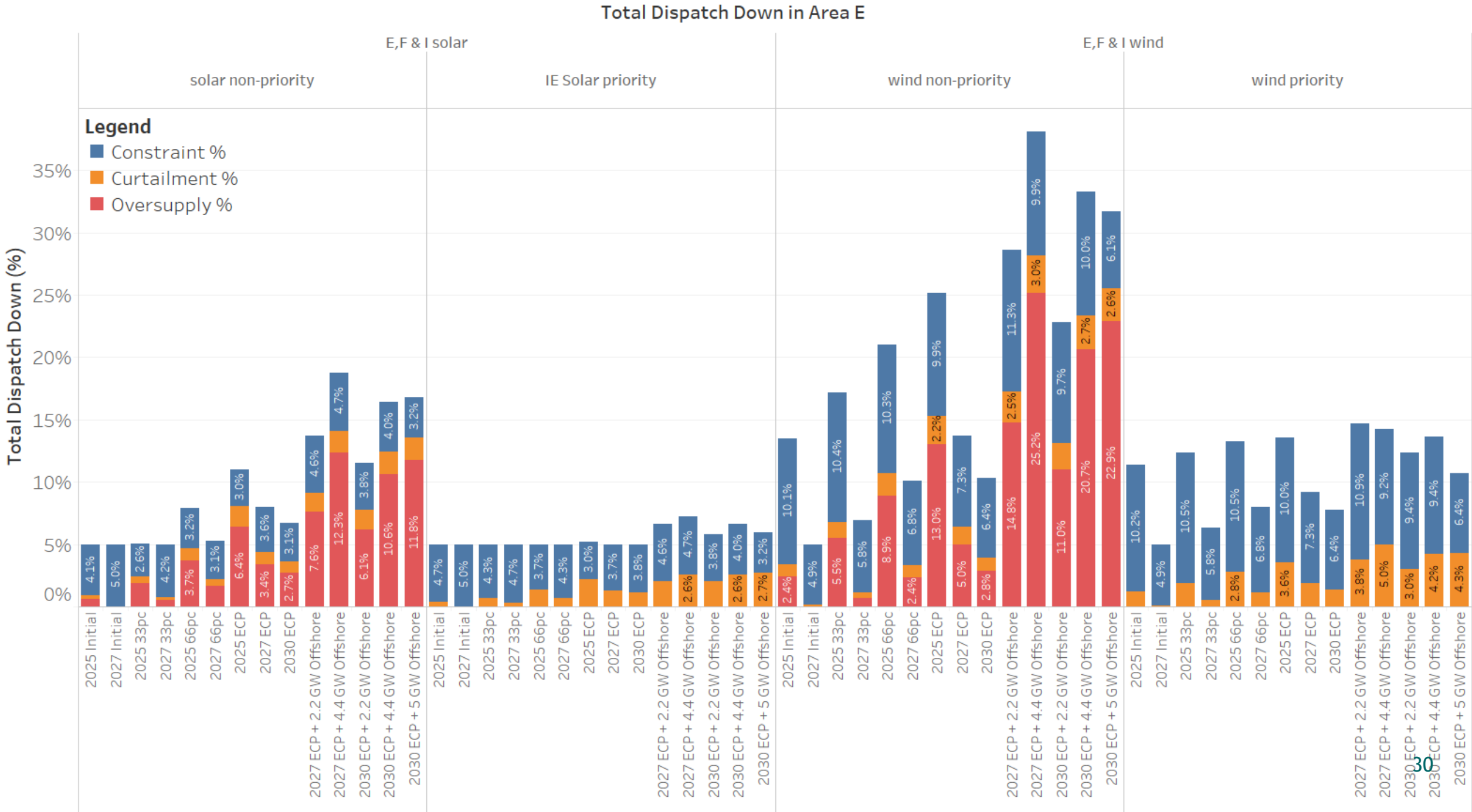
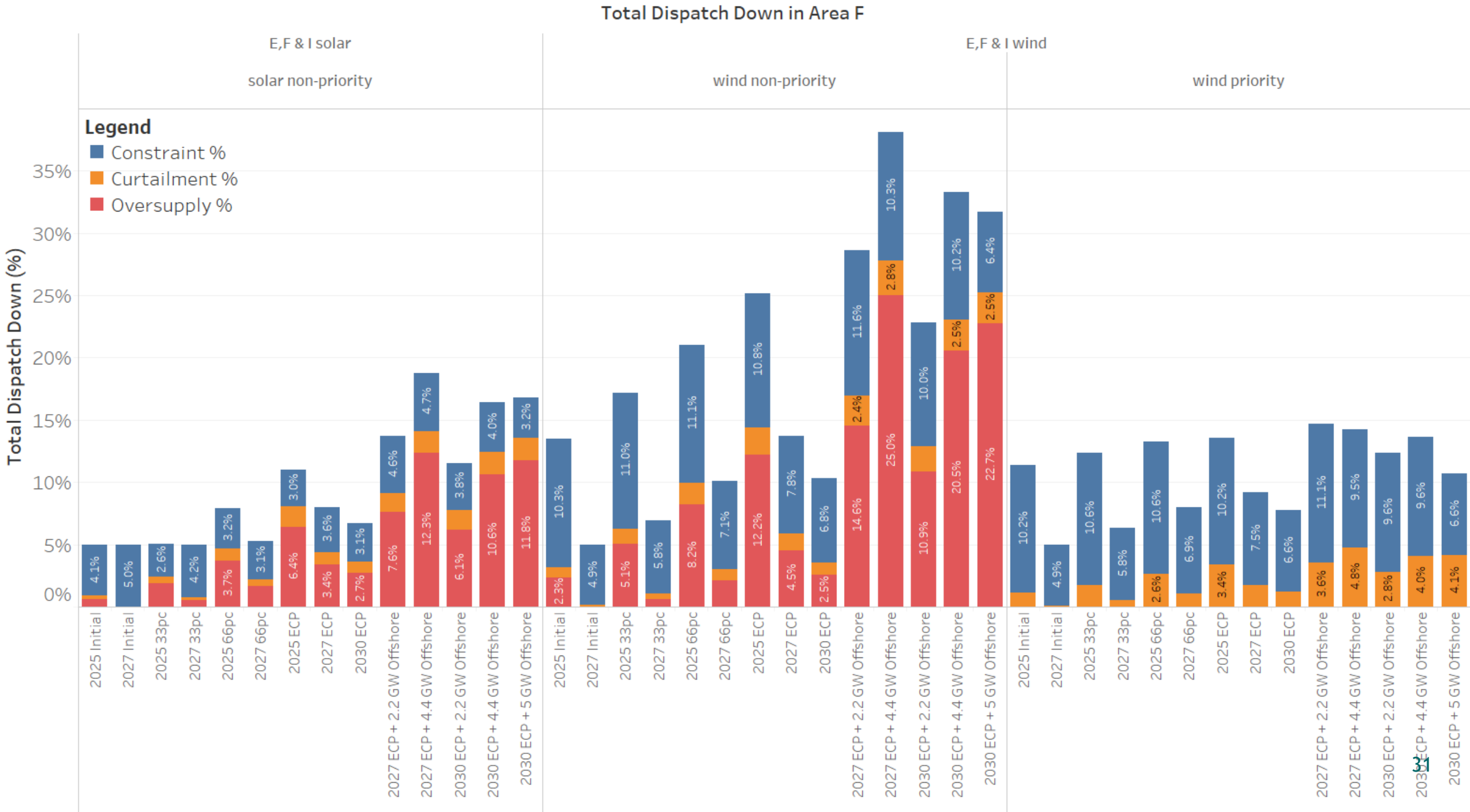
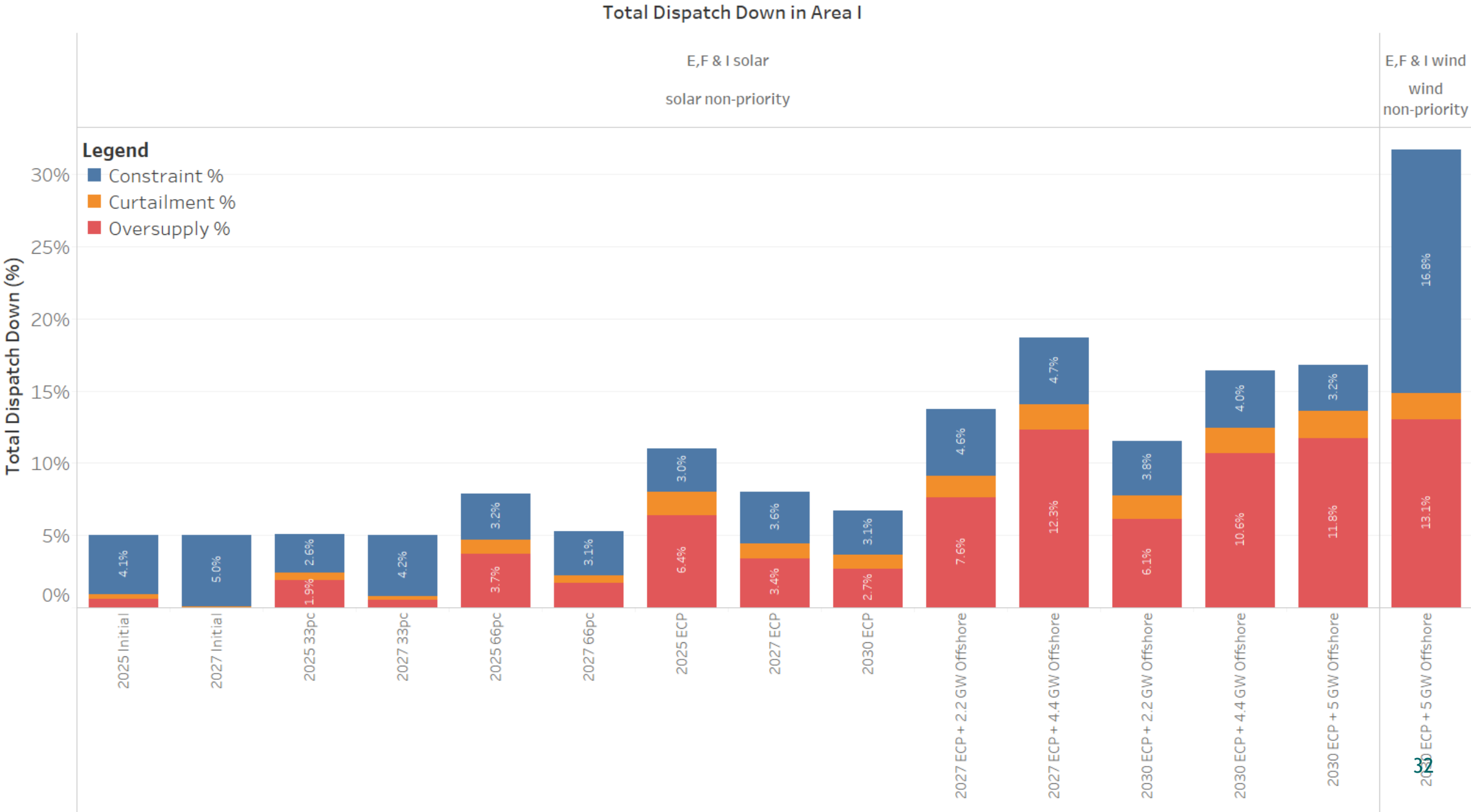
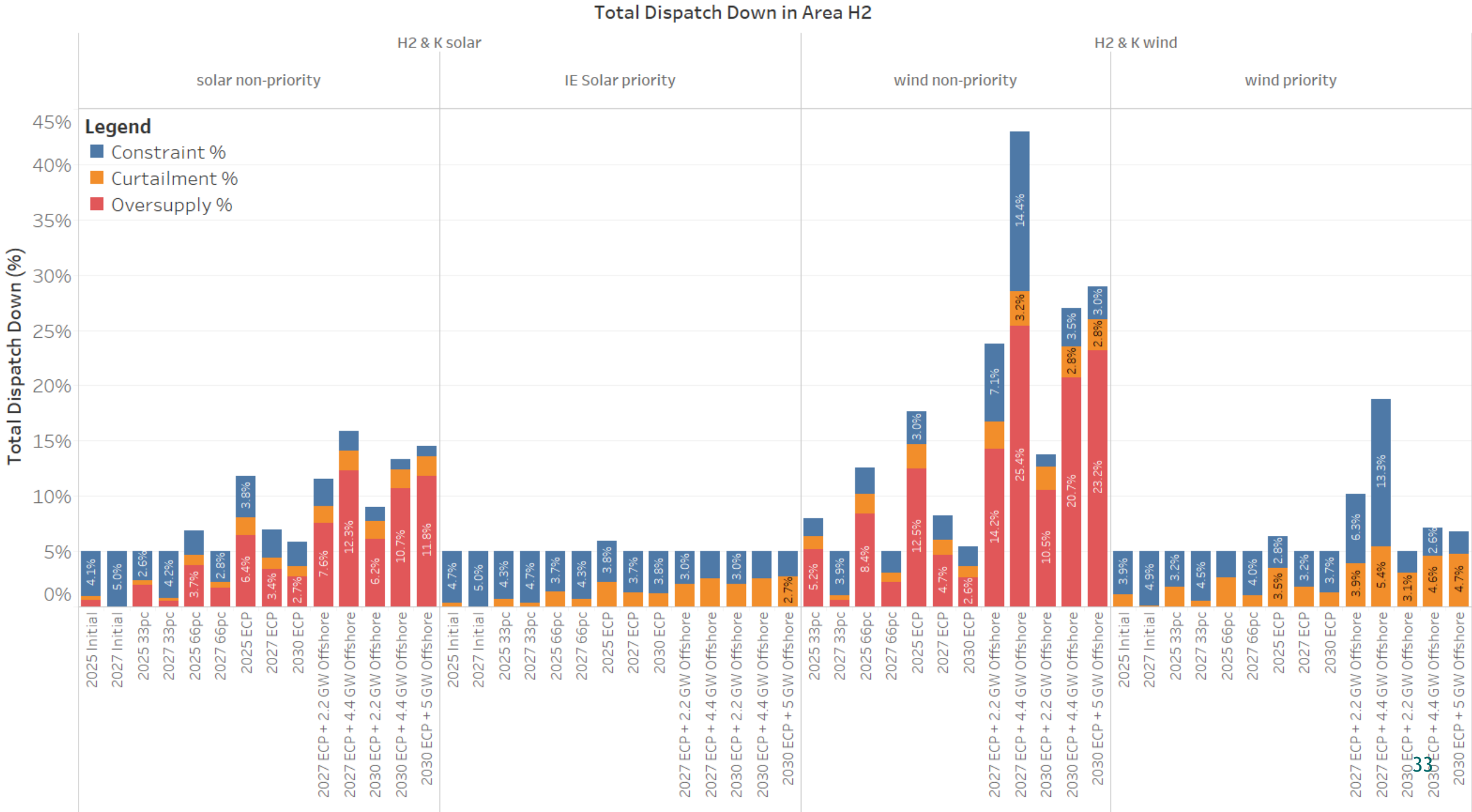


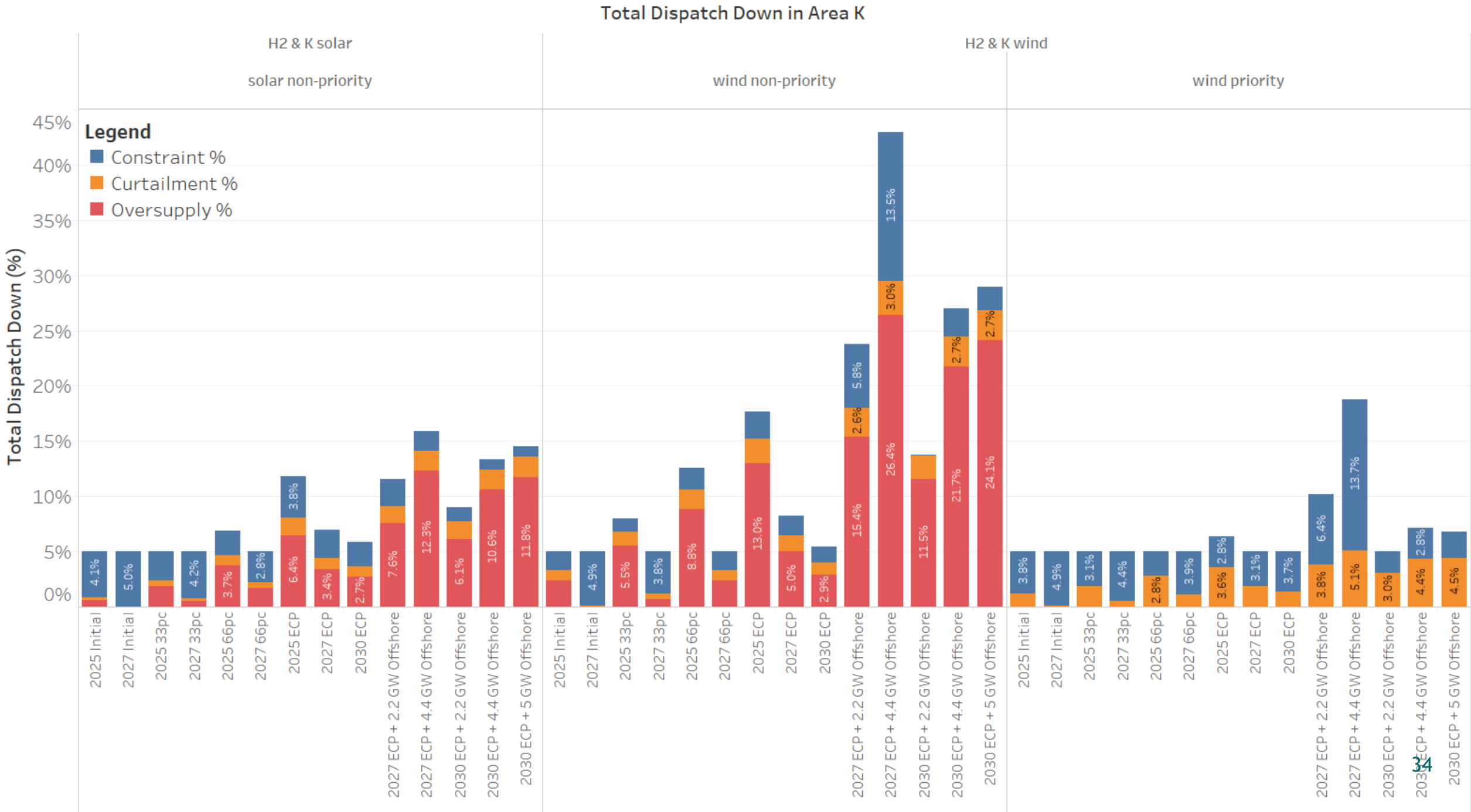
Figure: Area E, F, I, H2 and K


Total Dispatch Down in Area E
E,F & I solar
E,F & I wind
solar non-priority
IE Solar priority
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
35%
30%
25%
20%
15%
10%
5%
0%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area F
E,F & I solar
solar non-priority
E,F & I wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
35%
30%
25%
20%
15%
10%
5%
0%
4.1%
5.0%
2.6%
4.2%
3.2%
3.7%
3.1%
3.0%
6.4%
3.6%
3.4%
3.1%
2.7%
4.6%
7.6%
4.7%
12.3%
3.8%
6.1%
4.0%
10.6%
3.2%
11.8%
10.3%
2.3%
4.9%
11.0%
5.1%
5.8%
11.1%
8.2%
7.1%
10.8%
12.2%
7.8%
4.5%
6.8%
2.5%
11.6%
2.4%
14.6%
10.3%
2.8%
25.0%
10.0%
10.9%
10.2%
2.5%
20.5%
6.4%
2.5%
22.7%
10.2%
4.9%
10.6%
5.8%
10.6%
2.6%
6.9%
10.2%
3.4%
7.5%
6.6%
11.1%
3.6%
9.5%
4.8%
9.6%
2.8%
9.6%
4.0%
6.6%
4.1%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore

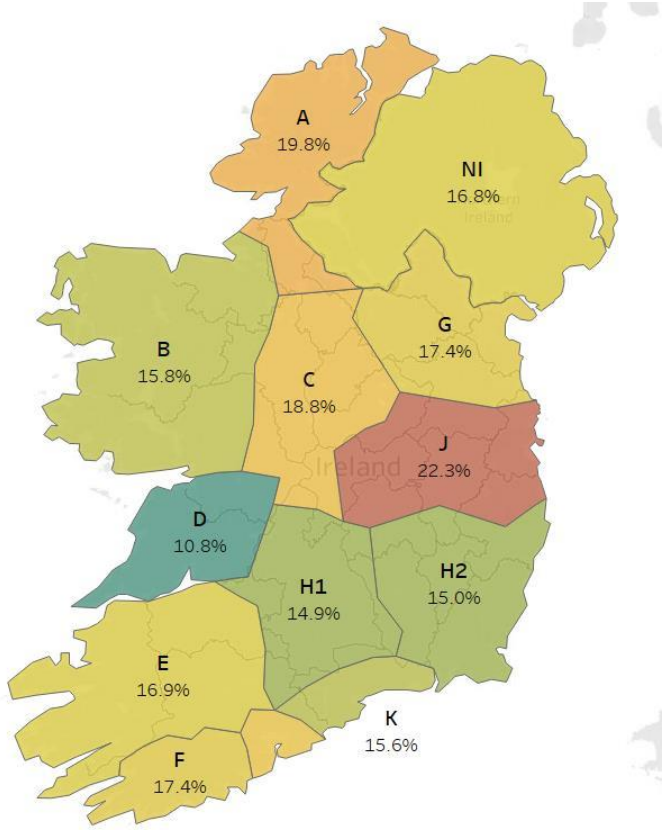

Total Dispatch Down in Area I
E,F & I solar
solar non-priority
E,F & I wind
wind non-priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
30%
25%
20%
15%
10%
5%
0%
4.1%
5.0%
2.6%
1.9%
4.2%
3.2%
3.7%
3.1%
3.0%
6.4%
3.6%
3.4%
3.1%
2.7%
4.6%
7.6%
4.7%
12.3%
3.8%
6.1%
4.0%
10.6%
3.2%
11.8%
16.8%
13.1%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area H2
H2 & K solar
H2 & K wind
solar non-priority
IE Solar priority
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore


Total Dispatch Down in Area K
H2 & K solar
solar non-priority
H2 & K wind
wind non-priority
wind priority
Legend
Constraint %
Curtailment %
Oversupply %
Total Dispatch Down (%)
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
4.1%
5.0%
4.2%
3.7%
2.8%
6.4%
3.8%
3.4%
2.7%
7.6%
12.3%
6.1%
10.6%
11.8%
4.9%
5.5%
3.8%
8.8%
5.0%
13.0%
2.9%
15.4%
2.6%
5.8%
26.4%
13.5%
3.0%
11.5%
21.7%
2.7%
24.1%
2.7%
3.8%
4.9%
3.1%
4.4%
2.8%
3.9%
3.6%
2.8%
3.1%
3.7%
3.8%
6.4%
5.1%
13.7%
3.0%
4.4%
2.8%
4.5%
2025 Initial
2027 Initial
2025 33pc
2027 33pc
2025 66pc
2027 66pc
2025 ECP
2027 ECP
2030 ECP
2027 ECP + 2.2 GW Offshore
2027 ECP + 4.4 GW Offshore
2030 ECP + 2.2 GW Offshore
2030 ECP + 4.4 GW Offshore
2030 ECP + 5 GW Offshore

ECP 2.2 - Key Messages

- In the longer term scenarios, oversupply becomes a more significant component of total dispatch down with increasing renewable capacity.
- Higher dispatch down is observed for non-priority generators due to oversupply dispatch down.
- Area A, B, G and J has higher dispatch down in 2025 but reduces in 2027 due to increase in demand and network development.
- Solving network issues in the north west can increase power flow towards Dublin, but leads to congestion moving to the north east.
- At times, network issues in one area can affect the power flow in other area causing congestion in the second area.



*illustrative figure for total dispatch down

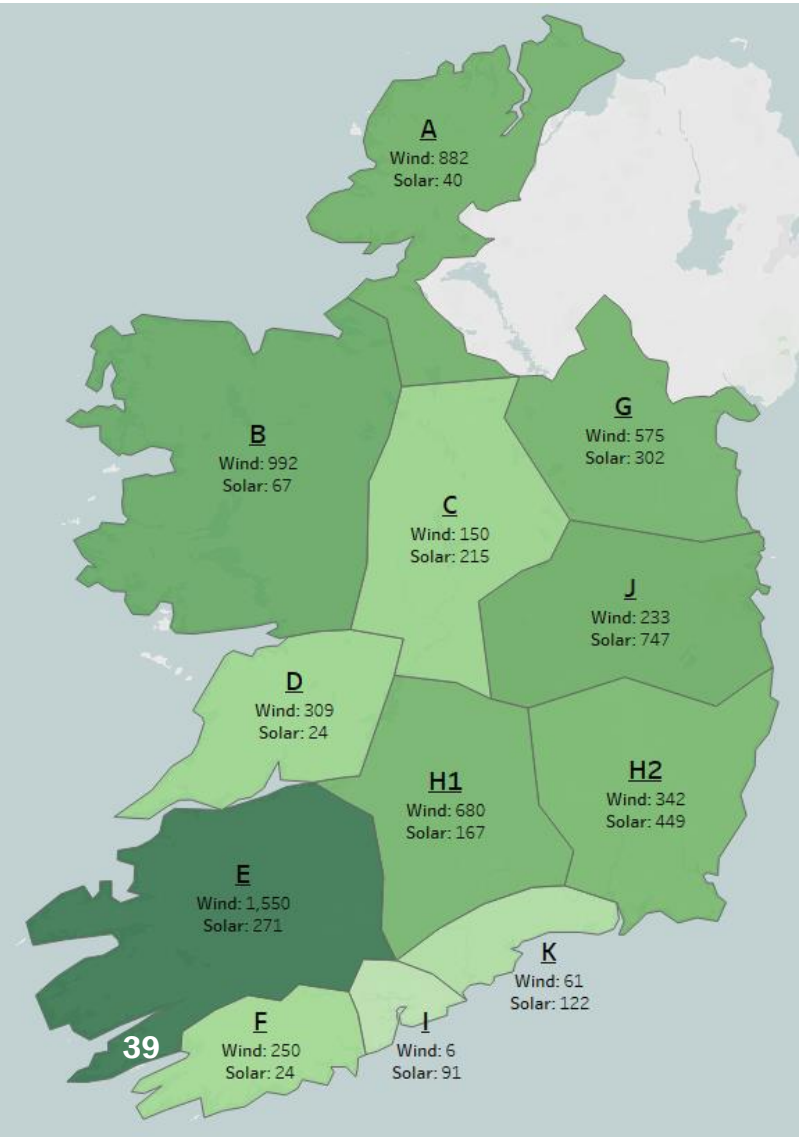
Questions?
Thank You


EirGrid

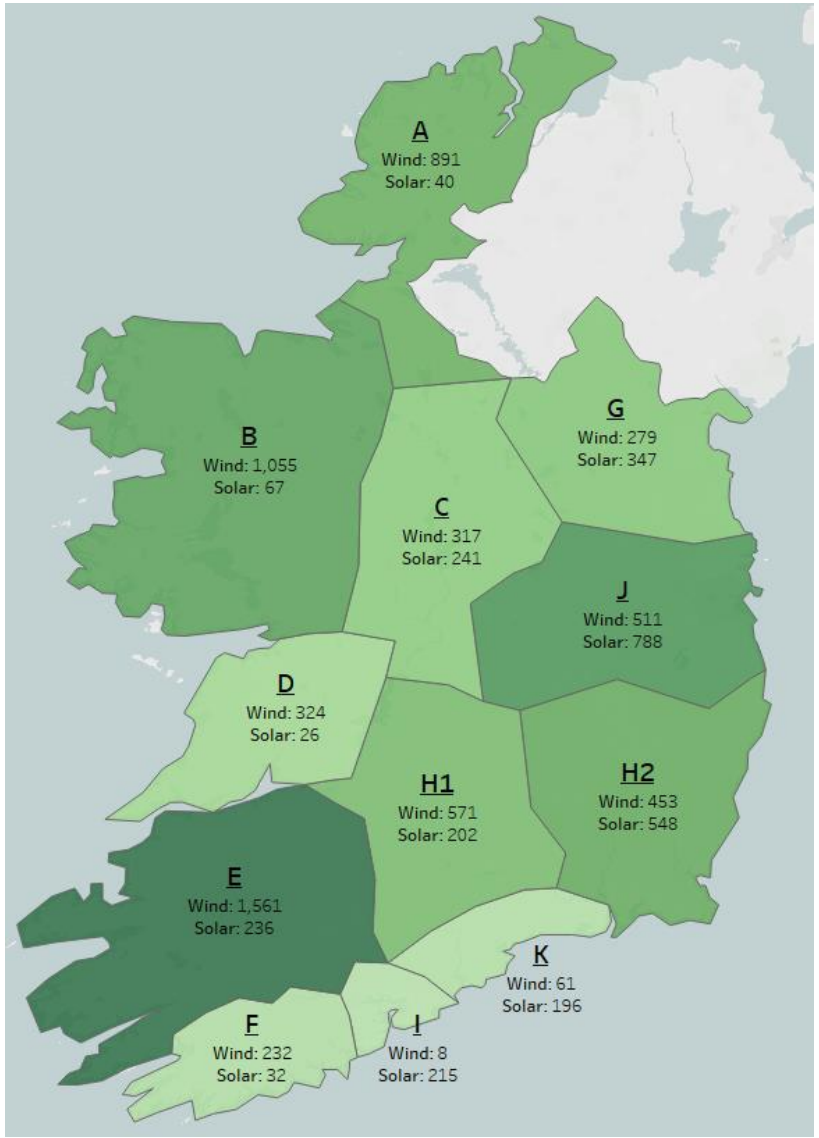
Additional Material

Installed capacity (MW) in different ECP process

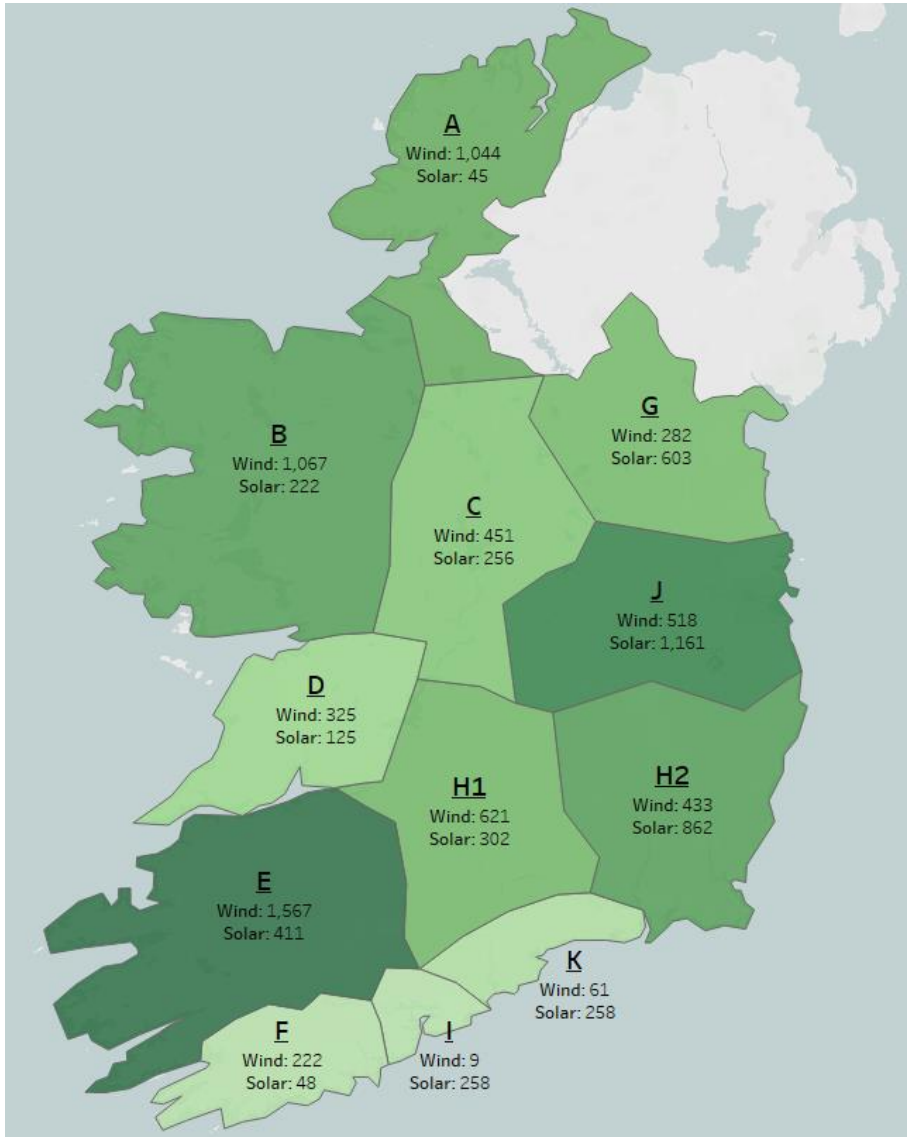
ECP 1



ECP 2.1



ECP 2.2



OVERSUPPLY AND CURTAILMENT CALCULATION

Oversupply – Applied differently for priority and non priority generators

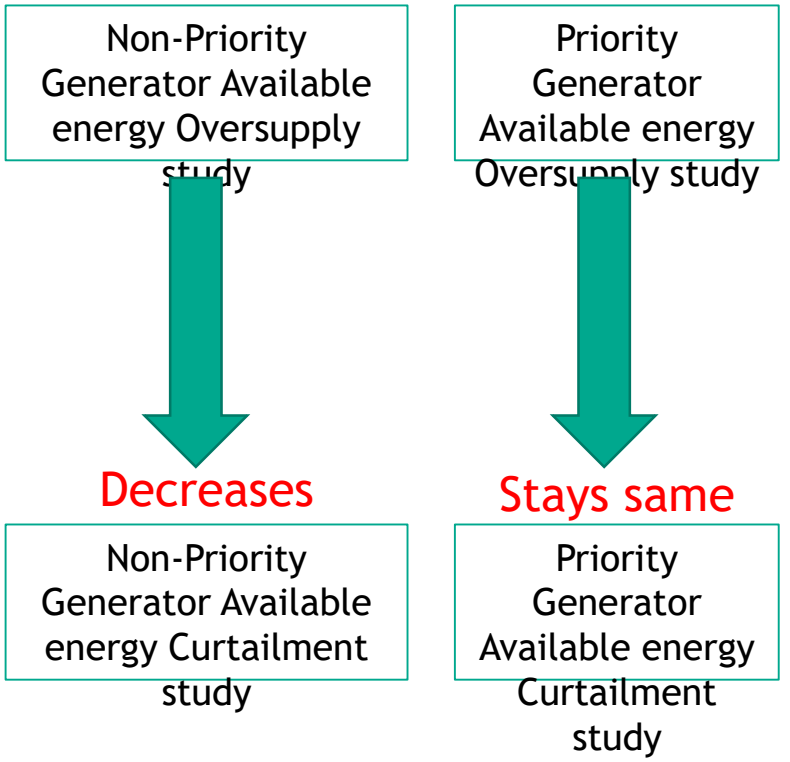
$$Oversupply\ \%\ (system) = \frac{Total\ Oversupply\ Dispatch\ Down\ (system)}{Total\ Available\ Energy\ in\ Oversupply\ study} \times 100$$

$$Oversupply\ \%\ (Generator) = \frac{Total\ Oversupply\ Dispatch\ Down\ pro-rata\ (Generator)}{Total\ Available\ Energy\ in\ Oversupply\ study\ (Generator)} \times 100$$

Curtailment – No distinction between priority and non priority generators

$$Curtailment\ \%\ (system) = \frac{Total\ Curtailment\ Dispatch\ Down\ (system)}{Total\ Available\ Energy\ in\ Oversupply\ study} \times 100$$

$$Curtailment\ \%\ (Generator) = \frac{Total\ Curtailment\ Dispatch\ Down\ pro-rata\ (Generator)}{Total\ Available\ Energy\ in\ Oversupply\ study\ (Generator)} \times 100$$



Modelling Approach to Dispatch Down

- Renewable generation modelled at 110kV station
  - A 110kV station can have Wind/Solar Priority, Non Priority or Uncontrolled generation connected
  - Wind and Solar hourly profiles are used in model

- Oversupply Dispatch Down
  - Applied if there is not enough demand, or export capability to meet renewable generation.
  - For each hour, the “non priority” generators are dispatched down first (pro-rata all island).
- Curtailment
  - Following dispatch down for oversupply reasons, curtailment is applied to meet operational limits e.g. SNSP, Inertia, Min Sets Rules, Generator Must Runs, Operating Reserve.
  - For each hour, curtailment is shared equally between “priority” and “non priority” generators (applied pro-rata all island).
- Constraint
  - Following curtailment, generation constraint is applied to solve localised transmission issues.
  - The model dispatches down by individual station to mathematically minimise the total renewable generation dispatch down.
  - For annual energy, the results are then averaged across adjacent 110kV stations.
  - “priority” and “non priority” generators are dispatched down equally.