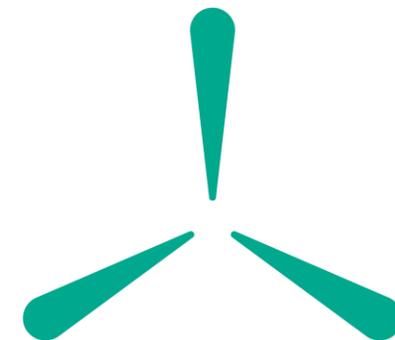


17/07/2023

ECP-2.3 Constraints Forecast

Constraints Analysis for Solar and Wind - Proposed Draft Assumptions



Disclaimer

EirGrid has followed accepted industry practice in the collection and analysis of data available. While all reasonable care has been taken in the preparation of this data, EirGrid is not responsible for any loss that may be attributed to the use of this information. Prior to taking business decisions, interested parties are advised to seek separate and independent opinion in relation to the matters covered by this report and should not rely solely upon data and information contained herein. Information in this document does not amount to a recommendation in respect of any possible investment. This document does not purport to contain all the information that a prospective investor or participant in the Single Electricity Market may need.

For queries relating to the document or to request a copy contact:

info@eirgrid.com

Agenda

- Background
- Key Metric - Total Dispatch Down
- Article 12 and Article 13
- Study Scenarios
- Assumptions
- Analysis Process
- Discussion

Background

- The Enduring Connection Policy (ECP) 2-3 is the third of initially three, now four batches of connection offers for Renewable Energy Sources (RES) planned under ECP 2 by the Commission for Regulation of Utilities (CRU).
- The ECP-2.3 Constraints Analysis is carried out by EirGrid (as mandated by CRU/20/060 decision on ECP 2) to forecast dispatch down levels for ECP-2.3 wind and solar projects.
- EirGrid plans to publish 12 regional constraints reports that will provide ECP-2.3 developers with information on forecasted dispatch down levels in each region.
- Timeframe for completion of this work is Q4 2023.
- ECP-2.3 applicants include:

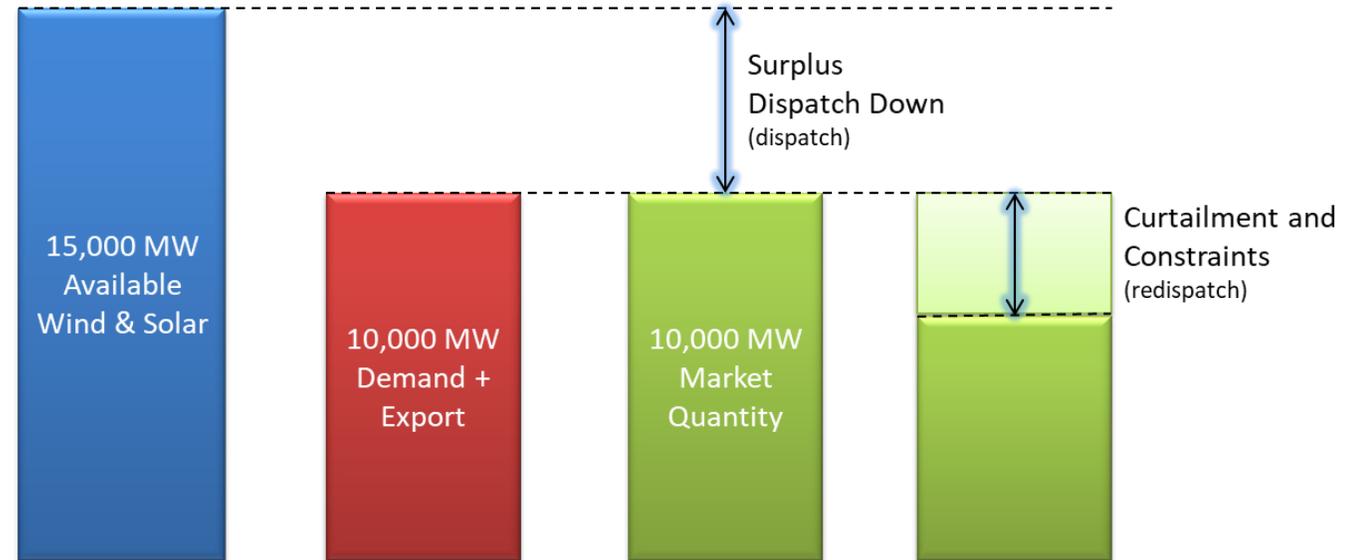
Battery	Gas	Solar	Wind
677 MW	500 MW	1,989 MW	497 MW

Key Metric: Total Dispatch Down

Total Dispatch Down

- Sum of Surplus, Curtailment & Constraint

Type of Dispatch Down	Definition
Surplus	Dispatch down applied for energy balancing when generation exceeds demand + interconnector export.
Curtailment	Dispatch Down applied to ensure operational limits are met.
Constraint	Dispatch Down applied to manage network constraints.

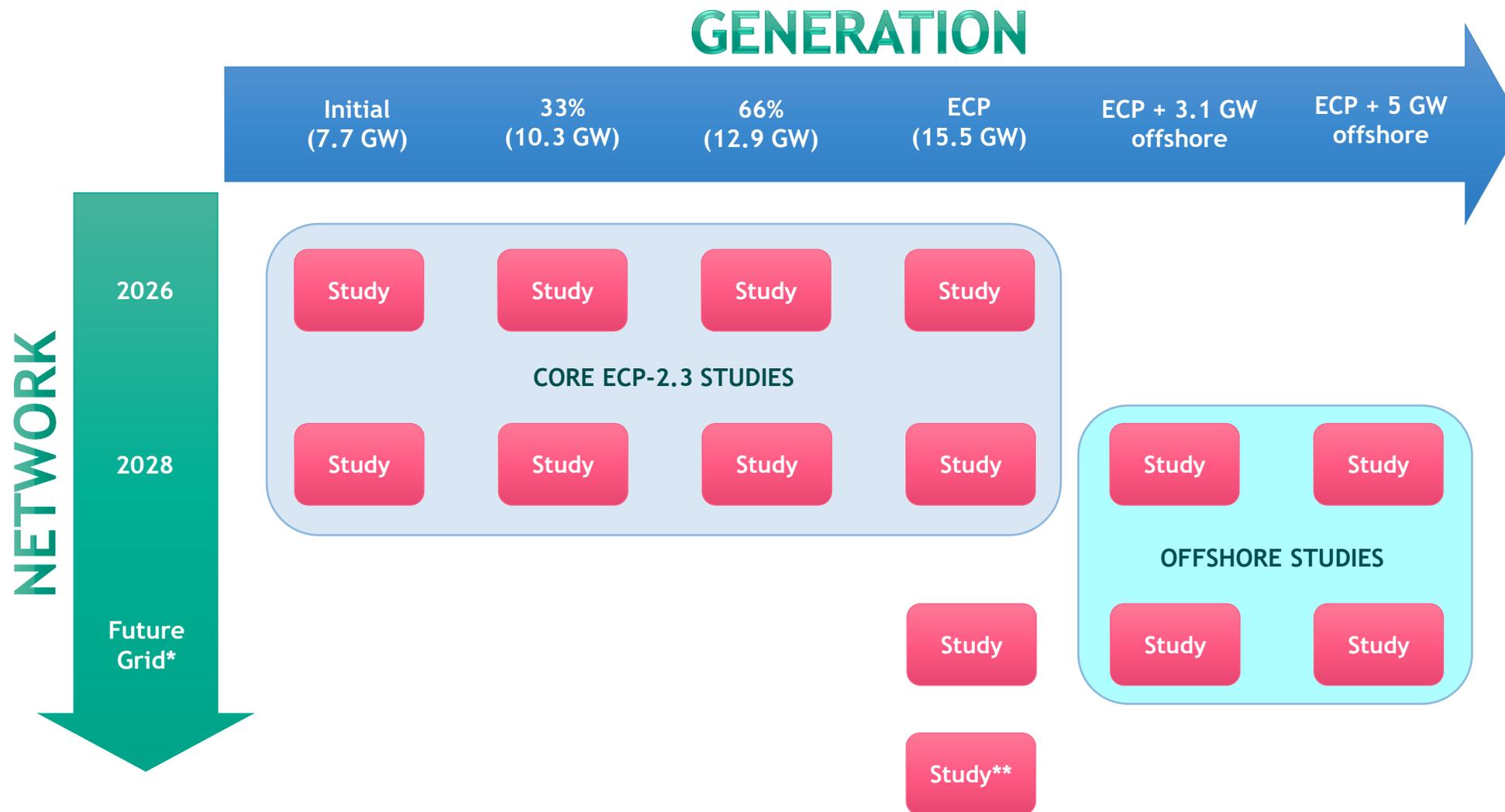


Article 12 and Article 13 in ECP2-3

Under consideration - Potential implementation

	1. Surplus	2. Curtailment	3. Constraint
ECP-2.2 Approach	<ul style="list-style-type: none"> • Non-PD to reduce output on a pro-rata basis. • If Surplus is unresolved by non-PD reduction, PD reduce output on a pro-rata basis. 	<ul style="list-style-type: none"> • PD and non-PD reduce output equally on a pro-rata basis. 	<ul style="list-style-type: none"> • PD and non-PD reduce output equally on a pro-rata basis within a constraint group or area.
Proposed ECP-2.3 Approach	<ul style="list-style-type: none"> • As per ECP-2.2. 	<ul style="list-style-type: none"> • As per ECP-2.2. 	<p>Proposed according to Enduring approach from SEM-22-009:</p> <ul style="list-style-type: none"> • Non-PD to reduce output on a pro-rata basis. • If constraint is unresolved by non-PD reduction, PD reduce output on a pro-rata basis.

Study Scenarios



*The Future Grid network is based upon the SOEF V1.1 network

**Additional maintenance sensitivity

Updates to the model relative to ECP-2.2 modelling process

ECP-2.3 maintains strong consistency with ECP-2.2 constraints study for IE and the NI constraints study. There is large replication of assumptions and instances where some assumptions have been updated.

Assumptions	Changes
Implementation of Article 12 and 13	Considering Grandfathering model approach (2026 onwards)
Demand assumptions	GCS 2023-32 (Shape - 2022)
Interconnector modelling assumptions	TBC
Conventional generation assumptions*	GCS 2023-32 and Capacity auctions
RE generation IE	Updated with ECP-2.3 list
Wind and solar profile	Wind and solar year 2022
Offshore wind profile	Synthesised 2022 offshore profiles
Outage assumptions (transmission)	Consistent with ECP 2.2.
Reinforcement assumptions	2026 & 2028 - Network Delivery Portfolio (NDP) Future Grid - SOEF 1.1
Northern Ireland Assumptions	NI constraint studies

*gas generators totalling 1.1 GW MEC from ECP 2-1 & 2-3 to be included in model. Deviation from GCS.

Generation and Demand

Demand

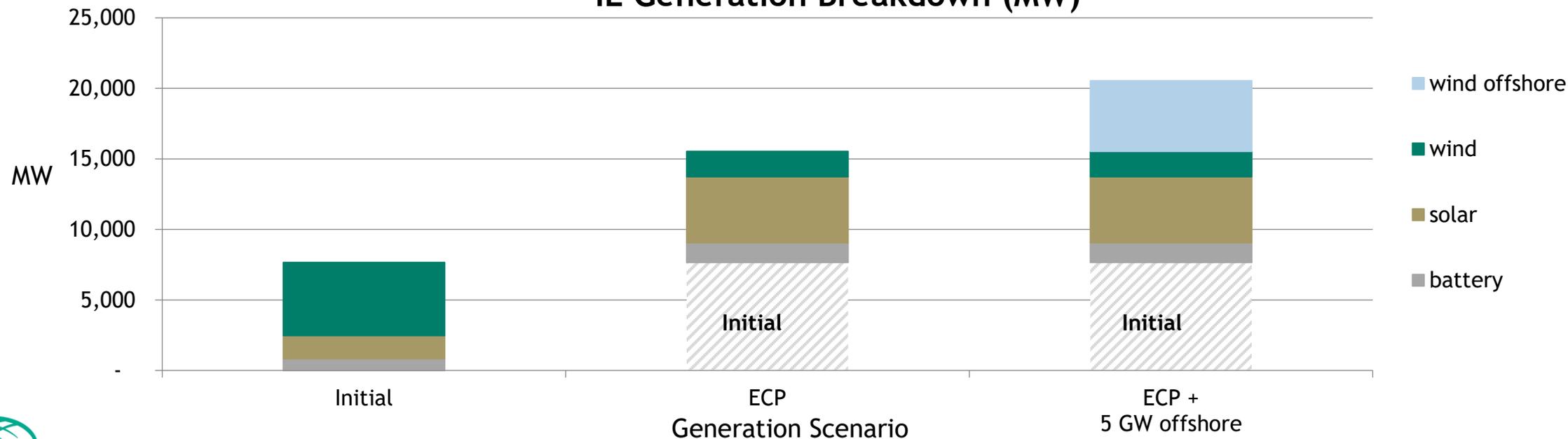
- Historical Year (HY) 2022 shape
- TER based GCS 2023-32
 - Median Demand
- LEU based on GCS 2023-32

Renewable Generation

- Data from Ireland Generation Database
- Offers from Non-GPA, Gate 3, Pre-Gate, ECP 1, ECP 2-1, ECP-2.2, ECP-2.3

Table 1 : Installed capacity in study scenarios (MW)						
	Initial Study	33% Study	66% Study	ECP All Study	ECP + 3.1 GW offshore	ECP + 5 GW offshore
Battery	836	1,296	1,756	2,230	2,230	2,230
Solar	1,635	3,180	4,724	6,315	6,315	6,315
Wind	5,190	5,783	6,376	6,987	6,987	6,987
Wind Offshore	-	-	-	-	3,100	5,000
Totals	7,660	10,258	12,856	15,533	18,633	20,533

IE Generation Breakdown (MW)



Assumptions

Wind and Solar Profiles

- Profiles from the year 2022 will be used (where available).
- Each area profile is a recorded profile from a representative node in that area.
- Offshore wind profile is yet to be confirmed.

Transmission Maintenance

- Representative maintenance based on ECP-2.2.

Interconnectors

- 2026 - EWIC, Greenlink, Moyle (Export 400MW).
- 2028 - EWIC, Greenlink, Moyle (Export 450MW), Celtic, North-South 2.
- Future Grid - EWIC, Greenlink, Moyle (Export 500MW), LirIC, Celtic, North-South 2, 2nd France*.

Batteries

- Based on current offers and applications.
- Used for maintaining reserve (POR, SOR, TOR1 & TOR2).
- 1 cycle per day limit.
- Batteries with 2+ hrs of generation can also provide energy arbitrage.

Reinforcements

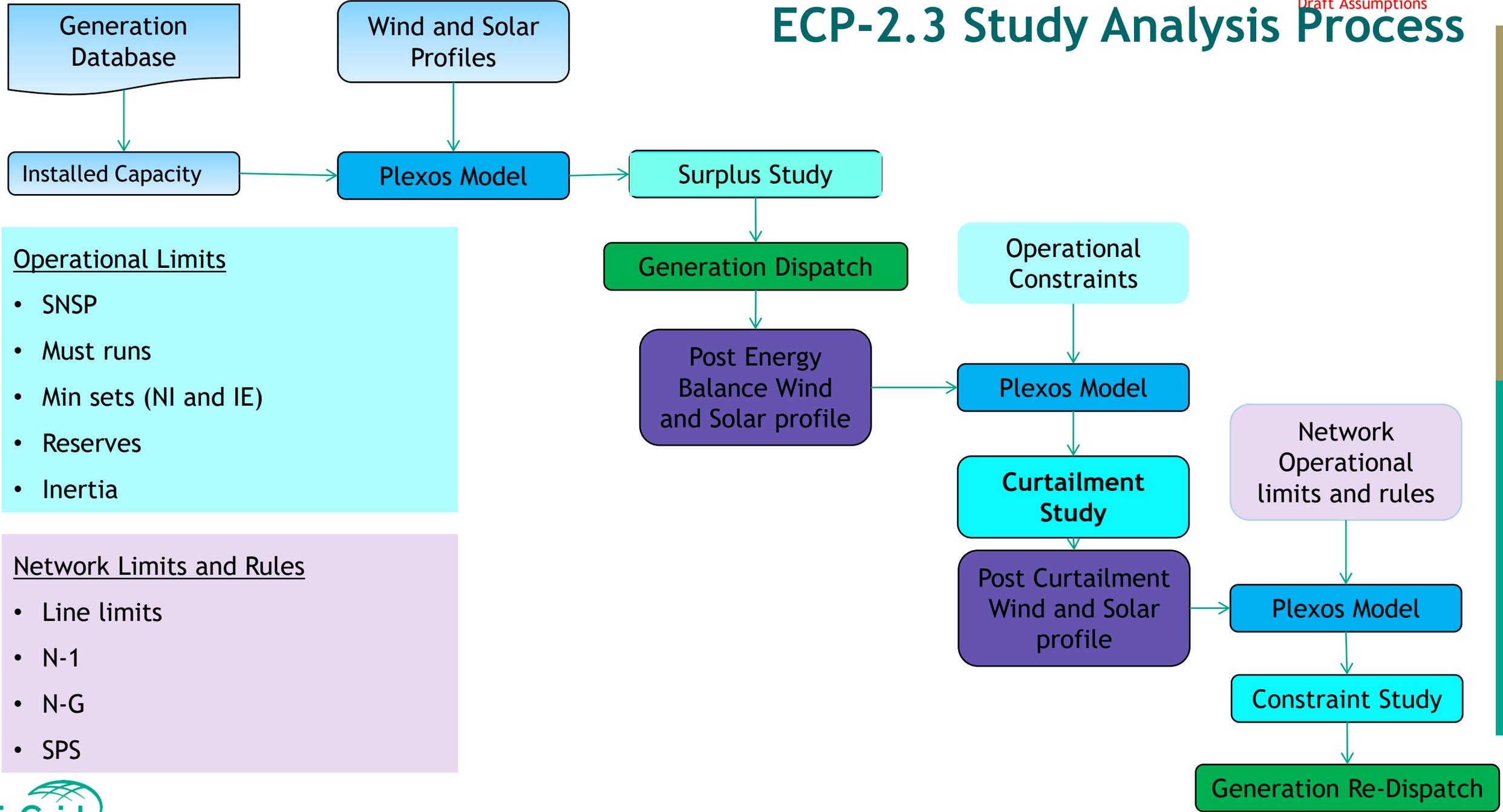
- Based on Network Delivery Portfolio (NDP), and SOEF v1.1

Operational Constraints

- Operational constraints
 - Based on the Operational Policy Roadmap 2023-2030 published

Active System Wide Constraints		Study Assumptions
Non-Synchronous Generation	There is a requirement to limit the instantaneous penetration of asynchronous generation connected to the All-Island system.	2026 - 85% 2028 - 90% Future Grid - 95%
Operational Limit for RoCoF	There is a requirement to limit the RoCoF on the All-Island system.	2026, 2028 & Future Grid - 1 Hz/sec
Operational Limit for Inertia	There is a requirement to have a minimum level of inertia on the All-Island system.	2026, 2028 & Future Grid - 20,000 MWs
Minimum Sets (IE, NI)	There is a requirement to have a minimum number of conventional generators in Ireland and Northern Ireland.	2026 - 6 (3/3 jurisdictional split) 2028 - 4 Future Grid - 3
Reserve (IE, NI)	The amount of spare capacity in the system to manage any system disturbance.	POR, SOR, TOR I, and TOR II

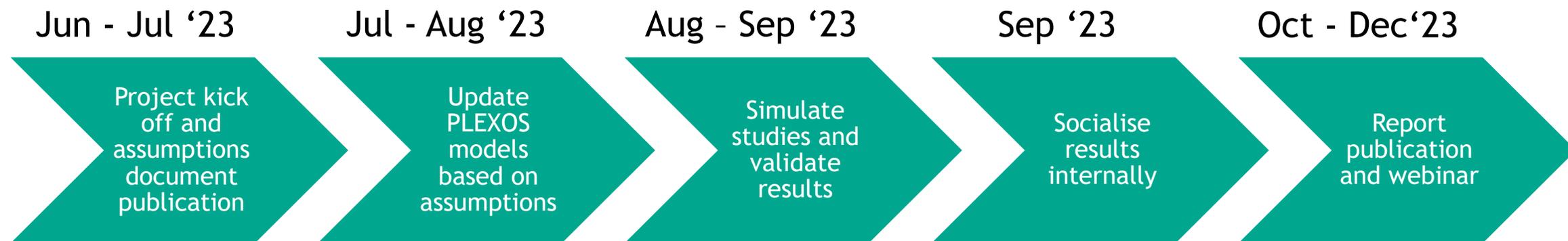
ECP-2.3 Study Analysis Process



- Operational Limits
- SNSP
 - Must runs
 - Min sets (NI and IE)
 - Reserves
 - Inertia

- Network Limits and Rules
- Line limits
 - N-1
 - N-G
 - SPS

Timeline



Thank You Questions?

