An Coimisiún um Rialáil Fóntais
Commission for Regulation of Utilities

Ireland's first Flexibility Needs Assessment

Workshop

20th October 2026



An Coimisiún um Rialáil Fóntais
Commission for Regulation of Utilities

Vision, Purpose, and Values



OUR VISION:

Resilient, efficient, sustainable, and safe energy and water services for Ireland.

OUR PURPOSE:

We actively serve the public interest by regulating the provision of energy and water to Irish homes and businesses, while supporting the transformation to net zero.

OUR VALUES:

INTEGRITY

Trust is vital, so we always act with integrity. We take balanced, evidence-based decisions that are fair and consistent.

PROFESSIONALISM

We are ambitious and dedicated to having a positive impact in everything we do. We work as a team, value, and respect each other, and always strive to develop our expertise. We are pragmatic and open to alternative processes.

OPENNESS

We are committed to co-operation. We clearly explain who we are and what we do. Our processes are open and thorough, and we consider views from all stakeholders.

ACCOUNTABILITY

We are accountable to the public through the Oireachtas for our decisions and the way we use our resources. We are independent and open to scrutiny.

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Strategic Priorities/Themes

Our Vision, Purpose and Values determine the way we work and what we prioritise.
There are eight strategic priorities for the next three years, which will guide us in serving the public interest.



Support Transition to Net Zero



Enable Efficient and Competitive Energy Markets



Enable Resilient Critical National Infrastructure



Ensure Efficient Investment in Infrastructure Delivery



Protect the Public in Energy Safety



Effective Economic Regulation of Water Services



Empower and Protect all Customers



Enhance Teams, Capabilities and Governance Standards

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About the CRU

Economic Regulation of Energy and Water

- Maintaining security of supply
- Ensuring efficient network delivery
- Promoting competition and innovation
- Monitoring performance of regulated entities



Facilitating Transformation to 'Net Zero'

- Accelerating delivery of network infrastructure
- Driving low carbon technologies
- Increasing flexibility of the energy system
- Facilitating consumer participation



Customer Engagement and Protection

- Setting service standards
- Informing customers about rights
- Resolving customer disputes
- Encouraging customer engagement



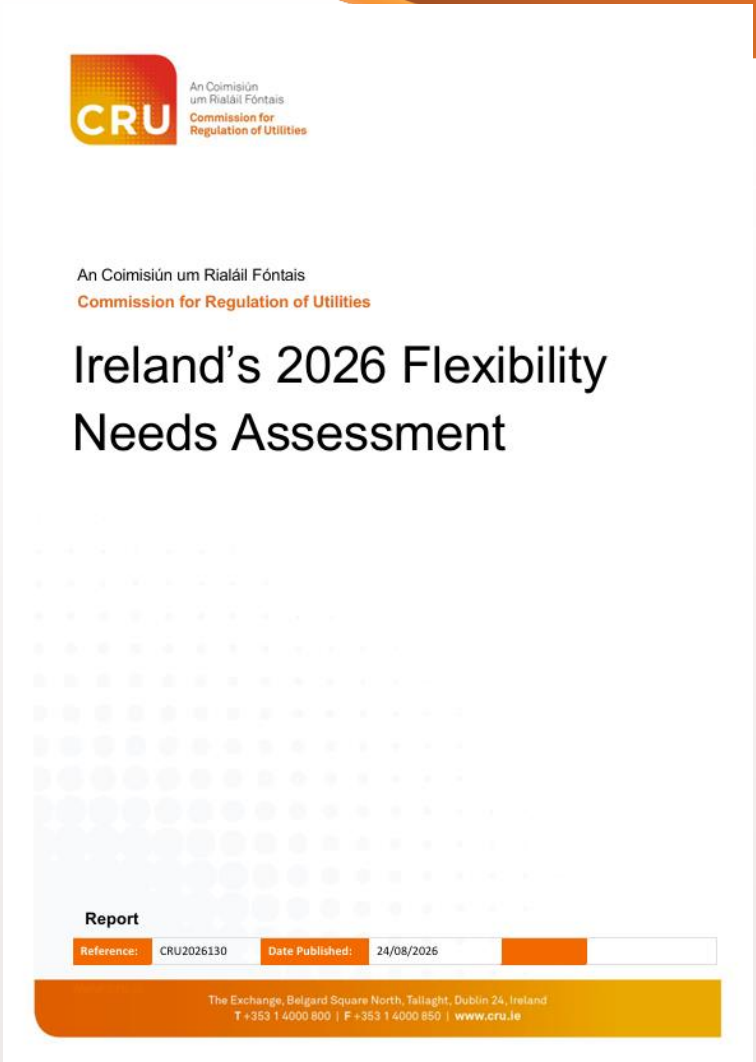
Energy Safety Regulation

- Protecting public safety
- Preventing major accidents
- Promoting safety awareness



Agenda

09:00–09:30	Arrive / Coffee & Tea
09:30–09:45	**Opening & Welcoming Remarks**
09:45–10:15	**Flexibility Needs Assessment Overview**
10:15–10:45	**System & Transmission Level Flexibility Needs**
10:45–11:00	**Q&A**
11:00–11:15	Coffee / Tea Break
11:15–11:45	**Distribution Level Flexibility Needs**
11:45–12:00	**Q&A**
12:00–12:40	**Options to Fill the Identified Needs**
12:40–12:55	**Q&A**
12:55–13:40	Lunch
13:40–14:10	**Market Barriers**
14:10–14:40	**Panel Discussion**
14:40–14:55	**Next Steps, Conclusion & Closing**



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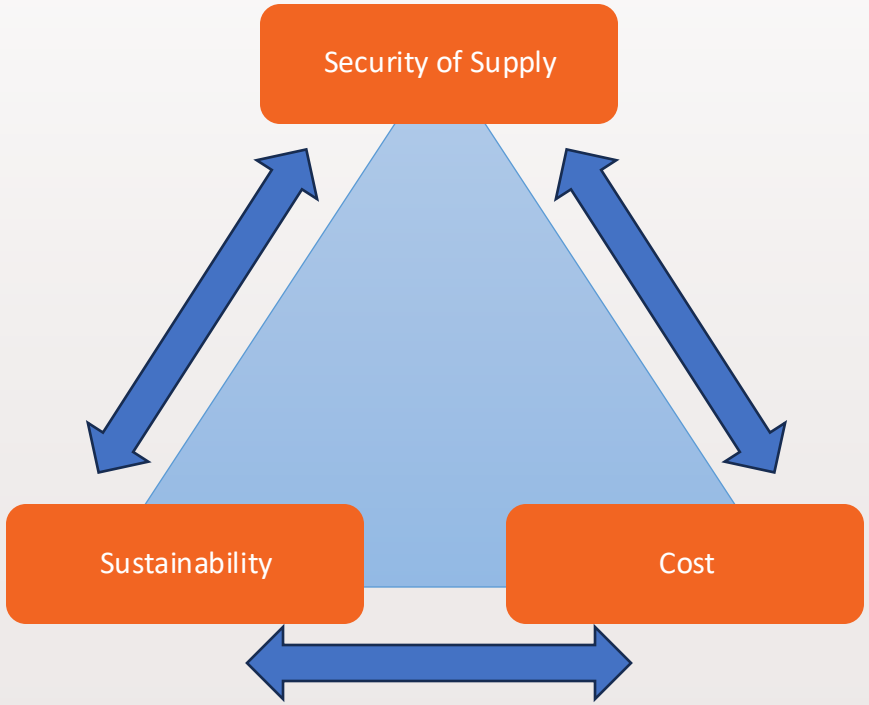
Flexibility Needs Assessment Overview

What is Flexibility?

"means the ability of an electricity system to adjust to the variability of generation and consumption patterns and to grid availability, across relevant market timeframes"

Energy Trilemma & the Role of Flexibility

- **Security of Supply** improves is demand can move from the peak
- **Costs** are lower if demand can move to times of low-cost generation output and away from high-cost energy
- **Sustainability** improves if demand can move to times of high-RES output



Flexibility Needs Assessment

01	**What it is**	Ireland's first national assessment of electricity flexibility needs, covering renewable integration and constraints across transmission and distribution networks.
02	**Legal requirement**	Article 19e of Regulation (EU) 2019/943, amended in 2024, requires national assessments. ACER's common methodology sets the analytical framework.
03	**Target years**	2028 and 2030. The assessment examines how much flexibility the system needs, when it is needed and where network needs arise.
04	**Output**	A national report on needs, options and barriers, informing non-fossil flexibility objectives and future policy. It does not prescribe technologies or procurement routes.

Roles and responsibilities

CRU	Led delivery and coordination, reviewed operator inputs and consolidated and finalised the national report.
EirGrid	Delivered system and transmission analysis, contributed technical report content and provided analysis on barriers to flex
ESB Networks	Delivered distribution analysis, and contributed technical report content and provide analysis on barriers to flex
DCEE: next step	Will set indicative national non-fossil flexibility objectives, informed by the report.

What the report covers

The introduction sets the context and legal basis. Six sections then develop the evidence and next steps.

Part A

Methodology

Scenarios, assumptions and data sources for system and network analysis.

Part B

Flexibility needs Estimates

Identified system, transmission and distribution network flexibility

Part C

Options to meet needs

Analysis of potential resources to meet identified needs.

Part D

Barriers and digitalisation

Identified market and regulatory barriers, and the role of digitalisation

Part E

Conclusion and next steps

Key findings, follow-on work and support for setting national non-fossil flexibility objectives.

Part F

Appendices

Supporting data, detailed analysis and supplementary assessment material.

Key findings at a glance

01 Where the needs arise

System and transmission flexibility needs centre on managing surplus renewable generation. Distribution flexibility needs stem from localised capacity constraints.

02 How needs may be met

Flexibility is expected to complement network reinforcement. Explicit flexibility products and more efficient market arrangements can help meet needs. It is not likely to be economic to meet all identified needs, and some residual renewable dispatch down is expected to remain.

03 What affects delivery

Market, regulatory and operational barriers remain, although progress is being made. Key issues include viable revenues, grid access and TSO–DSO coordination.

Future FNAs: consider improvements to modelling and the alignment of the ACER methodology with SEM arrangements.

Flexibility Needs

Curtailment	Constraints	Surplus
• System-wide Operational issue • E.g. SNSP, inertia, voltage support or frequency stability • Resolved by improvements in operational policies & system services procurement	• Local network issue • Resolved by grid development • Complemented by “non-wire” solutions, e.g. flexibility services (“explicit” flexibility)	• System-wide generation/demand balance issue • Available generation exceeds demand & exports • Can be resolved by market flexibility (“implicit” flexibility) & flexibility services (“explicit” flexibility)

Delivery process and milestones

REPORT DEVELOPMENT COMPLETED

NEXT STEPS



Common methodology

ACER adopted the methodology for national assessments.

Scope agreed

CRU and System Operators agreed scope, responsibilities and data timelines.

Report Published

System Operators delivered analysis. CRU reviewed and drafted the report.

Objectives

Indicative non-fossil flexibility objectives due

Initiation of next assessment

Next Report

Updated reports follow at least every two years.

Join the Slido

Scan the QR code to take part

After each section

We'll ask specific questions during the Q&A after each section.

During the panel session

You'll have another opportunity to ask questions and continue the discussion.

#2742060

System & Transmission Level Flexibility Needs

Context and Background

Article 19e of Regulation (EU) 2019/943 as amended by Regulation (EU) 2024/1747 of the European Parliament and of the Council of 13 June 2024

The analytical methodology was developed by ENTSO-E and the EU DSO Entity, and approved by ACER.

TSOs and DSOs each hold defined responsibilities in supporting data collection and analysis, CRU and UR are the Designated Entities responsible for the delivery of the IE and NI reports. The TSOs used a coordinated all-island economic-dispatch model covering Ireland and Northern Ireland, with aligned assumptions. Ireland and Northern Ireland outputs were subsequently processed and reported separately for the respective national FNAs.

Modelled the 2028 and 2030 target years using three representative AIRAA weather scenarios: WS4, WS28 and WS34. The scenarios capture different weather-driven patterns of renewable availability and demand while maintaining a manageable modelling scope. WS28 is used for detailed illustrative results as it was broadly representative of the average outcomes across the scenarios assessed.



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Defining Flexibility – EU Regulation and Methodology

"means the ability of an electricity system to adjust to the variability of generation and consumption patterns and to grid availability, across relevant market timeframes"



'System Flexibility Needs':

- Flexibility needed by the electricity system to adjust to variability of generation and consumption patterns across relevant market timeframe (TSO). Three needs are considered:
  a) RES integration needs – RES surplus and curtailment
  b) Ramping needs – hourly variability in RES and Demand
  c) Short-term flexibility needs – errors from day-ahead forecast vs actual RES and Demand

'Network Flexibility Needs':

- Flexibility needed to adjust for grid availability, by means of preventing or solving congestion or voltage issues (DSO and TSO) – in our case, assess impact on RES constraint.

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FNA Model - Background

Two models were considered as the start point when developing the FNA: AIRAA and ECP.

AIRAA model selected as it better aligned with the FNA methodology.

FNA methodology allowed for RES constraint results due to transmission network to be taken directly from ECP models.

Modified the FNA model to deliver more representative RES surplus and curtailment outcomes. E.g. incorporated operational constraints, added generation/interconnector operational parameters, adjusted RES profiles, adjusted reserves modelling, adjusted model settings, developed a "High RES" scenario informed by ECP results.

Incorporated Ramping and Short Term needs and capabilities directly into the model – the methodology in this case focuses on RES Integration flexibility needs.

All Island Resource Adequacy Assessment (AIRAA) Model

PURPOSE

Assess generation adequacy for the SEM over a 10-year horizon.

KEY ELEMENTS

- Regional, 'copper-plate' model.
- Includes FR, GB regions to represent interconnection.
- Simple model to run many Monte Carlo samples across a variety of system conditions.

VS

Enduring Connection Policy (ECP) Model

PURPOSE

Illustrate levels of dispatch down across a range of scenarios for the ECP study years.

KEY ELEMENTS

- Nodal model.
- Includes notional generation in GB/FR regions to represent interconnection.
- Scenario based model.
- Detailed representation of operational and network constraints impacting dispatch down.

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FNA Model – Further Inputs

Short term flexibility needs – forecast error for wind, solar, and demand - created error profile and added directly into the FNA model. This was done by:

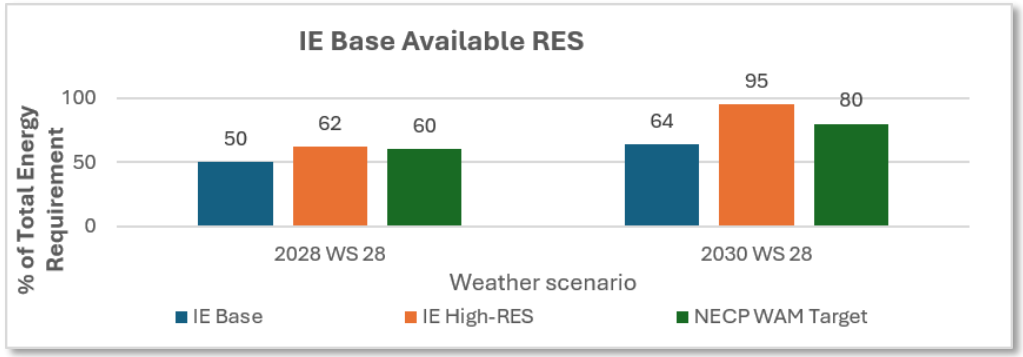
- Adding reserve objects in the model to cover the largest potential loss, and to cover the day-ahead forecast errors of wind power, solar power, and load.

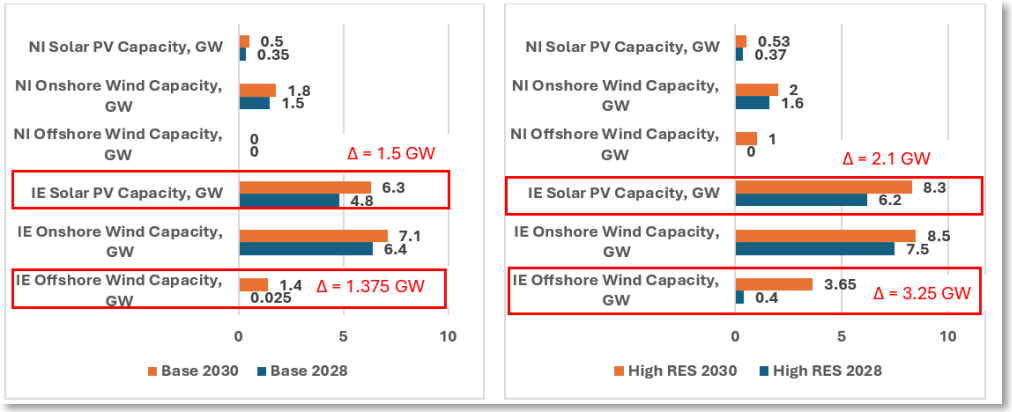
Ramping needs - also incorporated directly into the FNA model:

- Including representation of generator properties which correspond to flexibility and impact on their ramping abilities. This included parameters such as, but not limited to, ramp rates up and down, cold/warm start times, shutdown times, minimum on/off times, and minimum stable generation levels, etc.

Consideration needed on level of RES capacity and availability:

- The level RES following the FNA Methodology meant that the RES integration target could not have been met even if all dispatch down was removed;
- This meant that by following the FNA methodology there would technically be no “uncovered” RES integration need from the base scenario with how it is expected in the methodology;
- There were limited meant through which to manage this to get useful outputs – this led to the introduction of the High RES scenario.





RES Integration Needs

As required by the FNA Methodology, RES Dispatch Down was characterised across target years, weather scenarios and timeframes (hourly/daily/monthly) to help identify flexibility needs and understand how flexibility resources could address them:

- Annual time series and probability distributions
- Correlation distributions against wind and solar availabilities, and against demand
- Average, max, min, and variations against averages
- Number of periods showing a need, duration of need, gap between periods with needs
- Sensitivity analysis on the main drivers for flexibility needs



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Results IE – RES Integration Flexibility Needs

	Base scenario			High RES scenario		
FNA scenario	IE annual surplus + curtailment dispatch down (%)	IE annual constraint dispatch down (%)	IE annual total dispatch down (%)	IE annual surplus + curtailment dispatch down (%)	IE annual constraint dispatch down (%)	IE annual total dispatch down (%)
2028 Weather Scenario 4	2.33%	9.84%	**12.17%**	7.01%	10.82%	**17.83%**
2028 Weather Scenario 28	1.84%	9.84%	**11.68%**	6.36%	10.82%	**17.18%**
2028 Weather Scenario 34	1.89%	9.84%	**11.73%**	6.74%	10.82%	**17.56%**
2030 Weather Scenario 4	7.27%	6.05%	**13.32%**	22.47%	7.10%	**29.54%**
2030 Weather Scenario 28	7.26%	6.05%	**13.32%**	23.00%	7.10%	**30.10%**
2030 Weather Scenario 34	7.65%	6.05%	**13.7%**	23.62%	7.10%	**30.72%**

Base scenario

- Using All-Island Resource Adequacy Assessment (AIRAA) model, RES capacity levels do not meet national RES integration targets.

High RES scenario

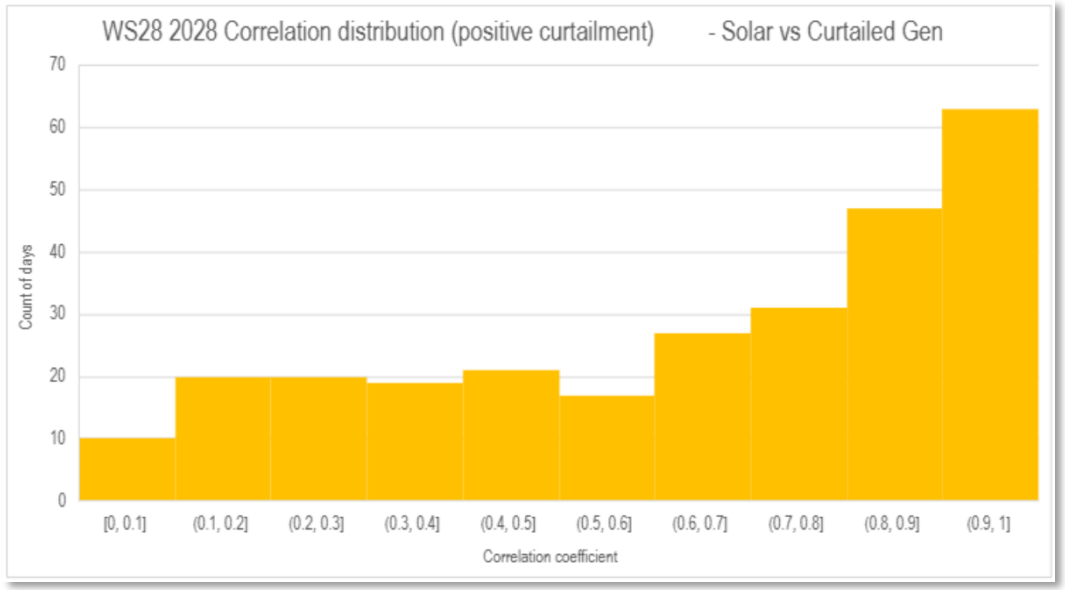
- Increase RES capacity to levels which meet national RES integration targets before dispatch down.

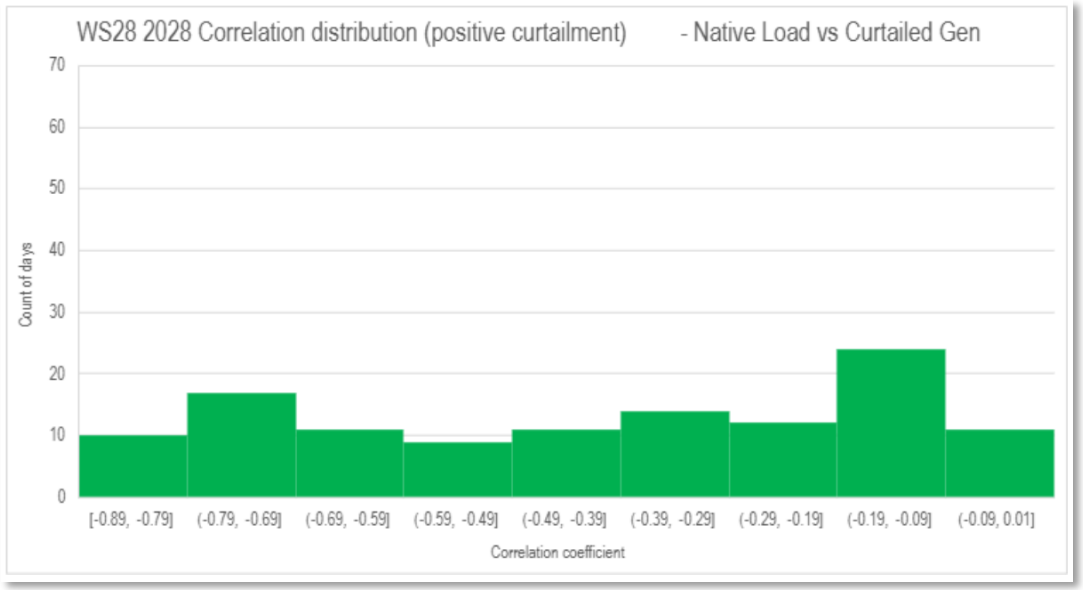
Transmission Network Needs

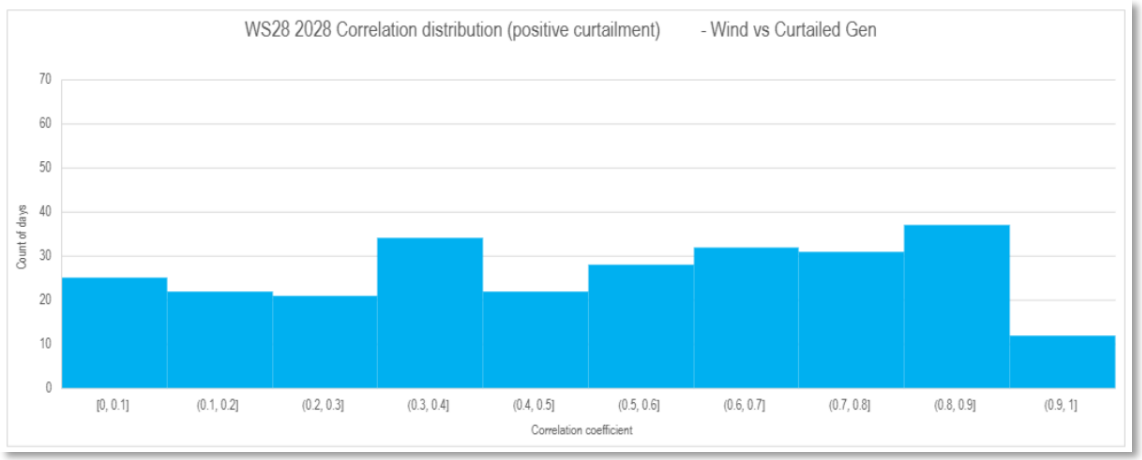
- The ECP 2.5 network simulation model was used, based on the most recent available Network Delivery Portfolio and scenarios with similar characteristics to FNA model (e.g. operational constraints, generation capacities).
- Separate runs with and without the network modelled to get a time series of constraint volumes.
- Fine-tuning to incorporate into RES integration needs - volumes added directly in each hour to curtailment time series from the FNA model, sense-checking rational outputs.
- More location-specific impacts in ECP modelling results published through the constraint reports.

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Results IE – RES Integration Flexibility Needs Characteristics – Correlation

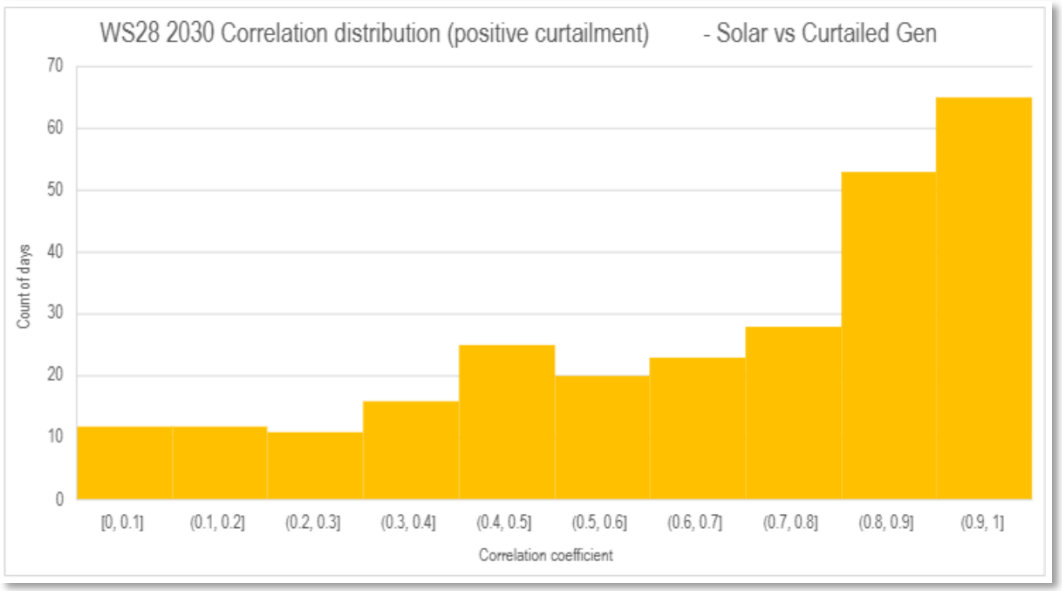


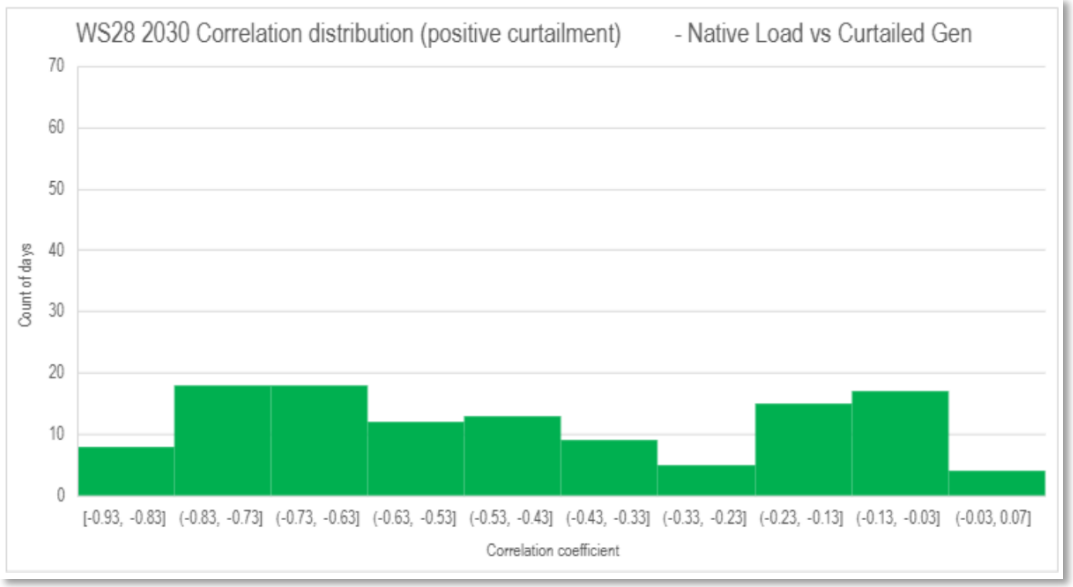


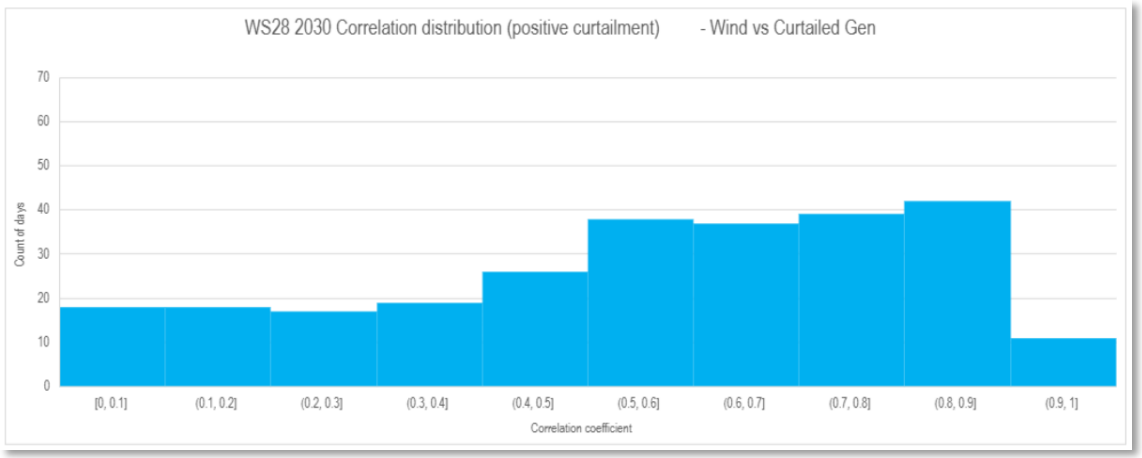


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Results IE - RES Integration Flexibility Needs Characteristics - Correlation

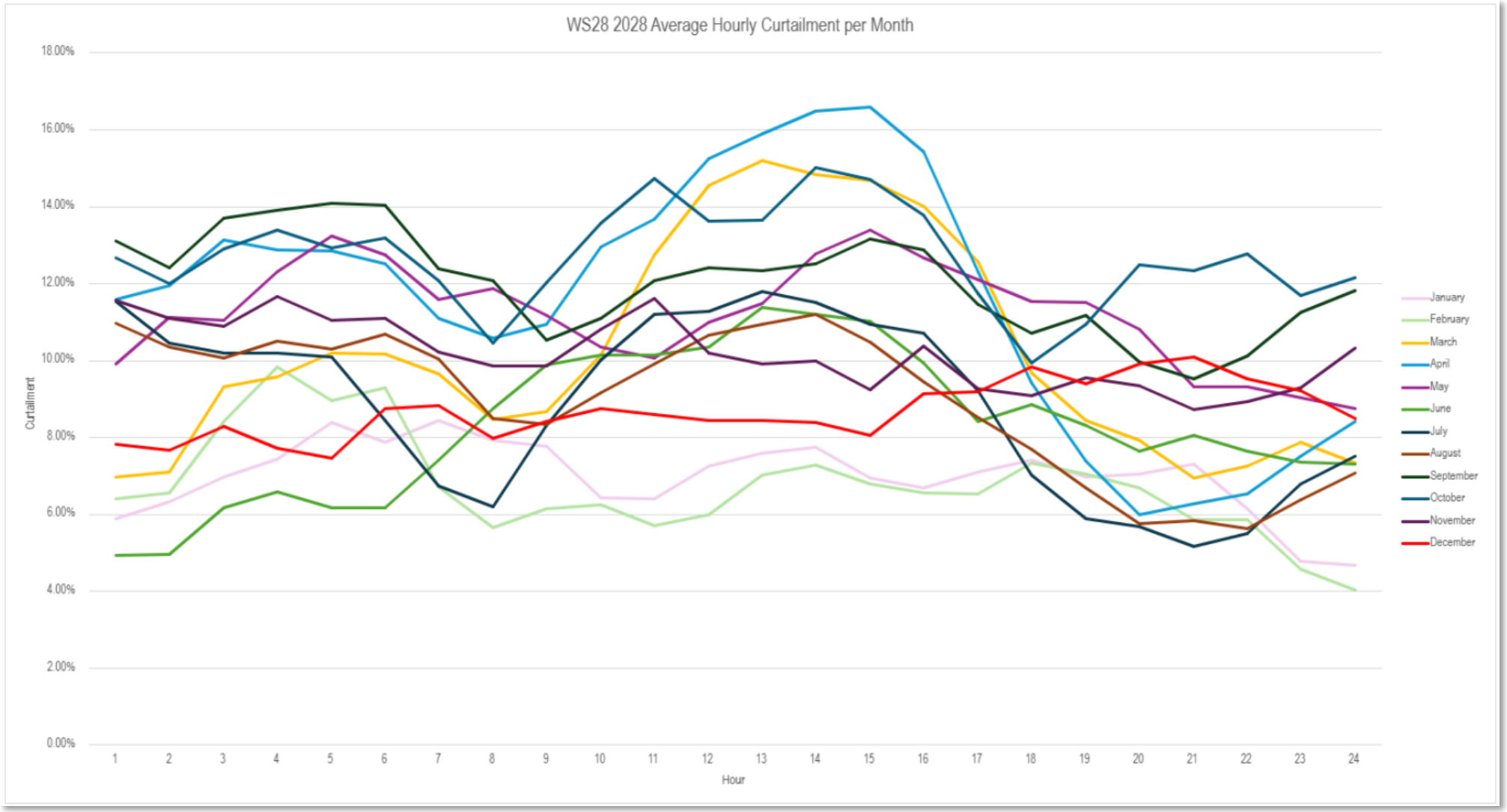




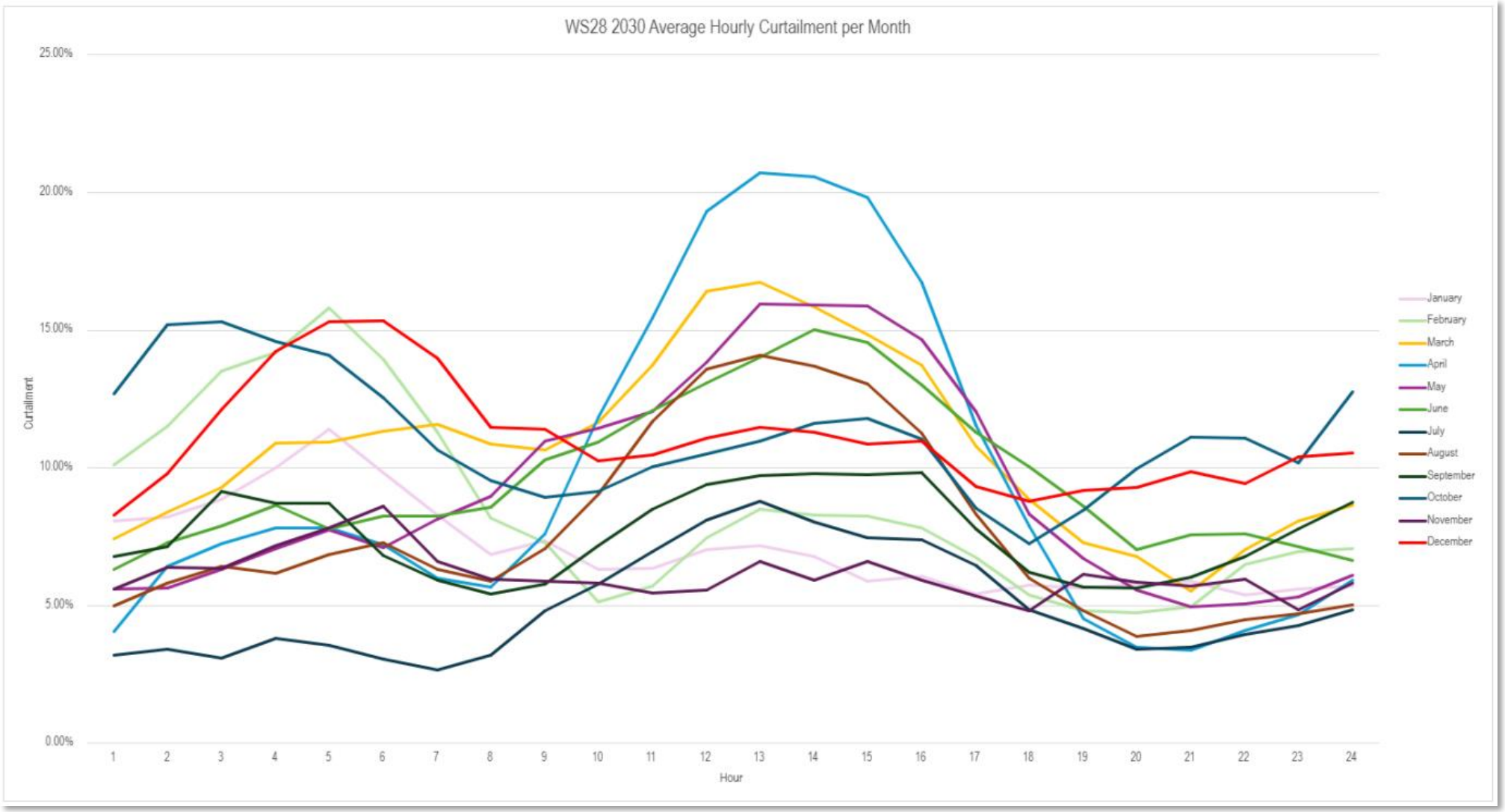




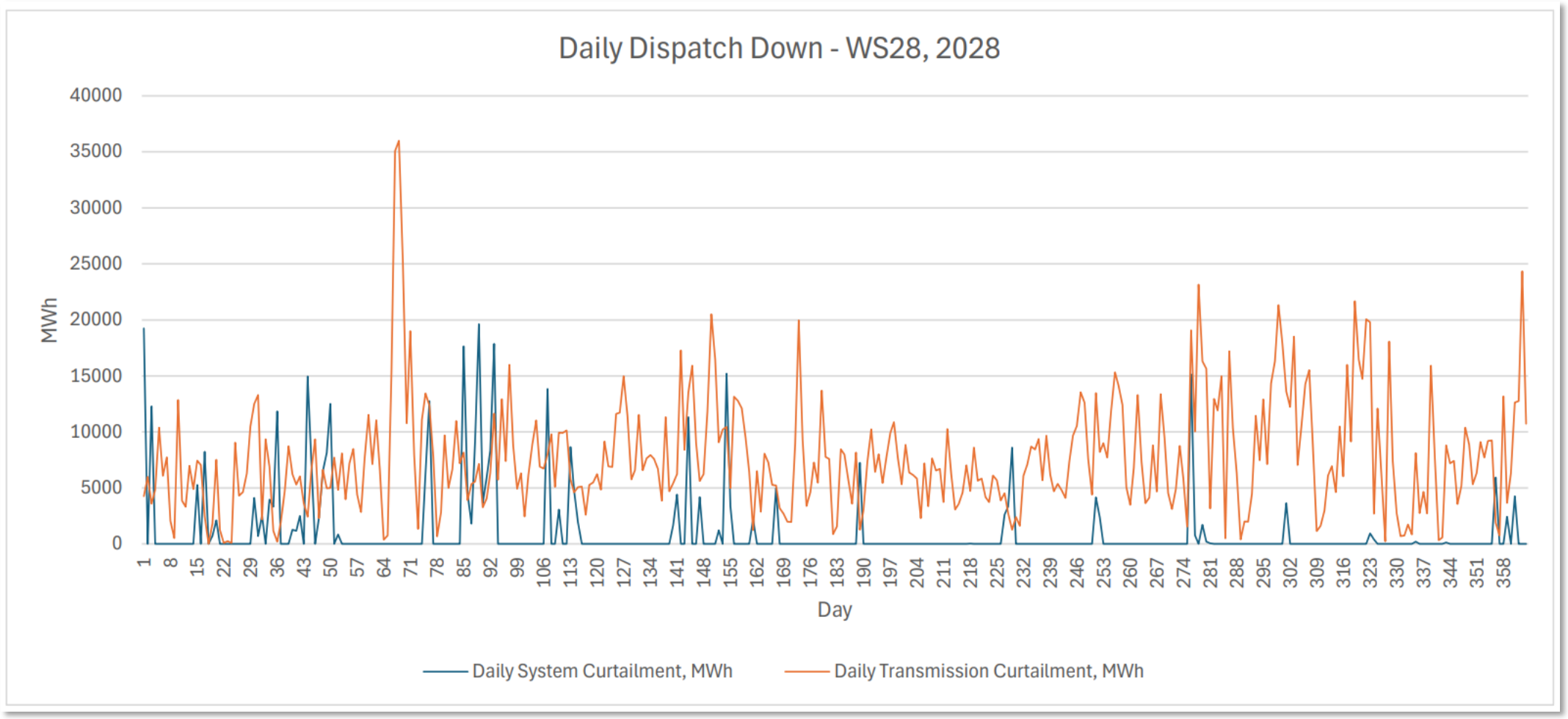
Results IE - RES Integration Flexibility Needs Characteristics - Function of Time of Day



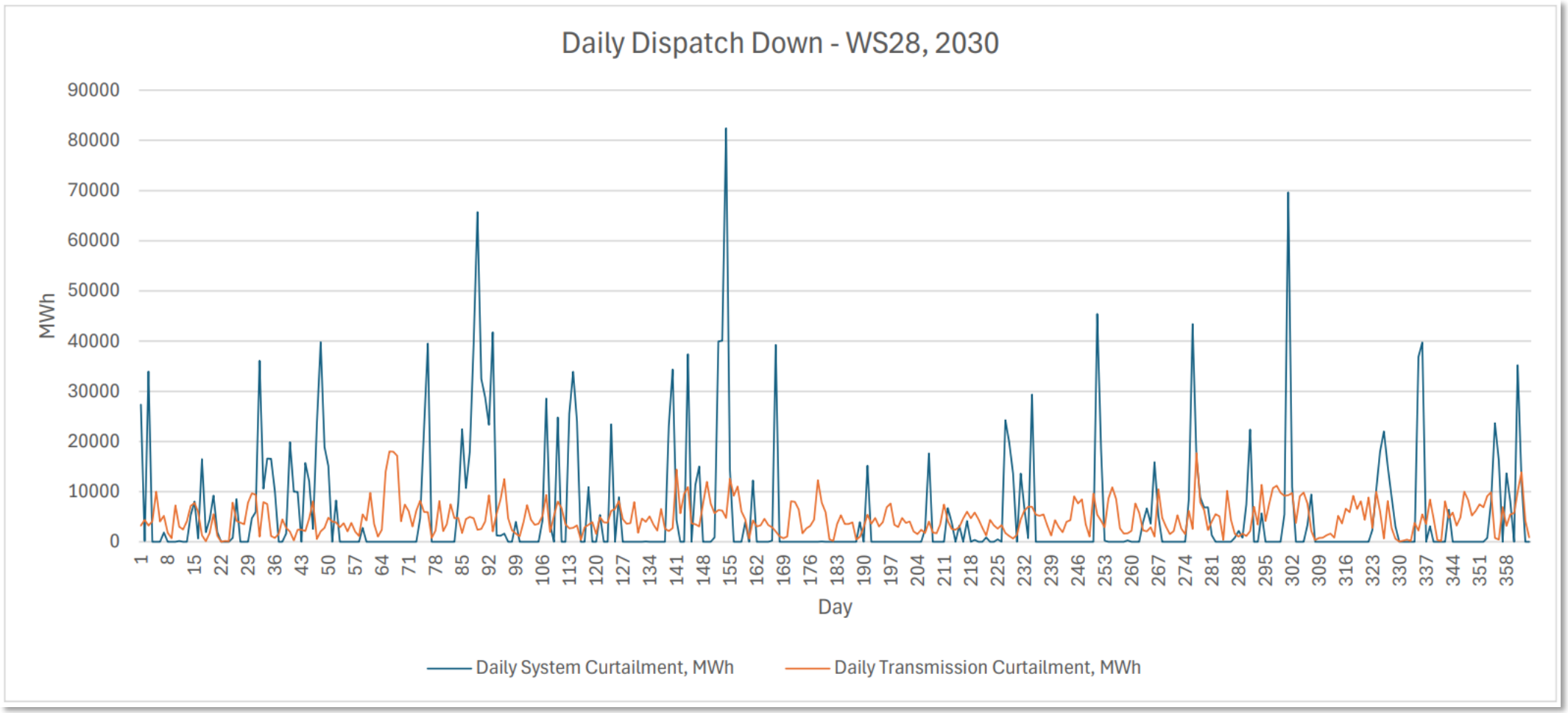
Results IE - RES Integration Flexibility Needs Characteristics - Function of Time of Day



Results IE – RES Integration Flexibility Needs Characteristics – Duration



Results IE – RES Integration Flexibility Needs Characteristics – Duration



Results IE – Sensitivity Analysis - Ramping and Short Term Needs

FNA scenario	IE Surplus + Curtailment (%)	IE Constraint (%)	IE Total Dispatch Down (%)
Base	7.26	6.05	13.31
No STFlex	7.12	6.05	13.17
No Ramp	7.16	6.05	13.21
No Ramp or STFlex	7.03	6.05	13.08
No Op Constraints	4.37	6.05	10.42
No Op Constraints or STFlex	2.52	6.05	8.57
No Op Constraints or Ramp	4.05	6.05	10.1
No Op Constraints or Ramp or STFlex	2.57	6.05	8.62
No Tx Constraints	7.26	0	7.26
No STFlex or Tx Constraints	7.12	0	7.12
No Ramp Tx Constraints	7.16	0	7.16
No Ramp or STFlex or Tx Constraints	7.03	0	7.03
No Op Constraints or Tx Constraints	4.37	0	4.37
No Op Constraints or STFlex or Tx Constraints	2.52	0	2.52
No Op Constraints or Ramp or Tx Constraints	4.05	0	4.05
No Op Constraints or Ramp or STFlex or Tx Constraints	2.57	0	2.57

- The highlighted scenarios show that ramping and short-term flex needs have only a minor impact on RES dispatch down on their own, indicating no uncovered needs in these areas under the FNA modelling methodology.
- **CAVEAT:** As FNA definitions of short-term flexibility and ramping differ from how operating reserves and ramping margins are assessed in the Irish power system and SEM, results should be interpreted with caution when reflecting those operational considerations.
- Wider sensitivity results indicate that while ST Flex and Ramping have no real impact on their own, if combined with removal of operational constraints this can result in a greater impact – highlighting the importance of removing those operational constraints as a fundamental aspect to enable further meeting RES integration needs

Results IE - Key messages

01 Significant RES integration flexibility needs in Ireland, shown through increasing levels of RES dispatch down across all scenarios and target years. In 2028 transmission constraints results from ECP model are somewhat higher than surplus results in FNA model. Towards 2030, anticipated network development reduces the level of transmission constraints, and the contribution of RES surplus increases as RES penetration increases.



02 There are characteristics to the RES integration flexibility need that may impact how it could be met, including distribution of volume over time, function of time of day showing "double-peak" characteristic with different focus on overnight and mid-day in different seasons correlating with wind solar and demand, "blocky" nature - when it arises it tends to be for relatively long durations with relatively high MW levels.

03 Further development of the methodologies, modelling approaches, data sources and analytical approaches will be required in future assessments (next due 2028). In particular, the assessment identified a number of challenges associated with applying the ACER modelling methodology with SEM-specific operational arrangements and processes – used "High RES" scenario to get more useful results in this iteration.

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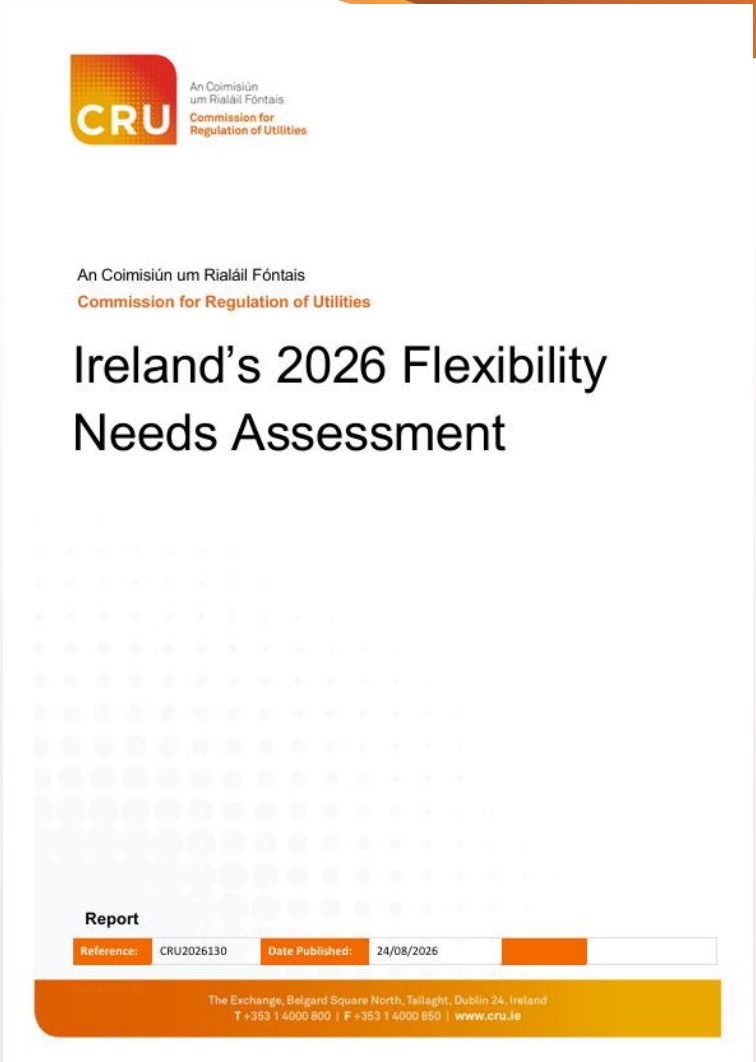
Q&A

Coffee / Tea Break

11:00–11:15

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Distribution Level Flexibility Needs

Flexibility Needs Assessment : Distribution System Needs

FNA Industry Event 20 October 2026

DMSO
Distribution Markets
& System Operation

Requirements To Be Delivered Per ACER Document

DMSO Distribution Markets & System Operation

DSOs to consider and complete the following :

- **Assess network flexibility needs to prevent or solve congestion or voltage issues on their own network over the next 5–10 years.**
- **Provide accurate and complete data and analysis for the FNA report, following the specified format and methodology.**
- **Use Distribution Network Development Plans (DNDPs) as the main source for assumptions, scenarios, and data.**
- **Coordinate with TSOs, other DSOs, designated authorities, and regulatory bodies to harmonize data and agree on roles.**

Timeframe to deliver this first FNA was challenging – 12 months

Impact

- The report will inform indicative national objectives for non-fossil flexibility (Art. 19, Reg. (EU) 2019/943) and transparently signal where flexibility can address network constraints ahead of time.
- This will be a market-informing report and not a procurement statement; DMSO procurement plans will be informed by the FNA.

ESB NETWORKS

FNA report delivery: sustained, high-intensity collaboration

DMSO Distribution Markets & System Operation

A 15-month delivery journey combining internal mobilisation, technical workshops and continuous regulatory / TSO alignment



Strong level of effort

Multiple workstreams progressed in parallel, supported by frequent cross-organisation checkpoints.

15 months from methodology to lessons review

3 external organisations aligned

Weekly / fortnightly coordination cadence throughout

Internal mobilisation

Cross-functional workshops, project planning, structured review and lessons learned.

ESBN teams

Tri-partite alignment

In-person workshop plus regular coordination across ESBN, CRU and EirGrid.

Governance

External engagement

Advisory Council and DSOEntity touchpoints shaped market-barrier and methodology inputs.

Industry input

Key delivery and engagement milestones

25 Jul 2025
ACER methodology published

18 Nov 2025
Advisory Council briefing

27 Nov 2025
SOW approved by CRU

7 Apr 2026
In-person tri-partite workshop

2–3 Jun 2026
DSOEntity workshop

24 Aug 2026
FNA publication

26 Aug 2026
Initial lessons-learned workshop

17 Sep / 2 Oct 2026
DSOEntity workshops

ALWAYS-ON ENGAGEMENT

Weekly or fortnightly CRU–ESBN–EirGrid coordination meetings throughout delivery

The report was not a point-in-time publication. It was the outcome of sustained internal effort, iterative challenge and continuous external alignment.

ESB NETWORKS

Points To Note – ESBN SOW (Distribution Network Methodology)

DMSO Distribution Markets & System Operation

01

A FNA report will be produced every 2 years

02

The main focus in the first report is congestion at 110kV/38kV, 110kV/MV & 38kV/MV stations (220kV/110kV stations in greater Dublin area)

03

Upwards Flexibility Needs only to be identified (e.g. demand down flexibility) in detail

04

Downward flexibility – an assessment of flexible generation connections and micro/mini-generation

05

Voltage – sample studies to show positive impact on network

06

Cost Benefit – proposed approach for future iterations documented

07

Key Assumptions re load base and approach to new load outlined (amongst other items)

08

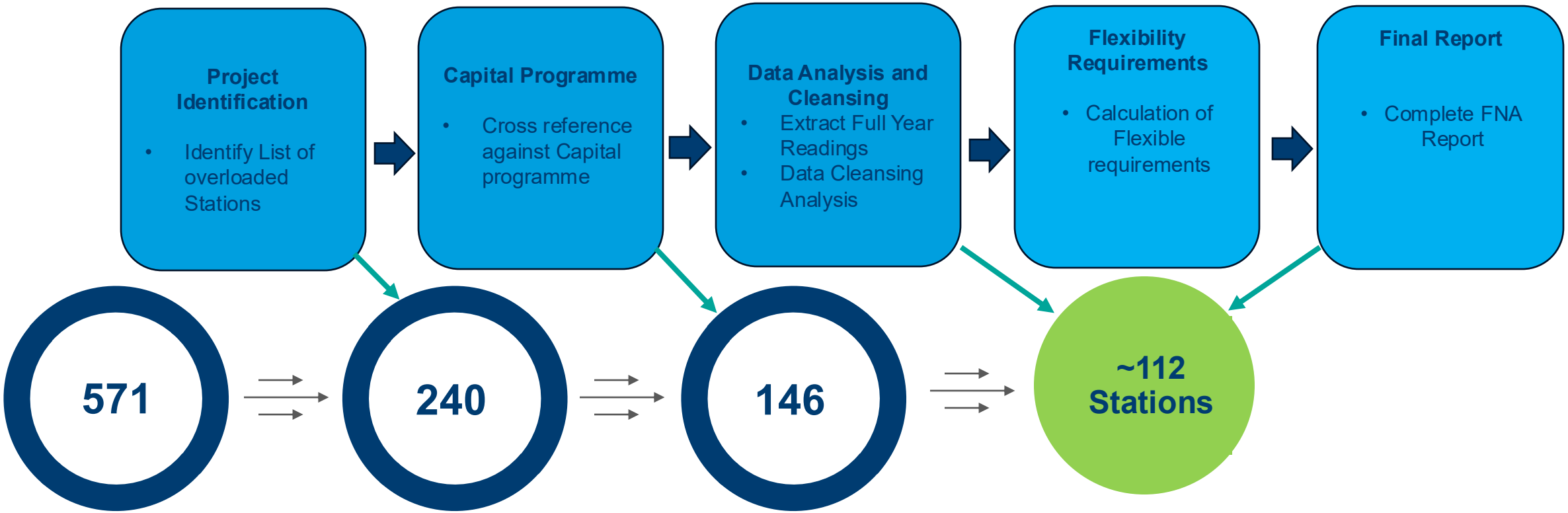
Risks and Mitigations outlined

ESB NETWORKS

Upward Flexibility : Our Approach

DMSO Distribution Markets & System Operation

- The FNA Team have developed a comprehensive methodology and statement of work
- Our approach can be summarized as follows:



ESB NETWORKS

Upward Flexibility : Detailed Assessment

DMSO Distribution Markets & System Operation

For each shortlisted station, ESBN identified:

- Maximum power (MW) requirement over the year
- Total energy (MWh) requiring flexibility intervention
- The specific time windows when flexibility would be required.

Figure 1: A sample 38kV/MV station loading profile for the target year 2028

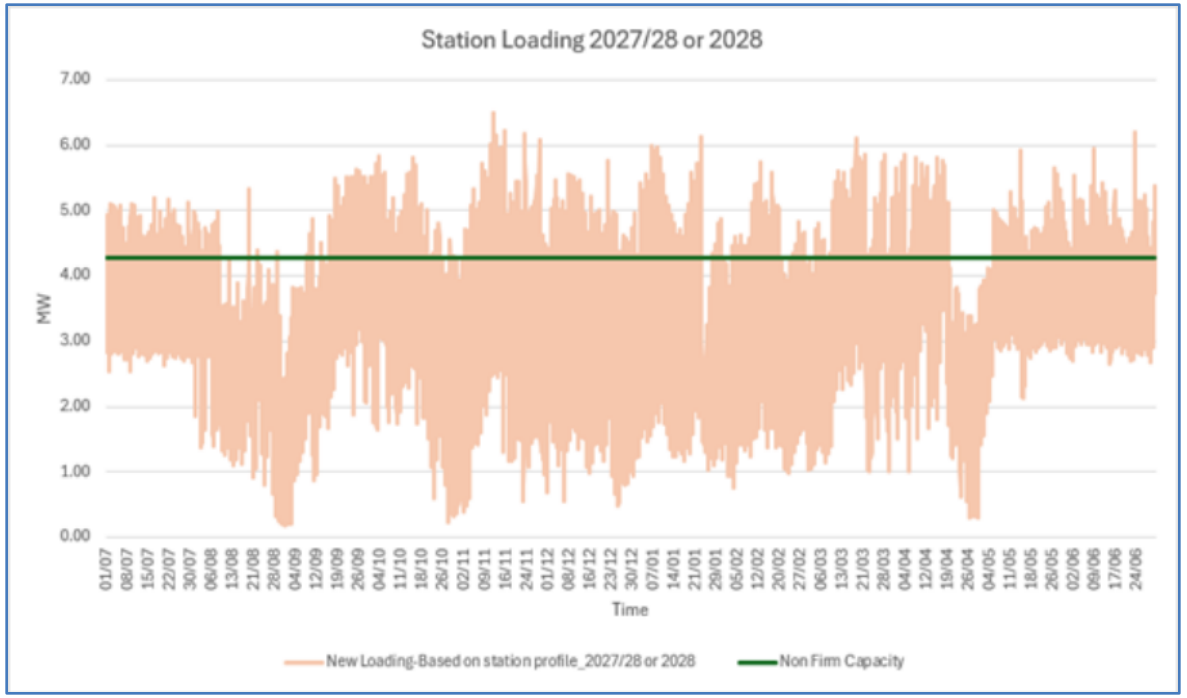


Figure 2: FNA Sample Summary Table

Direction of need	Target Year	Time Block	Reasoning to define the time block	Spatial granularity	Voltage level of congestion issue	Type of value	Network flexibility needs	Expected contractual means to access flexibility
Upwards	2028	Jan, Weekday, 12:30pm, 5:30pm	Congestion at station level	DUBLIN CENTRAL	38/MV	Total energy over the entire time block (MWh)	1.00	ESBN intend to access flexibility via procurement of flexible services or issuing flexible connection offers to customers requiring new capacity
				CLONDALKIN-38/MV		Summation of Maximum power (MW)	1.00	
Upwards	2030	Jan-Feb, Weekday, 9am-2:30pm & 4:00-7:30pm		DUBLIN CENTRAL	38/MV	Total energy over the entire time block (MWh)	75.27	
				CLONDALKIN-38/MV		Summation of Maximum power (MW)	3.42	

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List of stations Assessed and Flexibility Needs have been Identified

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The graph sets out for each of the target years the number of stations where flexibility needs have been identified. This is broken down as follows:

- Where the longest duration of need is > = five hours
- Where the longest duration of need is < five hours

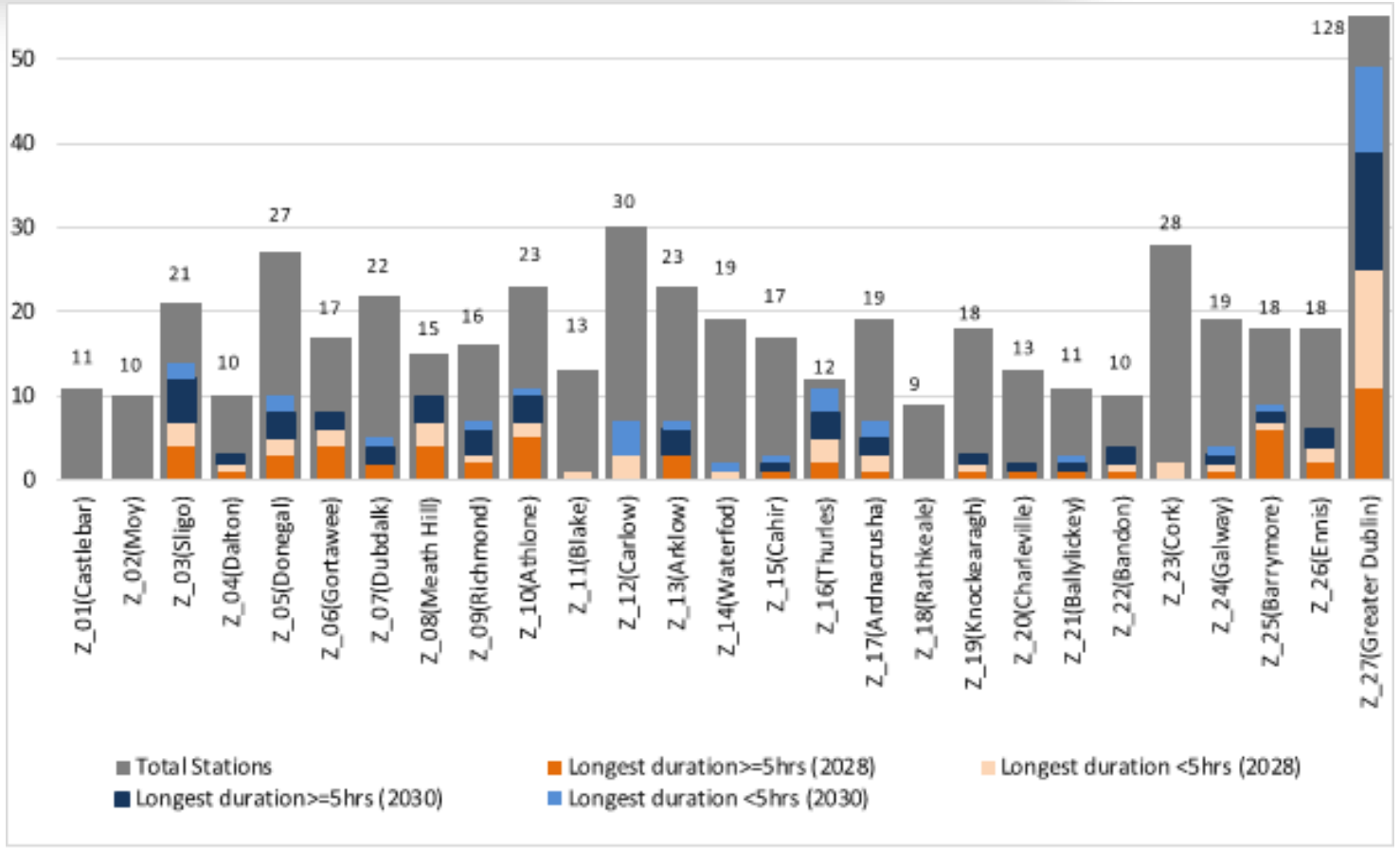


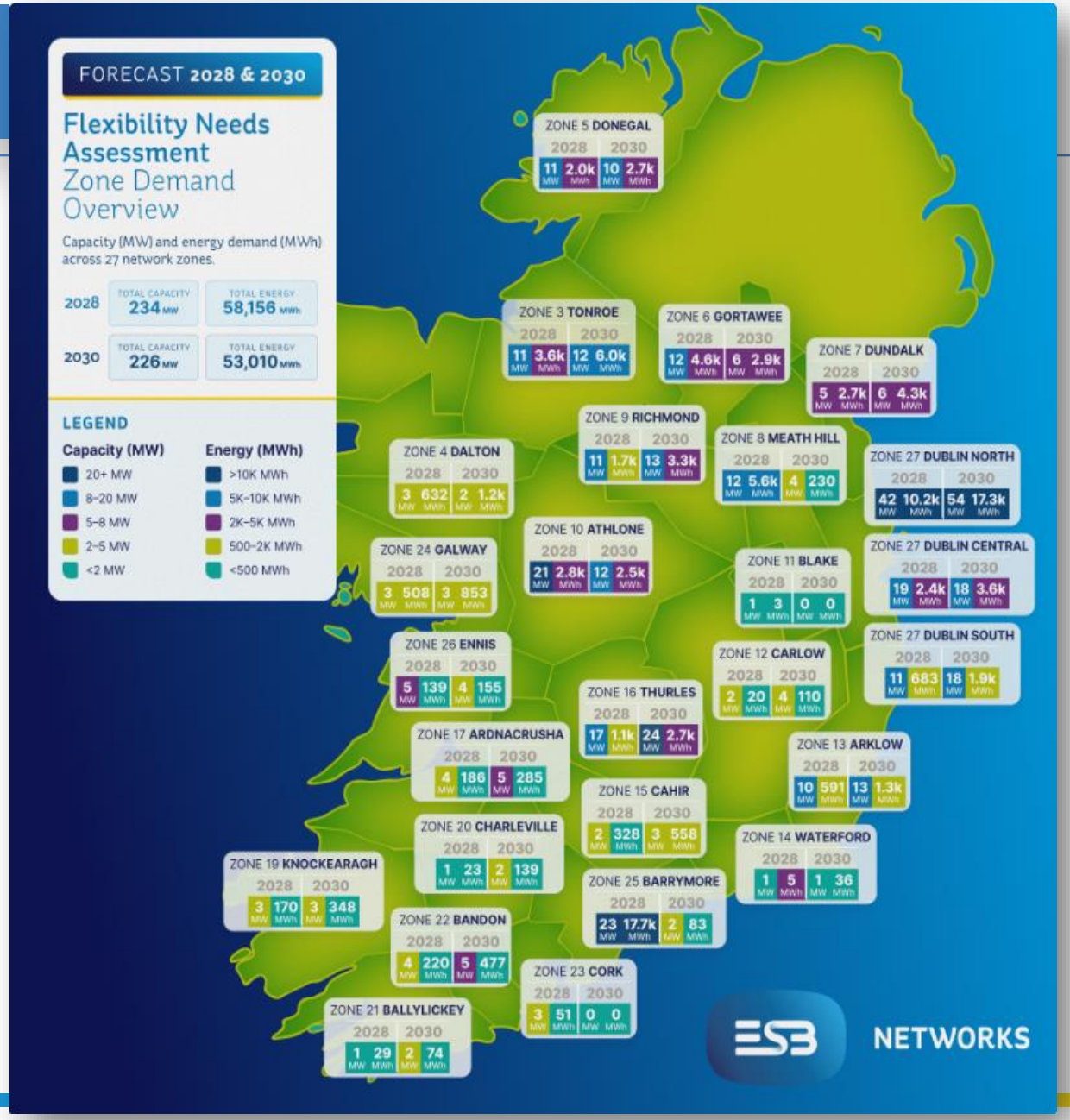
Fig 3: Substation Distribution by Planner Zones and Longest Duration of Flexibility Need

Note: Number of stations where the longest duration of need is >=5 hours – 56 (2028) & 54 (2030)

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Upward Flexibility : Results

	MW	MWh	% flexible needs across Zone (MWh)	MW	MWh	% flexible needs across Zone (MWh)
Zone 3 - Tonroe	11	3632	1.41	12	6043	2.28
Zone 4- Dalton	3	632	0.83	2	1240	3.58
Zone 5- Donegal	11	2034	0.99	10	2672	1.42
Zone 6- Gortawee	12	4582	1.62	6	2925	3.62
Zone 7- Dundalk	5	2692	4.33	6	4266	4.06
Zone 8- Meath Hill	12	5627	1.81	4	230	0.16
Zone 9 - Richmond	11	1749	1.05	13	3282	1.85
Zone 10 - Athlone	21	2845	0.79	12	2505	1.51
Zone 11 - Blake	1	3	0	0	0	0
Zone 12- Carlow	2	20	0.01	4	110	0.05
Zone 13- Arklow	10	591	0.31	13	1342	0.55
Zone 14- Waterford	1	5	0.01	1	36	0.08
Zone 15-Cahir	2	328	1.33	3	558	0.47
Zone 16-Thurles	17	1095	0.56	24	2665	1.03
Zone 17-Ardnacrusha	4	186	0.24	5	285	0.25
Zone 19-Knockearagh	3	170	0.19	3	348	0.78
Zone 20-Charleville	1	23	0.05	2	139	0.26
Zone 21-Ballylickey	1	29	0.14	2	74	0.12
Zone 22-Bandon	4	220	0.39	5	477	0.01
Zone 23-Cork	3	51	0.06	0	0	0
Zone 24-Galway	3	508	1.93	3	853	1.84
Zone 25-Barrymore	23	17698	3.48	2	83	0.09
Zone 26-Ennis	5	139	0.09	4	155	0.22
Dublin Central	19	2376	0.45	18	3583	0.95
Dublin North	42	10238	0.80	54	17277	1.48
Dublin South	11	683	0.20	18	1863	0.30
Total	234	58156		226	53010	
Average % Flexible Needs			0.89			1.04



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Upward Flexibility : 110/38KV Hub Assessment and Voltage Assessment

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110/38KV Hub Assessment

- A methodology was applied to ensure flexibility needs are co-optimized across voltage levels, preventing double-counting between upstream and downstream stations
- This approach reinforces the importance of co-optimizing flexibility across the network to ensure accurate identification of requirements
- Upstream 110/38kV stations Determination:
  - When total downstream flex requirements is lower than initially estimated upstream requirement:
    - The upstream requirement is reduced so that it reflects only the difference between the two
  - When total downstream flex requirements exceeds the initially estimated upstream requirement:
    - The upstream requirement is set to zero, assuming that the downstream stations will fully cover the flex requirements at the upstream level

Voltage Assessment

- FNA doesn't directly assess voltage or overload-driven flexibility needs.
- Power-flow testing (PSS®SINCAL) at sample 38kV/MV stations shows upward flexibility improves voltage when relieving station congestion.
- Scenarios assessed:
  a) Base Scenario: Actual load profile grown to the relevant target year with no flexibility activation.
  b) Flexibility Scenario: Identified upward flexibility procured and activated, with corresponding volumes removed from the grown load profile

Key takeaway:

- Upward flexibility materially improves voltage during constrained periods.
- Confirms flexibility as a credible non-wires alternative for both voltage and thermal management.

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Downward Flexibility Findings

- Downward flexibility was assessed under two approaches:
  1. In terms of flexible generation projects level of reduction in generation that might arise
  2. In terms of micro/mini-generation, similarly, level of reduction that may arise

- In both cases there is no consideration of Transmission or system issues which may drive constraint or curtailment

- Similar to upward flexibility only transformers are considered:
  - Flexible Generation– could be 38kV/MV or 110kV/38kV (depending on restriction in the specific location)
  - Micro/mini-generation MV/LV substation capacity

Overall Results (MWh)			
	2025	2028	2030
Pilot 4	1.38	-	-
Mini/Micro Generation	643	1223	2035

Key Findings for Distribution Level Flexibility Needs

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	2028	2030
Ireland annual total demand in GWh - per All-Island Resource Adequacy Assessment Report	41,900	44,600
Flexibility Needs in GWh	58	53
Flexibility Needs as a % of annual consumption	0.14%	0.12%
Flexibility Needs in MW	234	226

**Ireland annual Total Demand - Based on EirGrid's All-Island Resource Adequacy Assessment 2026-2035*
***GWhrs of Flexibility Needs is based on 112 stations*

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Distribution Network Flexibility Needs: Key Messages

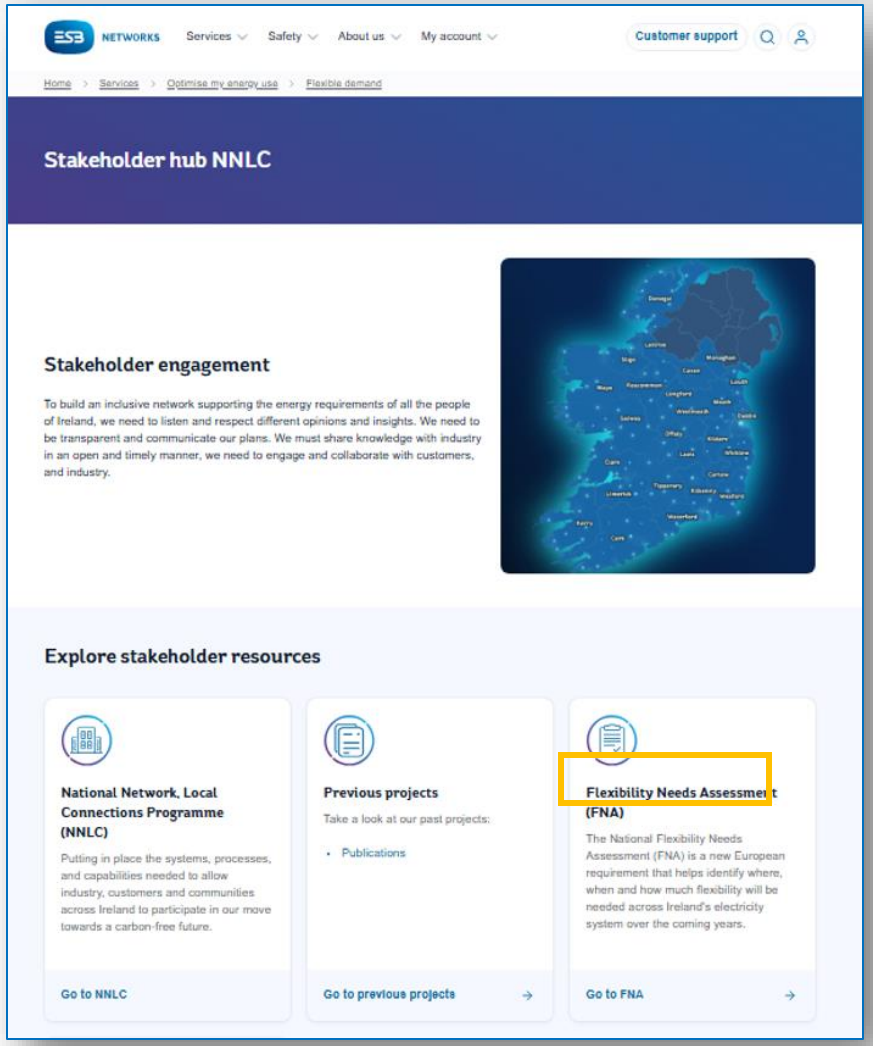
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- Flexibility needs are localized, driven by forecast station overloads and demand-related congestion.
- Overall system-wide energy requirement is modest, but needs are highly concentrated in specific zones.
- Greater Dublin Area shows the most significant need in MW and MWh terms.
- Needs are location-specific and sensitive to planned reinforcement; constraints will reduce once reinforcement is delivered in an area.
- At Distribution level, flexibility is most effective as a targeted tool for managing local constraints - via targeted procurement, short-term products, or local flexibility markets.
- Additional benefits include voltage support in assessed cases.
- Downward flexibility needs from flexible generation and microgeneration are limited today but expected to evolve as the distribution system changes.

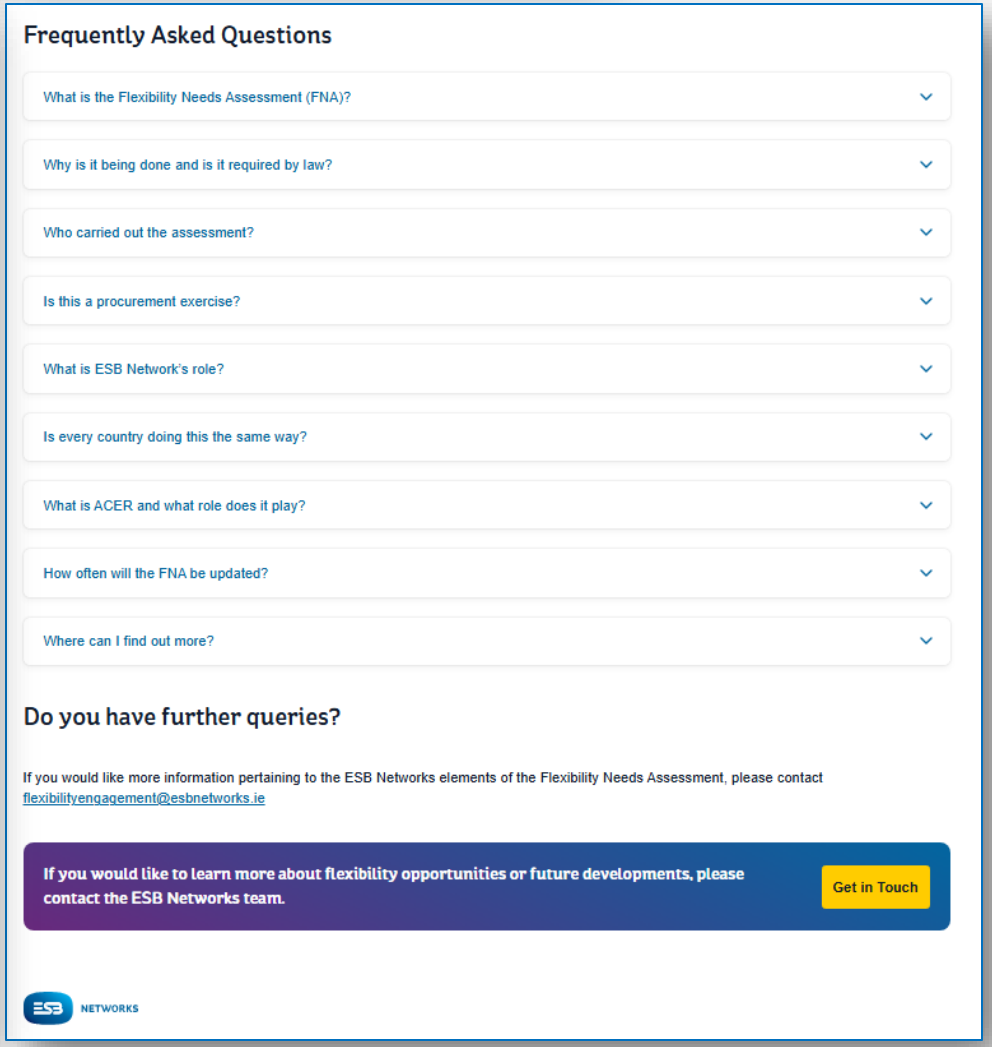
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Further Details on ESBN Website Flexibility Needs Assessment (FNA)

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Local Business Flex – locations published

Local Business Flex | ESB Networks

Thank You

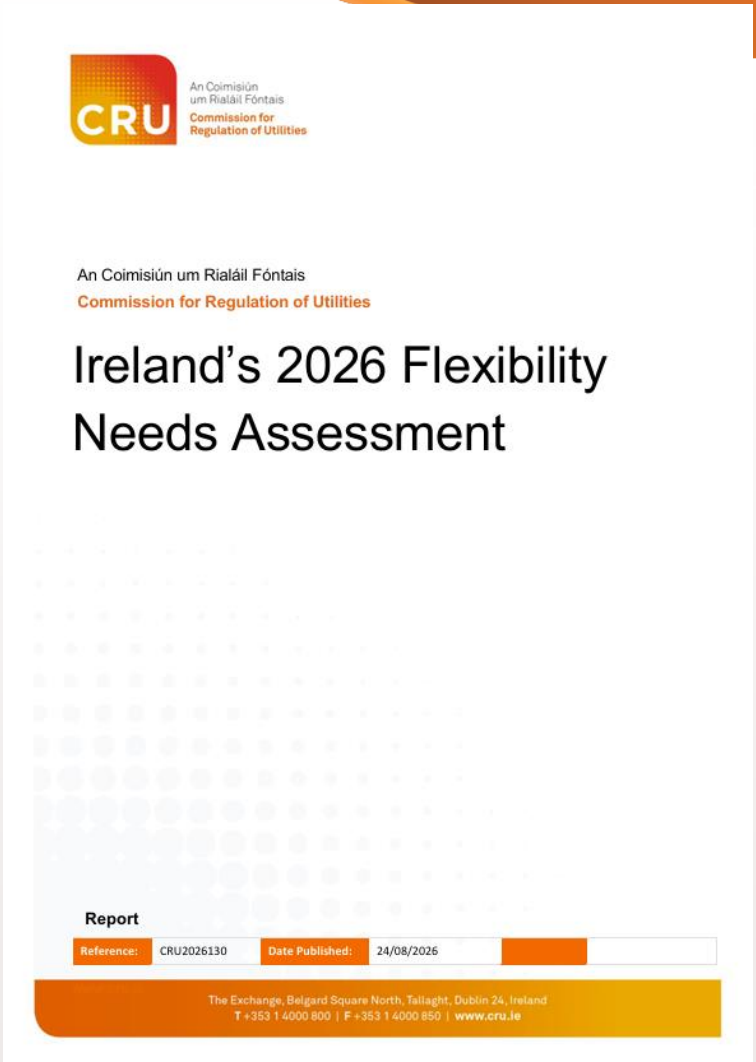
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Q&A

11:45–12:00

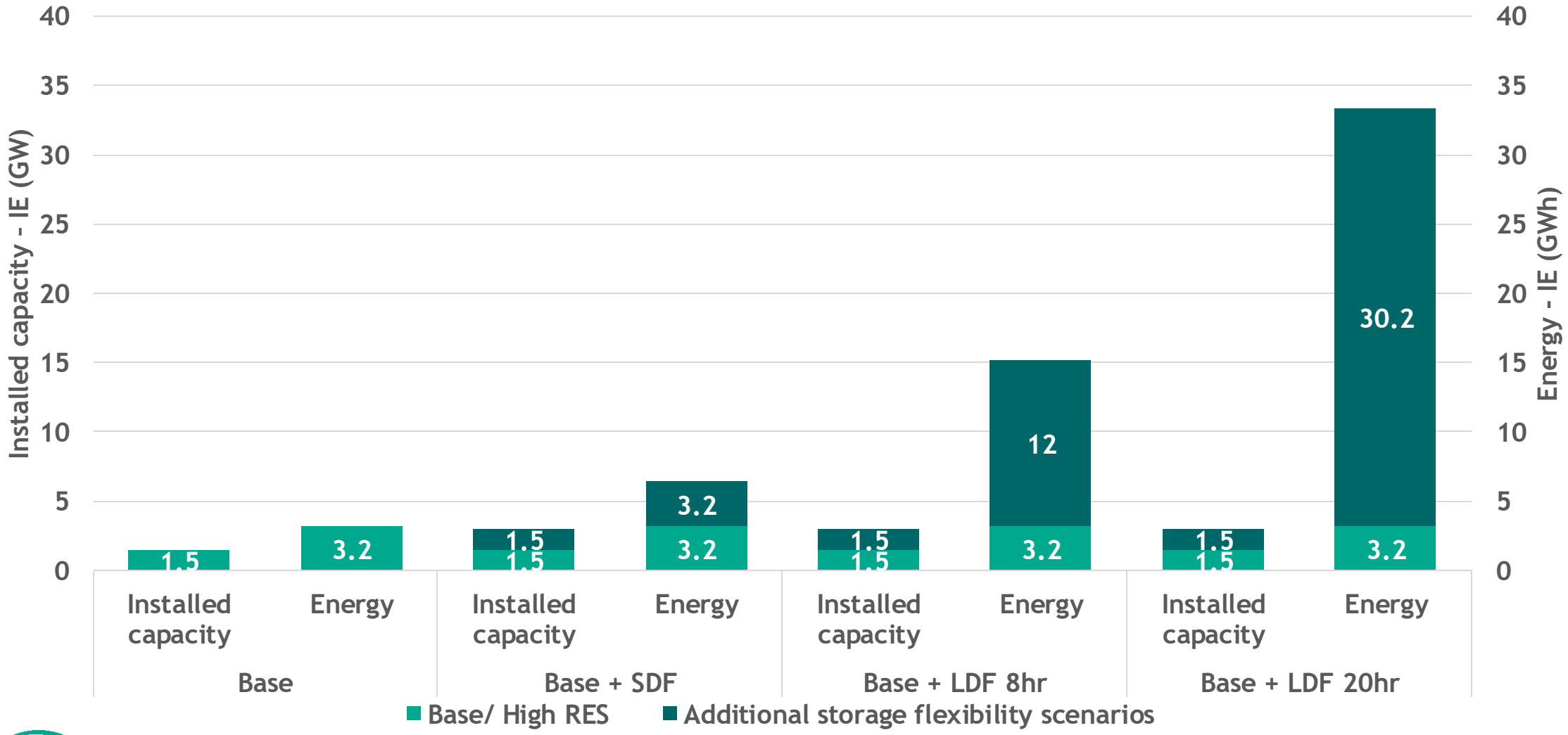
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Options to Fill the Identified Needs
TSO

Potential impact of additional storage on reducing renewable energy dispatch down – Input scenarios for additional flexible capacity in Ireland



Note that similar doubling of capacity and energy was done in NI – each would have all-island impact

Results - Ability for Additional Flexibility to Meet RES Integration Needs

	IE annual surplus + curtailment dispatch down				
FNA scenario	High RES	Additional SDF	Additional 8hr LDF	Additional SDF & 8hr LDF	Additional 20hr LDF
2030 WS28 (%)	23.00%	22.41%	20.74%	20.28%	18.5%
2030 WS28 (GWh)	9,852.14	9,599.40	8,884.28	8,689.35	7,923.13

Scenarios explored:

- Additional Short Duration Flexibility (SDF) – double MW capacity of existing flexibility, duration of additional flexibility is same as current.
- Additional 8hr Long Duration Flexibility (LDF) – double MW capacity of existing flexibility, the duration of the additional flexibility is 8hrs.
- Additional 20hr Long Duration Flexibility (LDF) - double MW capacity of existing flexibility, the duration of the additional flexibility is 20hrs.

Additional flexible resources are valuable for meeting RES integration flexibility needs by reducing RES curtailment:

- Benefit is clear in terms of GWh of dispatch down saved;
- Increasing flexibility duration is somewhat more valuable than adding capacity of shorter duration flexibility, less diminishing returns as duration increases, due to long continuous duration and high MWh level of surplus + curtailment;
- Could indicate better value of flexibility without energy limits – analysis shows that for the same additional flexible capacity without duration limits the surplus + curtailment for the High RES scenario could be reduced to **12.9%** in 2030.

EirGrid

Additional results – Ability for Additional Flexibility to Meet RES Integration Needs, Duration of Curtailment



	IE annual dispatch down by category				
WS28, 2030, IE, High RES	High RES	Additional SDF	Additional 8hr LDF	Additional SDF & 8hr LDF	Additional 20hr LDF
Annual Surplus Dispatch Down, %	18.54%	17.57%	15.69%	15.13%	13.81%
Annual Curtailment Dispatch Down, %	4.46%	4.84%	5.05%	5.15%	4.93%
Annual ECP Constraint Dispatch Down, %	7.10%	7.10%	7.10%	7.10%	7.10%
Annual Total Dispatch Down, %	**30.10%**	**29.51%**	**27.84%**	**27.38%**	**25.84%**

FNA scenario	Peak Surplus + Curtailment Dispatch Down (MW)	Largest Block of Surplus + Curtailment Dispatch Down (hrs)	Largest block average Surplus + Curtailment DD (MW)	MW of 4-hour flexibility required to supply largest Block (MW)	MW of 20-hour flexibility required to supply largest Block (MW)	Hours of flexibility at peak MW required to supply largest Block (hrs)
2030 WS28	7,455	70	2,303	40,303	8,061	22
2030 WS28 High RES	11,163	156	4,526	176,514	35,303	63

Results IE - Sensitivity analysis



FNA scenario	IE Surplus + Curtailment (%)	IE Constraint (%)	IE Total Dispatch Down (%)
Base	7.26	6.05	13.31
No STFlex	7.12	6.05	13.17
No Ramp	7.16	6.05	13.21
No Ramp or STFlex	7.03	6.05	13.08
No Op Constraints	4.37	6.05	10.42
No Op Constraints or STFlex	2.52	6.05	8.57
No Op Constraints or Ramp	4.05	6.05	10.1
No Op Constraints or Ramp or STFlex	2.57	6.05	8.62
No Tx Constraints	7.26	0	7.26
No STFlex or Tx Constraints	7.12	0	7.12
No Ramp Tx Constraints	7.16	0	7.16
No Ramp or STFlex or Tx Constraints	7.03	0	7.03
No Op Constraints or Tx Constraints	4.37	0	4.37
No Op Constraints or STFlex or Tx Constraints	2.52	0	2.52
No Op Constraints or Ramp or Tx Constraints	4.05	0	4.05
No Op Constraints or Ramp or STFlex or Tx Constraints	2.57	0	2.57

- Sensitivity analysis shows that operational constraints and transmission constraints have the largest individual impacts

Results IE - Key messages

01 Increased capacity of flexibility resources would reduce RES dispatch down and support RES integration, with longer-duration (or no-duration-limit) flexibility delivering the greatest value in reducing RES surplus. Some of this appears to be due to the "blocky" nature of RES dispatch down events, with long continuous duration and high MWh level of dispatch down whenever it occurs.

02 The scale of flexible resources required to fully eliminate RES dispatch down would be very large and unlikely to be economic. Some level of RES dispatch down should therefore still be expected. Other network reinforcement and operational constraint improvement solutions should be progressed in line with the Transmission Network Development Plan and Operational Policy Roadmap to reduce RES dispatch down. Additional RES capacity is also needed to meet renewable integration targets.



03 Further development of the methodologies, modelling approaches, data sources and analytical approaches would be needed in future assessments to determine quantitative recommendations of capabilities to meet needs. The kinds of scenarios and sensitivities considered should be expanded, including different flexibility inputs (e.g. storage, demand), different RES capacity scenarios, different impacts of decarbonisation policies, different network development and locational impact scenarios, etc.

EirGrid

Options to Fill the Identified Needs
DSO

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Options to Fill Identified Flexibility Needs -DSO

20 October 2026

DMSO
Distribution Markets
& System Operation

Flexibility Solution Categories Mapped to Distribution Level Needs

DMSO Distribution Markets & System Operation

High-level assessment of six identified flexibility solution categories

Demand Response (DR) Implicit and Explicit

Best fit for short evening peaks and predictable daily windows

Storage by Duration

Short duration highly effective for daily peaks
Medium duration addresses multi-hour events
Long duration generally poor fit for local congestion

Dispatchable Local Generation

Partially suited where local generation can be dispatched into congested feeder, but planning, emissions and fuel logistics often limit viability

Flexible Demand Connections

Where customers can tolerate controlled or flexible access to capacity, enabling new load to connect ahead of reinforcement, or existing load to increase MIC

Interconnection and Cross Border Flexibility

System scale solutions can sometimes indirectly reduce distribution congestion by lowering system peaks. However typically poor locational matches

Digital and Operational Measures

Advanced telemetry, dynamic reconfiguration, and market stacking platforms - enablers rather than stand alone measures

System outcome: lower peaks • reduced congestion • better renewable utilisation • more customer choice

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Structured Comparison — Key Decision Criteria

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Comparison of flexibility solutions and decision criteria to be used when considering one against the other

Solution	Unit response time	Duration match	Locational fit	Indicative lead time*
DSO-Procured Explicit DR	Seconds–minutes	Good for 0.5–4 h peaks	High (feeder/substation)	6–24 months
Implicit DR / Smart Tariffs	Minutes–hours	Variable; weaker for firm events	Medium (area/system)	6–24 months
Dedicated Local Storage (0.25–4 h)	Sub second–seconds	Excellent for daily peaks	Very high (point of connection)	12–36 months
Customer BTM Storage	Seconds–minutes	Good if State Of Charge managed	Medium (depends on telemetry)	6–24 months
Dispatchable Local Generation	Minutes	Partial (depends on fuel)	Medium–High (if on feeder)	12–48 months
Flexible Demand Connections	Minutes–hours	Good for multi-hour congestion if customer processes allow	High (site-specific, tied to the congested plant)	6–18 months
Interconnection / Cross-Border	Minutes–hours	Poor for specific feeder needs	Low (system scale)	>36 months
Digital / Operational Measures	Seconds–minutes	Enables other solutions	High (enables locational control)	3–18 months
Long-Duration / Seasonal Storage	Hours–days	Poor for short congestion events	Low (system scale)	>60 months

***Lead times** refer to the **indicative deployment horizon to implement each flexibility solution** — from project initiation or procurement to operational readiness

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Locational Considerations

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Locational considerations for the flexibility solutions



Proximity to congested asset

Solutions must be physically connected to, or controllable at, the specific feeder or substation experiencing overload

The closer the resource is to the congested plant, the higher its electrical effectiveness



Locational dispatchability and controllability

The DSO must be able to direct and predictably activate the resource

Explicit DR and feeder sited storage score highest; system wide measures score lowest



Firmness and verifiability of response

Resources must deliver measurable, testable relief at the exact location during the defined congestion window

This is essential for avoiding thermal or voltage violations



Network topology sensitivity

Effectiveness depends on how power flows through the local network

Some solutions (e.g., reconfiguration, BESS) can influence flows precisely; others (e.g., cross-border flexibility) have negligible locational impact

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Factors Affecting Timescales

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Elements that go into determining the deployment timeline for each flexibility category

Solution	Indicative lead time	Key pipeline stages affecting lead time
DSO-Procured Explicit DR	6–24 months	Product design, customer signup, contracting, telemetry setup, testing, activation
Implicit DR / Smart Tariffs	6–24 months	Tariff design, regulatory approval, customer communication, system changes, enrolment, behavioural adoption
Dedicated Local Storage (0.25–4 h)	12–36 months	Site selection, feasibility/design, grid connection application, civil works, battery procurement, commissioning
Customer BTM Storage	6–24 months	Customer contracting, site works, installation, control integration, SoC management & aggregation qualification
Dispatchable Local Generation	12–48 months	Fuel supply arrangements, permitting, plant construction, grid connection
Flexible Demand Connections	6–18 months	Contracting with large customers, process changes, telemetry & control integration
Interconnection / Cross-Border	>36 months	Major planning, regulatory approvals, construction, cross TSO coordination
Digital / Operational Measures	3–18 months	Software development, platform integration, testing, provider onboarding
Long-Duration / Seasonal Storage	>60 months	R&D / project financing, large scale procurement, permitting, grid reinforcement

Elements are based on industry experience and project maturity across different flexibility types

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Q&A

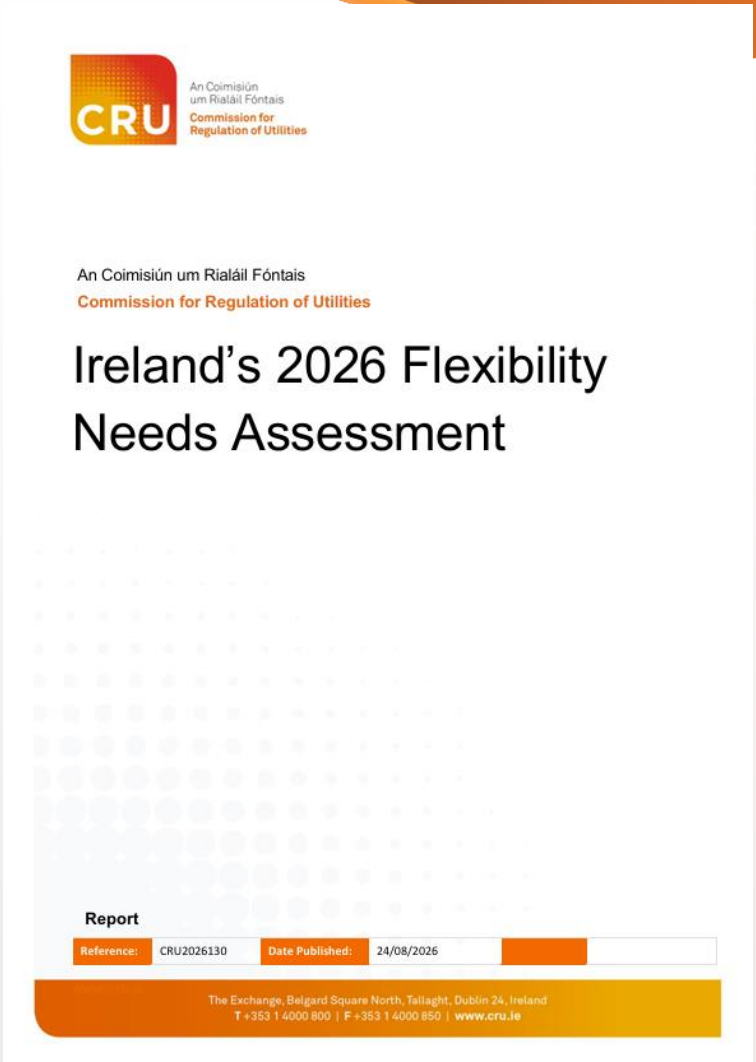
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Market Barriers

Market barriers assessment: scope

Assessment framework	The market barriers assessment followed the six ACER barrier categories and identified an additional cross-cutting barrier.
Evidence considered	The CRU consolidated regulatory analysis, EirGrid and ESB Networks assessments, and industry responses to the FNA information note.
How to interpret the findings	Barriers do not apply uniformly across all forms of flexibility. Their relevance and impact vary depending on the specific flexibility type, use case and location.

How the Barriers were Identified:

CRU
- Regulatory perspective; views across various regulatory teams within CRU.

EirGrid
- Cross-functional review of market, operational and regulatory barriers.

ESB Networks
- Internal assessments, stakeholder engagement, and pilot programme experience

Industry
- Responses to the FNA Information Paper (April 2026).

One consolidated, system-wide view of barriers

Grouped under the six ACER categories and an additional cross cutting category, with ACER indicators flagged where relevant

Market barrier categories

Six ACER barrier categories used in the assessment

1 Proper legal framework for market access to new entrants and small actors	4 Requirements to provide congestion management
2 Enablers and incentives to provide flexibility	5 Complex, lengthy and discriminatory administrative requirements
3 Requirements to provide balancing services	6 Regulatory incentives to system operators to consider non-wire alternatives

Additional cross-cutting barrier identified in the report

Value Stacking and the Multi-Market Participation

ACER barrier category 1

Legal framework for market access to new entrants and small actors

- **Ireland has established much of the legislative basis required to enable these actors to participate in electricity markets**

Issues covered in the report	Summary of the report findings
Development of an enduring flexibility framework	Market rules, TSO systems and licensing arrangements need further development to enable participation.
Limited Aggregation Framework	DSUs have an established route. Wider independent and retail aggregation remains less developed.
Integrated Hybrid Assets – market access	Integrated hybrids lack a single market-facing route. Co-located assets register separately.
Energy Communities – Lack of participation pathway	Legal rights exist, but a dedicated licensing and practical participation pathway is not yet in place.

ACER barrier category 2

Enablers and incentives to provide flexibility

A range of metering, tariff, market and product arrangements already provide a foundation for flexibility participation in Ireland.

Issues covered in the report	Summary of the report findings
Wholesale and capacity market - Incentives and enablers	Not an absence of incentives, but whether the available signals and market arrangements enable flexibility to respond efficiently and receive an appropriate share of the value they provide.
Time of Use Tariffs	Only 21% of smart-meter customers used ToU-type tariffs in June 2026, limiting demand flexibility.
Metering infrastructure and sub-metering	Secondary metering rules remain under development. Verification can be costly for small resources.
Incomplete economic signals, limited market value for flexibility and revenue uncertainty	Uncertain revenues and incomplete locational signals can deter investment and participation.

ACER barrier category 3

Requirements to provide balancing services

A number of ongoing projects are intended to improve the participation of flexibility resources, including storage and DSUs, in the ex-ante and balancing markets.

Issues covered in the report	Summary of the report findings
Dispatch, Control and Operations	Telemetry, control and testing requirements can weigh more heavily on smaller resources. Aggregated DSUs can limit visibility of responding sites.
Grid code and technical requirements	Demand facilities are often not subject to Grid Code stability requirements, limiting Large Energy Users' qualification for balancing services. Proposed Fault Ride Through requirements could enable participation.

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Commission for Regulation of Utilities

ACER barrier category 4

Requirements to provide congestion management

A number of initiatives are under way to increase the role of flexibility in congestion management.

DSO issues covered in the report	Summary of the report findings
Procurement process requirements	eTenders can impose a substantial administrative burden, especially on smaller and community providers.
Localised nature of DSO needs and limited supply-side depth	Local network needs restrict the eligible resource pool. Smaller opportunities may attract limited commercial interest.
Market architecture evolution and gaps	Market reforms may help overcome barriers but may also add uncertainty. Customer safety, compliance and process constraints can reduce available flexibility.

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Commission for Regulation of Utilities

ACER barrier category 5

Administrative requirements (avoiding complex, lengthy and discriminatory requirements)

The review found that established connection and market-access procedures are in place, including online information, electronic connection applications, defined process deadlines and simplified arrangements for a number of smaller-scale technologies.

Issues covered in the report	Summary of the report findings
Inefficient grid connection procedures	Limited grid capacity and long connection times can delay flexibility deployment.
Qualification trial process	Maturity, testing and code-compliance requirements can limit opportunities to trial innovative solutions.
Disproportionate procedures and requirements for market access	Providers may need to navigate up to four markets or arrangements with separate codes. Products may not fit customer capabilities.

ACER barrier category 6

Regulatory incentives to system operators to consider non-wire alternatives

The regulatory framework includes a number of mechanisms intended to enable and incentivise system operators to develop and use flexibility and other non-wire alternatives.

Issues covered in the report	Summary of the report findings
Regulatory incentives	PR6 strengthens incentives through the TSO capex/opex mechanism and DSO flexibility support. The report calls for monitoring of actual outcomes.
TSO-DSO operating model	Operator roles, data sharing and operational coordination need further clarity. The Joint System Operator Programme is progressing this work.

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Commission for Regulation of Utilities

Additional cross-cutting barrier

Value Stacking and the Multi-Market Participation

Existing arrangements provide some opportunities for flexibility service providers to participate across multiple markets and services and, in some cases, to stack revenues.

Issues covered in the report	Summary of the report findings
Revenue adequacy	A single market or service may not provide enough revenue to support investment, especially where flexibility needs are intermittent.
Combining services across markets	Combining TSO and DSO services remains challenging in practice, even though some arrangements already allow revenue stacking.
Managing conflicting obligations	Resources must reconcile DSO requirements with SEM commitments. Multi-market participation depends on compatible service obligations.

Panel Discussion

14:10–14:40

Next Steps, Conclusion & Closing

End of Q1 2027

National objectives

Set non-fossil flexibility objectives with DCEE, including demand response and storage contributions.

End of Q2 2027

ACER report expected

Brings together Member States' FNAs to assess EU-wide needs and recommend action on cross-border issues.

July 2027

Next process begins

Work begins on the next FNA, informed by lessons learnt and stakeholder feedback.

2028

Next FNA report due

Updated national assessment, following the two-year reporting cycle.

Your feedback is welcome: flexibility@cru.ie

Changes for the next FNA

- What should we change or consider in the next assessment?

Future engagement

- How and when would you like to contribute to the next process?

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