12th April 2024

National Resource Adequacy Assessment

Inputs and Assumptions Webinar

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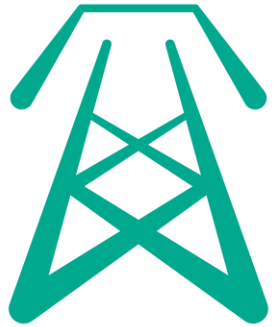
Webinar Introduction

- **The purpose of this webinar is to:**
  - Introduce the National Resource Adequacy Assessment.
  - Present on the proposed inputs and assumptions.
  - Invite feedback and questions from stakeholders.



- **Please consider the following:**
  - Mute microphone / turn camera off during presentations.
  - Time will be provided for questions following the presentations.
  - Please feel free to use the Q&A function in MS Teams to raise questions at any time. Questions will be addressed in the Q&A session.

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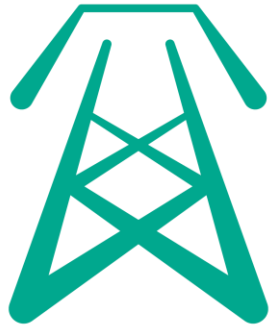
Webinar Agenda

- **12:00 - 12:05:** Welcome
- **12:05 - 12:10:** NRAA Project Introduction
- **12:10 - 12:25:** Demand
- **12:25 - 12:40:** Resource & Adequacy
- **12:40 - 12:55:** Q&A Session
- **12:55 - 13:00:** Closing & Next Steps



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National Resource Adequacy Assessment

Project Introduction

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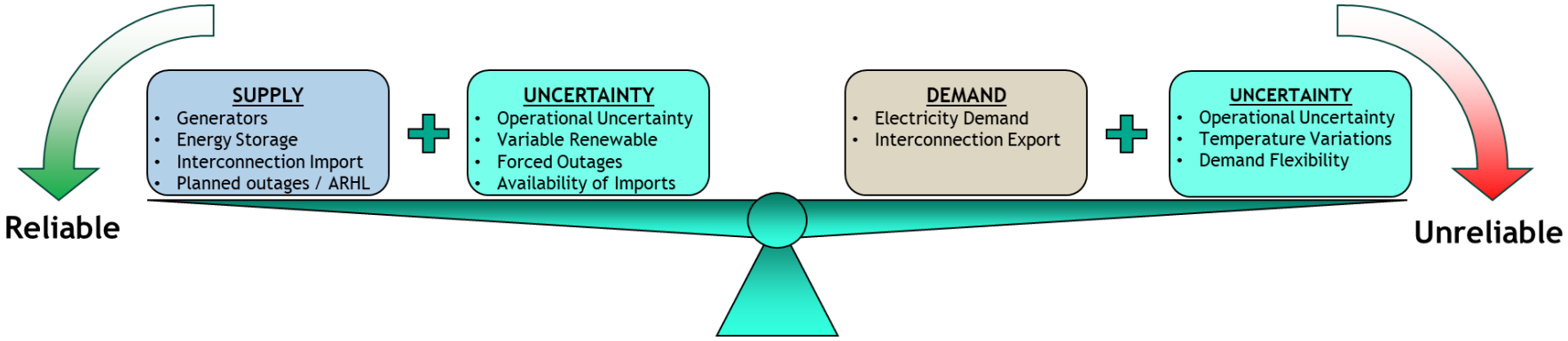
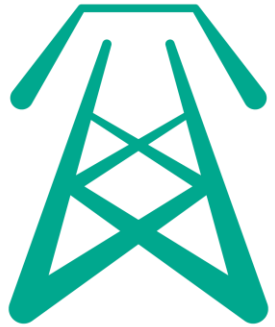
Resource Adequacy





- Under relevant statutory and licence requirements, EirGrid and SONI forecast the **projected level of electricity demand and the expected resources available to supply this demand over a 10-year horizon.**

- The Generation Capacity Statement has been the mechanism used to convey the projected supply and demand outlook to policy makers, regulators, industry, TSOs, DSOs and general electricity consumers.

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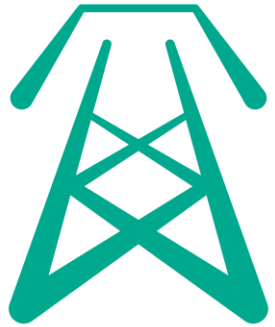
Evolving Resource Adequacy Assessments



- Electricity power systems are increasingly dependent on **variable renewables, interconnection, demand side response and storage technologies for ensuring security of supply to consumers.**

- European regulations have **evolved the approach to assessing resource adequacy** to appropriately **represent the transforming power system** at a pan-EU level.

- EirGrid and SONI's Shaping Our Electricity Future Roadmap identified the need to enhance our reliability assessments to:
    - Appropriately **dimension the possible risks to resource adequacy.**
    - **Align with European Union regulation.**

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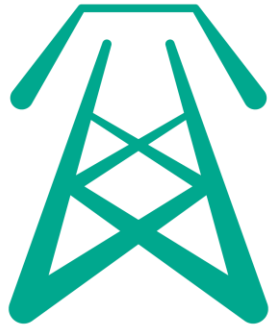
The National Resource Adequacy Assessment

- A National Resource Adequacy Assessment (NRAA) methodology has been developed **using the European Resource Adequacy Assessment as the foundation.**

- This NRAA methodology **enables system planners to capture market specific characteristics or risks that the European assessment may not capture in detail.**

- The NRAA effectively provides the scope to run studies that are relevant on a national level but may not be relevant at a pan-EU level.

- The consultation is focused on the **input data and assumptions, it follows on from the Methodology consultation held in January 2024.**



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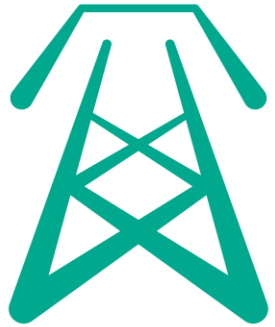
NRAA Objectives

- The NRAA framework aims to deliver:
  - **Enhanced capability to model power system reliability** of an increasingly diverse technology mix.
  - Enhanced **alignment with European modelling** framework and regulatory requirements.
  - Enhanced **stakeholder engagement** through consultations.
  - An **annual report** on resource adequacy.



- An updated methodology is required to improve **alignment with Regulation (EU) 2019/943 Article 24** National Resource Adequacy Assessment.

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What's Changing?

Demand	• Total Energy Requirement (TWh) forecast methodology will remain consistent with previous years • Demand profile will be developed using ENTSO-E Demand Forecasting Tool (DFT) • The use of DFT will allow modelling of a range of climatic conditions across 35 climate years

Adequacy modelling framework	• Main update is the **change in probabilistic tool** for adequacy assessments – moving from Convolution to Monte Carlo
	  • This allows us to assess a wider range of climatic conditions and outage patterns
	• Another key update is how we are **modelling interconnection capacity**
	  • The NRAA model contains models of GB and France (aligned with ERAA)
	  • Sensitivities on interconnector flows are more readily modelled
	• Other components of adequacy modelling remain consistent with existing methodology
	  • Conventional Generation, Renewable generation, Storage, Demand Flexibility, Reserves

Consultation	• Enhanced stakeholder engagement through three phase consultation process

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Consultation Timeline

	Q4 2023	20th March - 24th April	Q4 2024
Scope	• First iteration of methodology for consultation • Consultation window: 4th Dec 2023 to 26th Jan 2024	• Demand, adequacy resources and modelling data inputs and assumptions	• Following the publication of NRAA, feedback is welcomed on the first iteration of the NRAA process to identify areas for future improvements

Inputs & Assumptions Consultation

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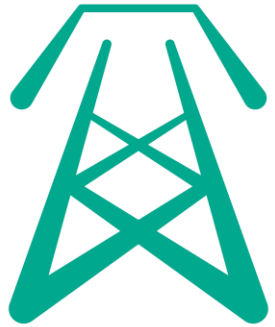
Inputs & Assumptions Consultation



- The purpose of this consultation paper is to set out the proposed data input sources and assumptions for the 2024 implementation of the National Resource Adequacy Assessment.
- Separate consultations available on EirGrid and SONI consultation portals
- The content within this consultations should be read in parallel with the methodology which was consulted on earlier this year.

- Questions are provided through the document, with a summary of all questions in section 7. Feedback is sought on:
  (1) The proposed data sources and assumptions.
  (2) The corresponding input excel sheet.
- Closing date for responses is the 24th April 2024.

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Inputs & Assumptions Consultation

Ireland Demand Modelling Inputs

Electric Vehicles

Year	Number of Electric Vehicles				Electirc Mileage				Efficiency		
	BEV	PHEV	LGV	Bus	BEV	PHEV	LGV	Bus	BEV	PHEV	LGV
2025											
2026											
2027											
2028											
2029											
2030											
2031											
2032											
2033											
2034											

Ireland Generation Modelling Inputs

Existing In-Market Conventional Generation Portfolio

Plant Name	ID	Rated Capacity (MW)									
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Aghada	AT1	0	0	0	0	0	0	0	0	0	0
	AT2	90	90	90	90	90	90	90	90	90	90
	AT4	90	90	90	90	90	90	90	90	90	90
	AD2	449	449	449	449	449	449	449	449	449	449
Ardnacrusha	AA1	21	21	21	21	21	21	21	21	21	21
	AA2	22	22	22	22	22	22	22	22	22	22
	AA3	19	19	19	19	19	19	19	19	19	19
	AA4	24	24	24	24	24	24	24	24	24	24
Dublin Bay	DB1	415	415	41							
Dublin Waste	DW1	61	61	6							
Edenderry	ED1	118	118	11							
	ED3	58	58	5							
	ED5	58	58	5							
Erne	ER1	10	10	1							
	ER2	10	10	1							
	ER3	22	22	2							
	ER4	23	23	2							
Great Island CCGT	GI4	464	464	46							
Huntstown	HNC	336	336	33							
	HN2	408	408	40							
Indaver Waste	IW1	17	17	1							

Northern Ireland Demand Modelling Inputs

Electric Vehicles

Year	Number of Electric Vehicles				Electric Mileage		Efficiency				Charging Profile Uptake	
	BEV	PHEV	LGV	Bus	Full Electric	PHEV	BEV	PHEV	LGV	Bus	Simple	Smarter
2025	64042	35958	2786	567	15000	7050	0.166	0.084	0.259	1.369	77%	23%
20												
20												
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Northern Ireland Generation Modelling Inputs

Existing In-Market Conventional Generation Portfolio

Plant Name	ID	Rated Capacity (MW)								
		2025	2026	2027	2028	2029	2030	2031	2032	2033
Ballylumford	B31	246	246	246	246	246	246	246	246	246
	B32	246	246	246	246	246	246	246	246	246
	B10	101	101	101	101	101	101	101	101	101
	GT7(GT1)	58	58	58	58	58	58	58	58	58
	GT8(GT2)	58	58	58	58	58	58	58	58	58
Kilroot	KGT1	0	29	29	29	29	29	29	29	29
	KGT2	0	29	29	29	29	29	29	29	29
	KGT3	0	42	42	42	42	42	42	42	42
			42	42	42	42	42	42	42	42
			53	53	53	53	53	53	53	53
			408	408	408	408	408	408	408	408
			79	79	79	79	79	79	79	79
			18	18	18	18	18	18	18	18
			12	12	12	12	12	12	12	12

All Island Plant Performance Modelling Inputs

Availability Statistics

Technology Category	Forced Outage Rate (%)	Scheduled Outage Duration (hours)	Annual Availability (%)
DSU	71.6	-	28.4
DSU Run Hour Limited	71.8	-	28.2
Gas Turbine	8.9	470	85.8
Hydro	10.9	470	83.7
Steam Turbine	11.3	820	79.3
Interconnector*	4.5	340	91.7
Pumped Hydro Storage	2.7	650	89.9
System Wide	19.2	680	73.1

Corresponding Input Data Workbooks are also available on EirGrid and SONI Consultation Portals for feedback

Demand Inputs and Assumptions

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Total Electricity Requirement

- Electric Vehicle’s (EV’s)
- Heat Pumps (HP’s)
- Data Centre & New Tech Load
- Conventional Demand
- Losses
- Flexibility

Electric Vehicles

	IE	NI
Types of EV Modelled	BEV, PHEV, LGV, Buses	
Historic number of electric vehicles	Irish Bulletin of Vehicle and Driver Statistics	Vehicle Licensing statistics from DVLA
Forecast number EV	Climate Action Plan 2024 Targets Growth based on historical trends towards CAP targets (@165k passenger vehicles per year with scrappage)	Aligned to NIEN RP7 EV projection
Distance travelled / year	Forecast to 2034 based on 10 year average of historic data from CSO 2025-2030 assumes 20% mileage reduction (CAP24 target)	Assuming 15,000 km /year
Efficiencies	Aligned to Tomorrows Energy Scenarios 2023 Assumptions (TES)	
Charging Profiles	Assume 10% of people currently using a 'smart' profile (higher off-peak charging), and 90% using 'simple' (higher peak time) Assume this grows to 90% by 2030 and stays at 90% beyond 2030	

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Draft proposal for consultation purposes

Key Drivers
- Historic Data
- Government Policy

Heat Pumps

	IE	NI
Historic Number of Heat Pumps	SEAI Data from BER Database analysis for residential properties	Assume no heat pumps in 2020 and linear growth to 2025 forecast
Forecast Number of Heat Pumps	Climate Action Plan 2024 (CAP24) Targets Polynomial projection of growth through latest historical figures, and CAP24 targets	Aligned to NIEN RP7 Heat Pump projection
Heating Demand	Assume residential heat pumps only fitted to efficient homes Commercial Heat Demand based on proportional attribution of commercial and public heat demand from SEAI national heat study	Annual heating demand assumes 80% of residential energy used for heating Annual heating demand is assumed to reduce by 0.8% per year
Heat Pump Efficiency	Based on SEAI low-carbon heating study giving 2020 efficiency and projecting out to 2050	
Heat Pump Type	All heat pumps are air source heat pumps	
Profile	Hourly heat demand based on when2heat study, and hourly climate data from PECD 35 historic years	

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Draft proposal for consultation purposes

Key Drivers
- Historic Data
- Government Policy

Data Centre & New Tech Load

	IE	NI
Annual Demand	The forecast is carried out on a site-by-site basis and aggregated into a total for the sector.	
	For sites that are currently connected, the historical trends at each individual site are analysed to determine average monthly and yearly growth. Anomalous behaviour that is occasionally witnessed during testing periods is excluded. In projecting future growth, a weighting is applied such that recent trends in growth are better reflected in the projections.	
	For sites that are yet to connect, growth rates are assumed to align to existing sites from the same customer, or existing sites of a similar size if it is a new customer.	

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Draft proposal for consultation purposes

Key Drivers
- Connection Agreements
- Historic Trends

Conventional Demand

	IE	NI
Historic End User Demand	Residential Demand includes domestic electricity sales (ESB), and an assumed level of self consumption from rooftop solar panels (detailed below). Commercial and Industrial Demand includes the DSO non-domestic energy sales (ESB), transmission connected energy sales (EirGrid), and self-consumption from Combined Heat and Power electricity generation (SEAI) Small Scale Generation (SEAI), and rooftop solar panels.	Historic demand based on generator metered data. Self-consumption from NIEN small scale generation connections with assumed capacity factors. Data quality controlled using NIEN data and SONI SCADA (Supervisory control and data acquisition).
Historic Temperature Correction	Daily Historic climate data from Met Eireann using a population weighting of temperatures at Dublin Airport, Knock Airport, Cork Airport, Shannon Airport.	Temperature correction applied to conventional demand based on climatic data measured at the operations site in Belfast.
Economic Growth	Historic residential demand correlated to historic personal consumption Historic commercial and industrial demand correlated to historic Modified GNI* figures from the CSO.	Forecast GVA provided by Oxford Economics

Conventional Demand

	IE	NI
Smart Meter Effects	Forecast rollout of smart meters assumes all domestic properties by end of 2024 Assume that a smart tariff reduces annual residential demand by 2% based on CRU study	There are currently no smart meter effects included in the demand forecast for Northern Ireland as aligned to PR7 and The Design Considerations for a Northern Ireland Smart Systems and Flexibility Plan
Efficiency Improvements	Residential efficiency improves 1.5% year on year. Historic efficiency improvements inherent in historic industrial and commercial demand assumed to continue.	Historic efficiency improvements inherent in historic demand trends assumed to continue. No additional supplemental efficiency improvements assumed

Flexibility

	IE	NI
Residential Demand	8% reduction in residential demand during peak period (17:00-19:00) assumed Based on the uptake of smart tariffs as described in Section 3.4 Reduction in residential demand assumed to be spread evenly throughout the remainder of the day.	On the basis of PR7 and the DFE Smart System and Flexibility Plan, no assumptions of residential demand flexibility are included.
EV	Electric vehicle contribution to flexibility accounted for on the basis of charging profiles avoiding peak The reduction of demand during times of typical high demand and the reduction of demand during times of typical low demand both contribute to flexibility.	

Network Losses

	IE	NI
Network Losses	Historic Losses are calculated using the difference between metered generation (net of interconnection and storage) and metered demand. This data is historically recorded by the TSO and DSO. Network losses are estimated as ~7.5% for the duration of the study.	

Adequacy Resources Inputs and Assumptions

Conventional Generation

- Existing conventional capacity is based on Connection Agreements / EDIL / REMIT / Closure Notices.
- New conventional capacity is based on the latest risk adjusted expected delivery of new projects which have been successful in capacity auctions.
- Unit efficiency (heat rates) based on ENTSO-E Market Modelling Database.
- Outage statistics are based on 5-years of Eirgrid and SONI monthly availability reports from 2019-2023.
- Run Hour restrictions are based on information from market participants / latest Best Available Techniques (BAT) guidance. Restrictions may be a result of environmental permits, planning permits or fuel supply restrictions.

Interconnection

- HVDC interconnection are included based on latest expected delivery of projects in development / EU Projects of Common Interest as noted in TYNDP / Connection Agreements.

- HVDC outage statistics are using statistics provided by the Regulatory Authorities consistent with capacity market and previous capacity statements.

- HVAC interconnection between Ireland and Northern Ireland is considering latest Transmission Development Plan forecast delivery of the new North South interconnector.

- Interconnection between GB and FR, or beyond these regions will align to ERAA 2023.

Variable Generation

- Trajectories for wind and solar capacities will consider renewable auction results connection offer processes in the short – medium term, and climate action targets and policies in the medium – long term.

- Renewable profiles (including hydro) will be based on the ENTSO-E pan European Climate Database (PECD). For Ireland and Northern Ireland:
  - A 0.9 scaling factor is proposed for onshore wind profiles to adjust capacity factors to expected levels based on historic recorded availability.
  - A 0.75 scaling factor is proposed for offshore wind profiles to adjust capacity factors to expected levels based on profiles used for constraints analysis.

- The technological efficiency improvements from the PECD data are assumed to apply to new renewable technologies.

- It is assumed appropriate to use the same profile for rooftop solar and large-scale solar.

Battery Storage

- Existing battery storage capacity is based on Connection Agreements / EDIL / REMIT / Closure Notices.
- New battery storage capacity is based on the latest risk adjusted expected delivery of new projects which have been successful in capacity auctions.
- The technical characteristics proposes to include a Max SoC: 90%, Min SoC: 10% and Round-Trip Efficiency: 80% based on an externally provided review of battery storage technologies.
- Plant performance statistics will not model outages of battery units. In future these may be included when there is sufficient data to dimension relevant statistics.

Demand Side Units

- Existing demand side unit capacity is based on Connection Agreements / EDIL / REMIT / Closure Notices.
- New demand side unit capacity is based on new capacity which has been successful in capacity auctions.
- Performance of demand side units will use a rating factor based on 5-years of EirGrid and SONI monthly availability reports from 2019-2023.

Pumped Storage

- Existing pumped storage capacity is based on Connection Agreements.
- Technical characteristics including pumped storage reservoir volume and efficiency are based on operational policy and procedures.
- Outage statistics are based on 5-years of EirGrid and SONI monthly availability reports from 2019-2023.

Adequacy Modelling Inputs and Assumptions

Modelling

- Loss of Load Expectation standard:
  - In Ireland is 3 hours (change from previous Generation Capacity Statements).
  - In Northern Ireland is 4.9 hours.

- Modelling Application: Plexos.

- Maintenance profile will be based on generator outage schedules from the 5-years 2019-2023, aligned with the outage statistics period.

- Reserves will be based on the synchronous area Largest Single Infeed which is expected to be 500 MW until the end of 2026 increasing to 700 MW from 2027 onwards.

- In Ireland, 350 MW will be included as an adjustment to account for the impact of transmission constraints on operating a reliable power system. No adjustment is assumed for Northern Ireland.

- Proposing to use the 35 climate years available from the ENTSO-E Pan European Climate Database (PECD).

Scenarios

Scenario	Description
Demand	Assessing the impact of a low or high demand trajectory arising dependent on the factors outlined in section 6.1.
Interconnection	Analysing the impact of low import availability. This could entail extended outages of interconnectors or low availability of generation in neighbouring regions such as low nuclear availability in France. For example: Four French nuclear stations unavailable for 6 months.
Flexibility	Assessing the impact of low flexibility and the opportunity presented from increased flexibility. This may include demand flexibility and behavioural changes, as well as flexibility of assets such as batteries. For example: No new flexibility assumed.
Renewables	Assessing the impact of a low or high renewable capacity deployment trajectory. For example: only 50% of incremental renewables turning up year on year.
Plant performance	Assessing the impact of declining performance which could entail increased unavailability for aging plant or a large unit on extended outage. For example: the extended outage of a large thermal unit.
Climate	Assessment of extreme climate conditions such as extended periods of cold weather and/or low renewable availability. For example: a two-week cold spell.

Questions?

Next Steps

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Next Steps

- We welcome responses to the consultation by the 24th April 2024.
- We will review and consider all responses received and update the inputs and assumptions as required for use in the final modelling process.
- Publication of the National Resource Adequacy Assessment in October 2024