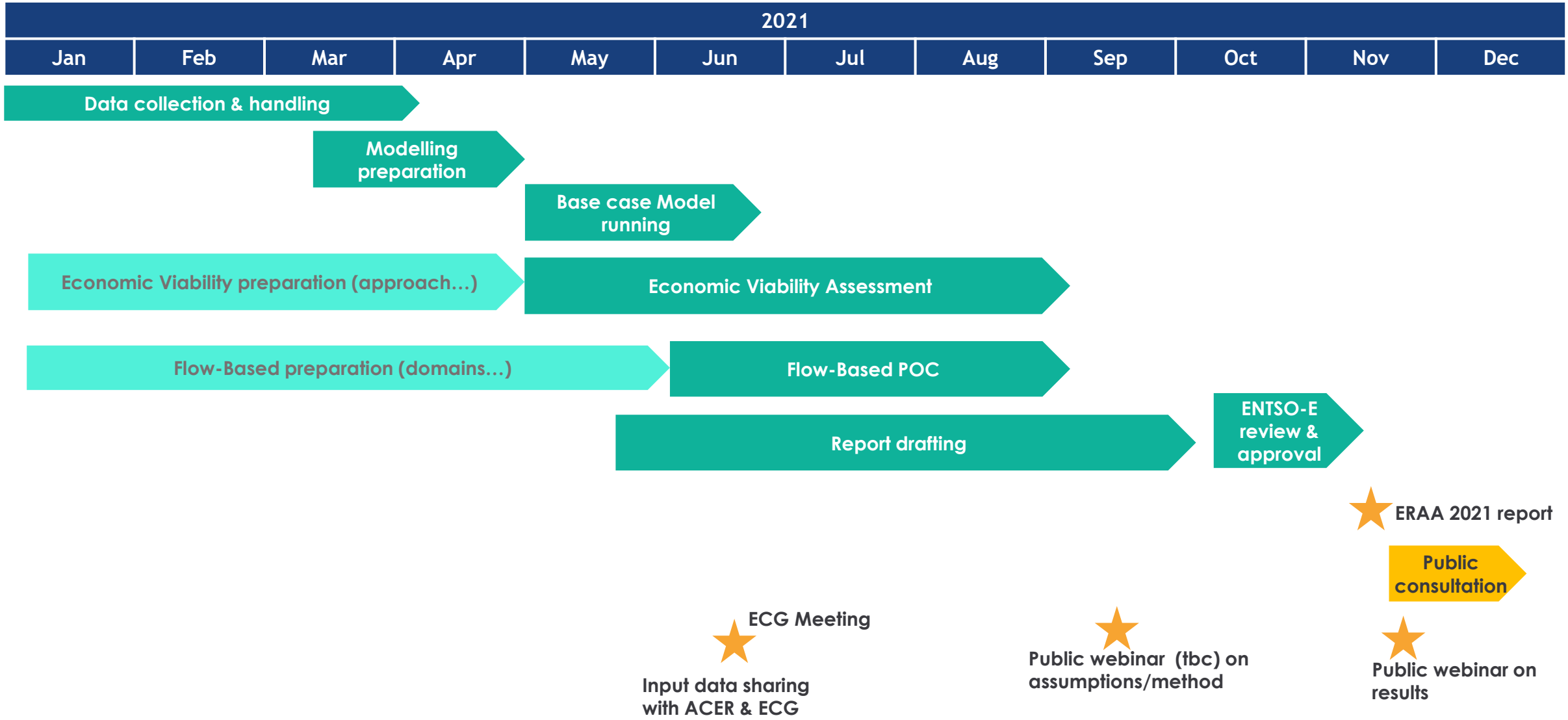
European Resource Adequacy Assessment (ERAA) 2021

Assumptions and status update

Energy Community meeting, 2 July 2021

ERAA - 2021 timeline overview



ERAA 2021 main assumptions and adequacy scenarios

ERAA 2021 collects data from NECPs, accounts for climate change and evaluates adequacy for a selected set of scenarios

Main assumptions

- National Energy and Climate Plans (status November 2020), collected through TSOs
- 70% of cross border capacity considered by default by TSOs (exceptions explained in report's country comments)
- Climate change accounted for (interim approach with temperature detrending)

Adequacy scenarios

- Focus on 2025 and 2030 target years:
  - 2 scenarios in 2025: with and without Capacity Mechanism
  - 2 scenarios in 2030: 'initial estimate' (NECP) and lower capacity estimate
- Flow-Based modelling tested separately as proof of concept for the year 2025

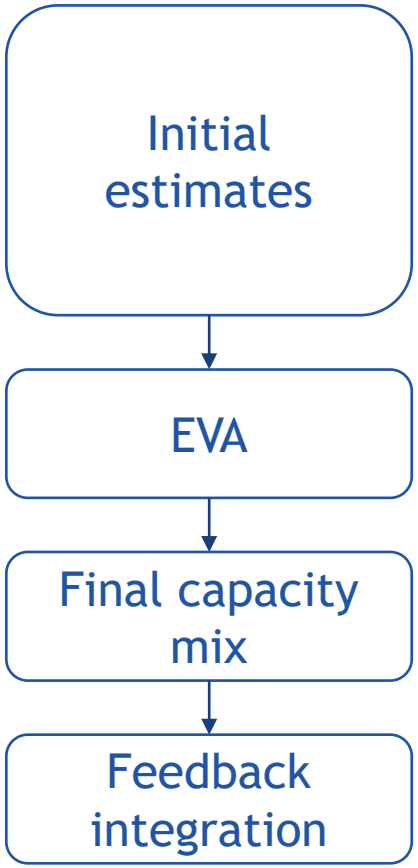
Assumptions for fuel and CO_2 Prices

Fuel and CO_2 prices are collected from TYNDP 2020, Booze&co, IEA, and EC/Refinitiv

		2025	2030	Reference	Link
€/net GJ	Nuclear	0.47	0.47	TYNDP 2020	https://tyndp.entsoe.eu/
	Lignite G1	1.40	1.40	Booze&co "Understanding Lignite Generation Costs in Europe"	https://www.dei.gr/Documents2/INVESTORS/MELETH%20BOOZ/Understanding%20Lignite%20Generation%20Costs%20in%20Europe.pdf
	Lignite G2	1.80	1.80		
	Lignite G3	2.37	2.37		
	Lignite G4	3.10	3.10		
	Hard coal	2.30	2.48	IEA Stated Policies Scenario with USD/EUR average ratio 2020 - 0,877	https://www.iea.org/reports/world-energy-model/stated-policies-scenario
	Natural Gas	5.57	6.23	IEA Stated Policies Scenario with USD/EUR average ratio 2020 - 0,877	https://www.iea.org/reports/world-energy-model/stated-policies-scenario
	Crude oil	10.05	10.76	IEA Stated Policies Scenario forecast trend	https://www.iea.org/reports/world-energy-model/stated-policies-scenario
	Light oil	12.87	13.78	IEA Stated Policies Scenario forecast trend applying a 28% increase of price wrt to crude oil	https://www.iea.org/reports/world-energy-model/stated-policies-scenario
	Heavy oil	10.56	11.30	IEA Stated Policies Scenario forecast trend applying a 5% increase of price wrt to crude oil	https://www.iea.org/reports/world-energy-model/stated-policies-scenario
€/ton	CO_2 price	40	70	Average values proposed by Refinitiv during the Expert workshop on the Market Stability Reserve – organized in December 2020 by Vivid Economics on request of the European Commission	https://ec.europa.eu/clima/events/2nd-expert-workshop-market-stability-reserve_en#:~:text=On%2024%20March%202021%2C%20Vivid,contract%20with%20the%20European%20Commission.&text=The%20Commission%20is%20required%20to,of%20its%20start%20of%20operation.

ERAA 2021 – input data

ENTSO-E will share initial input data estimates with ECG in June 2021 and include feedback as early as possible



Initial estimates are based on input data collected from TSOs

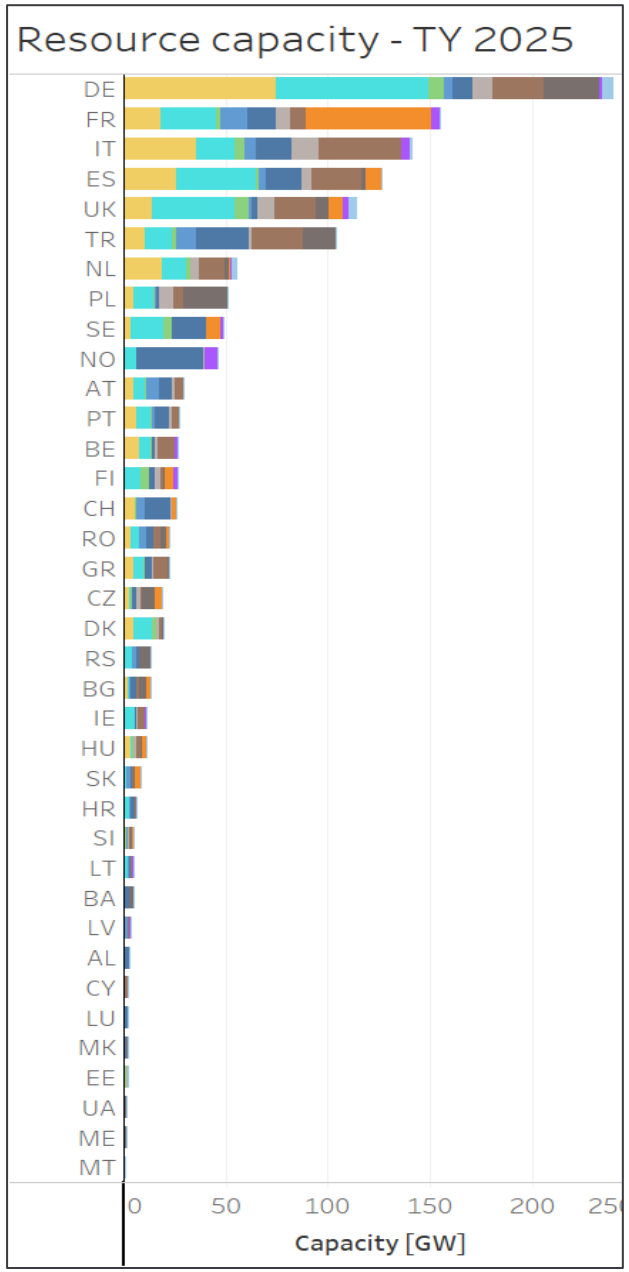
These initial data are prior to the execution of the Economic Viability Assessment (EVA), which should update commercial resource capacities

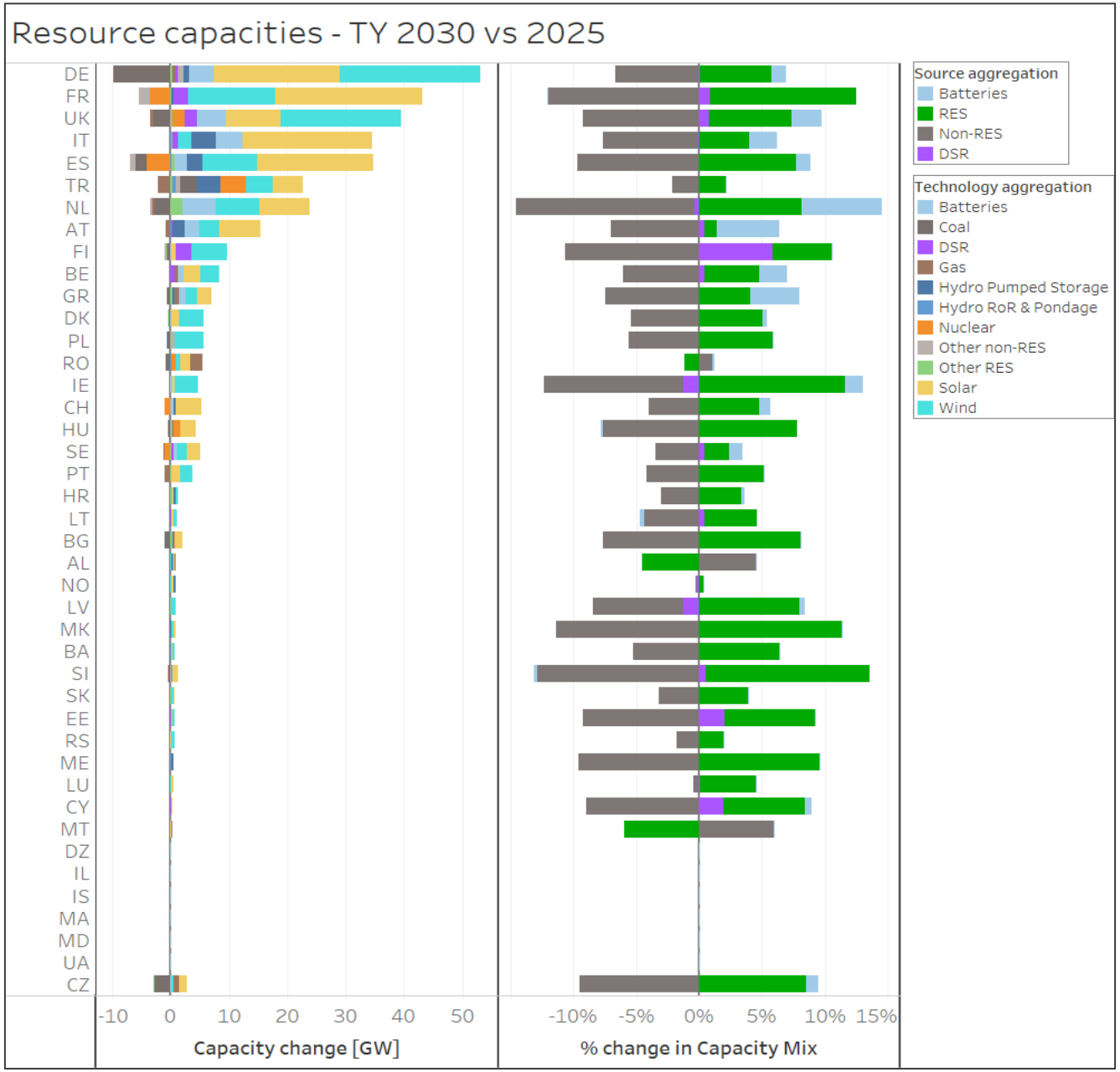
The EVA is an ongoing process, with simulations/iterations being executed during the coming months

The final energy capacity mix after execution of the EVA will be available in the ERAA 2021 report (November 2021)

ECG's feedback will be addressed at the earliest time possible. Quantitative updates are likely only feasible in ERAA 2022

ERAA 2021 assumptions: resource





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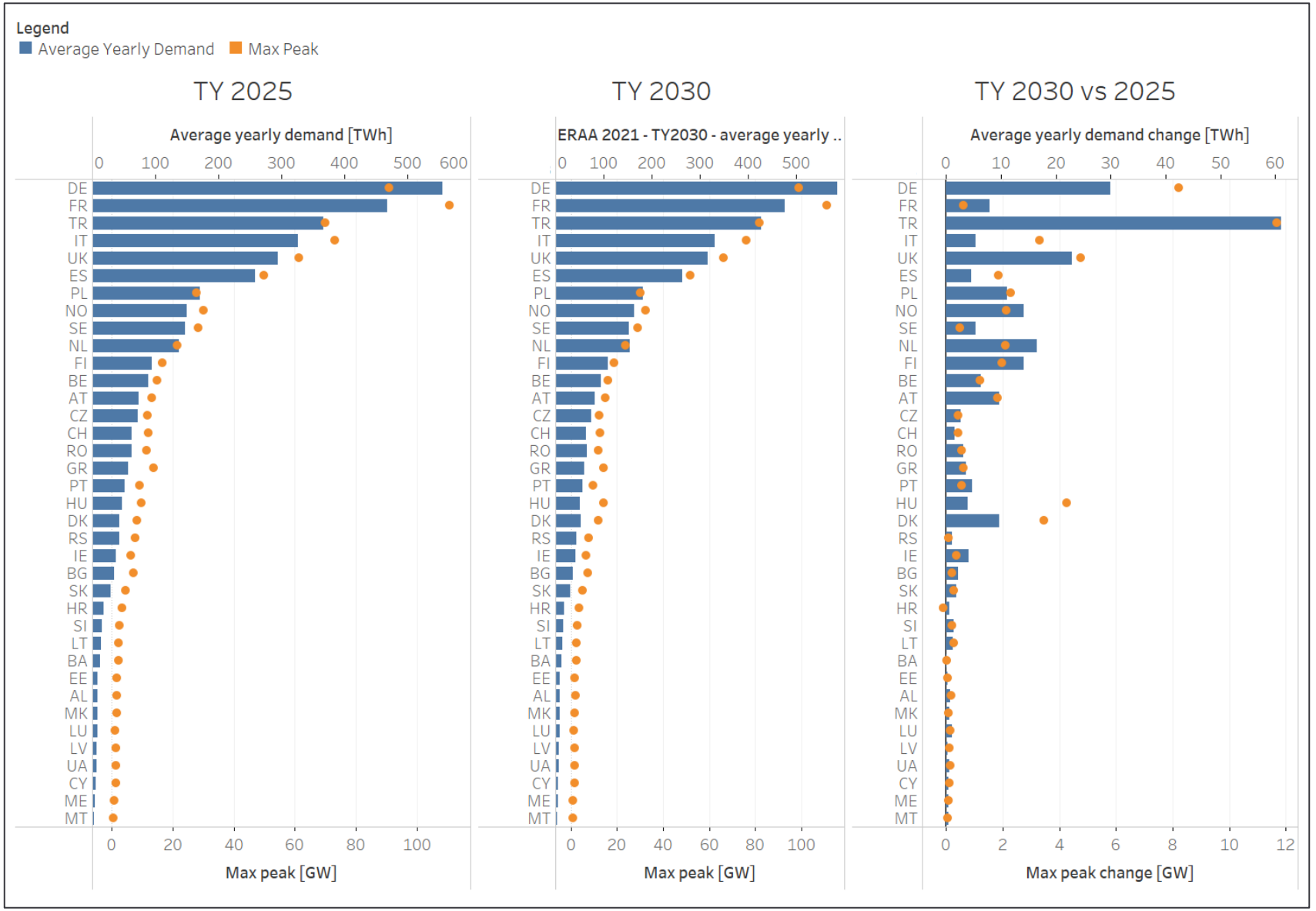
ERAA 2021 assumptions: demand



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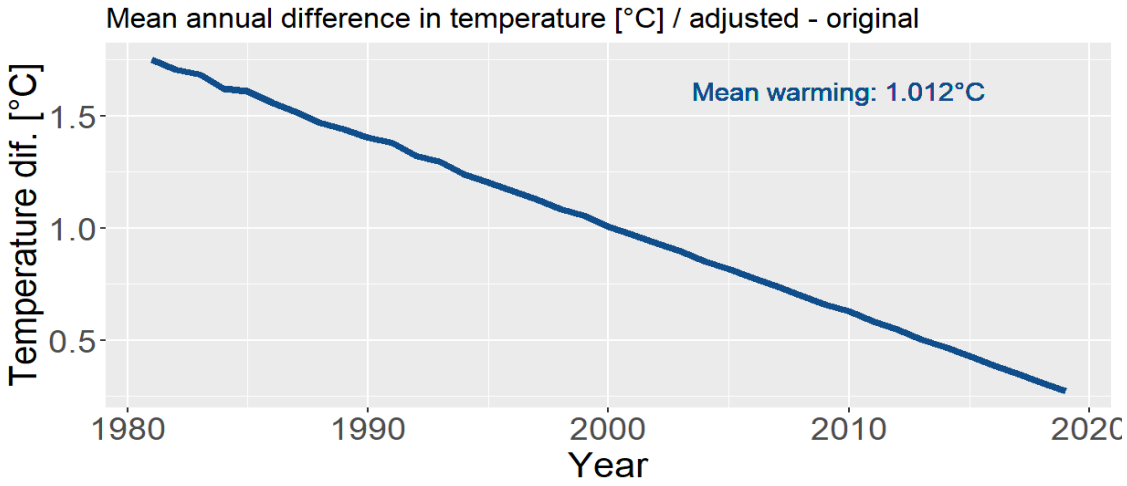
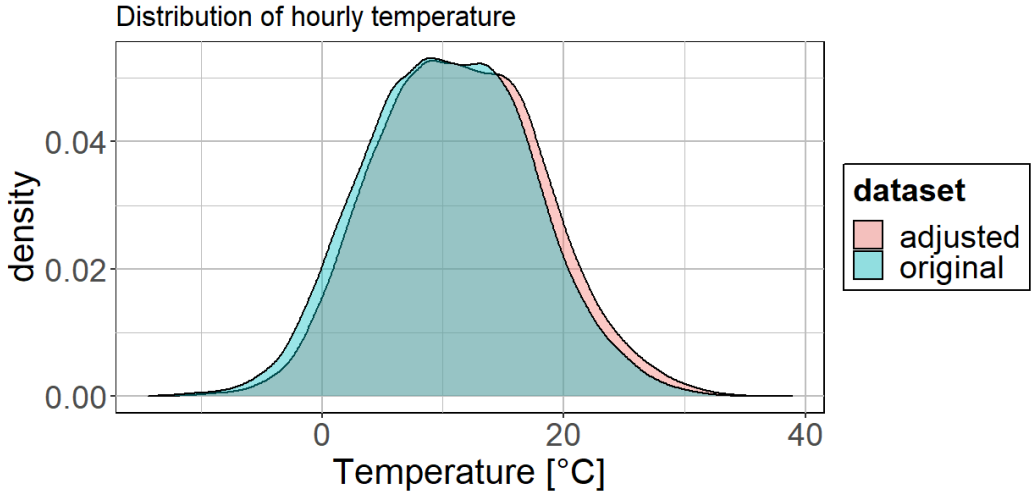
ERAA 2021 assumptions: climate years

35 historic climate years were detrended to consider recent climate change

Example for Belgium:





This is a temporary solution. ENTSO-E works with climate projection experts to implement a holistic climate change database by 2023

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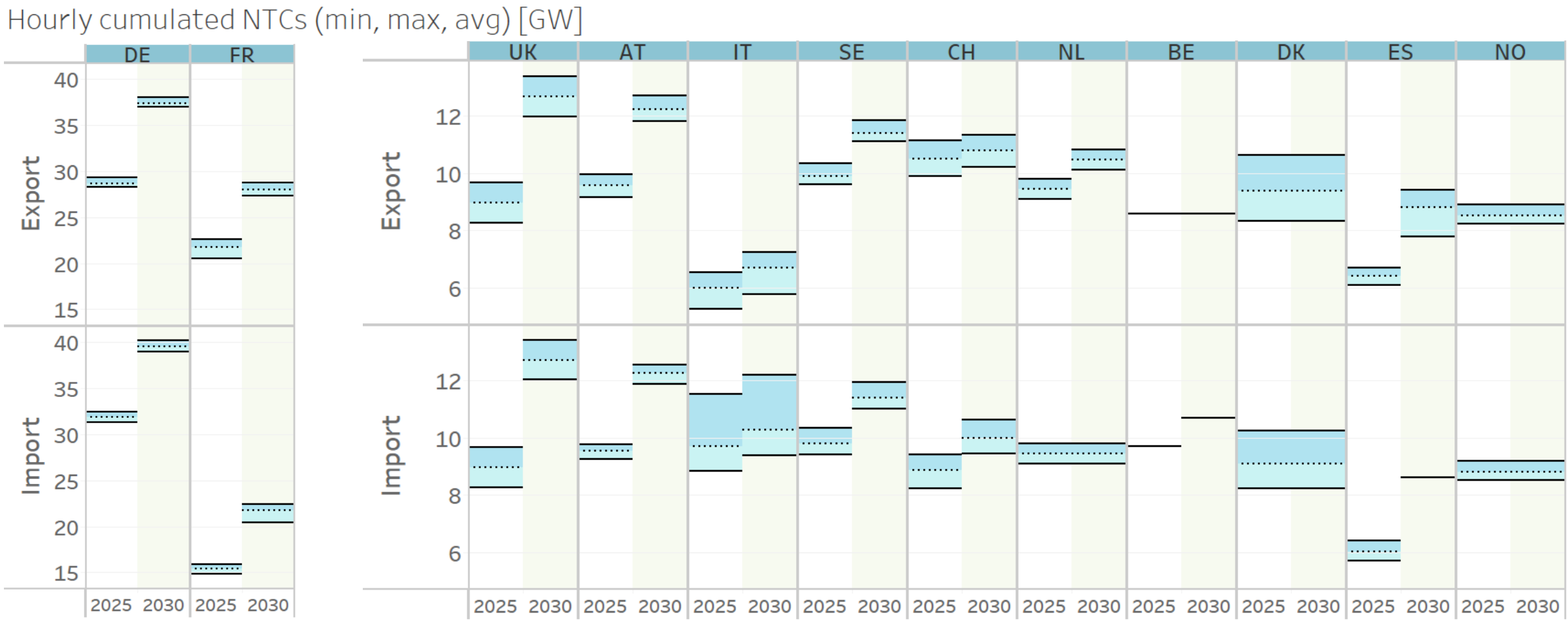
ERAA 2021 assumptions: grid



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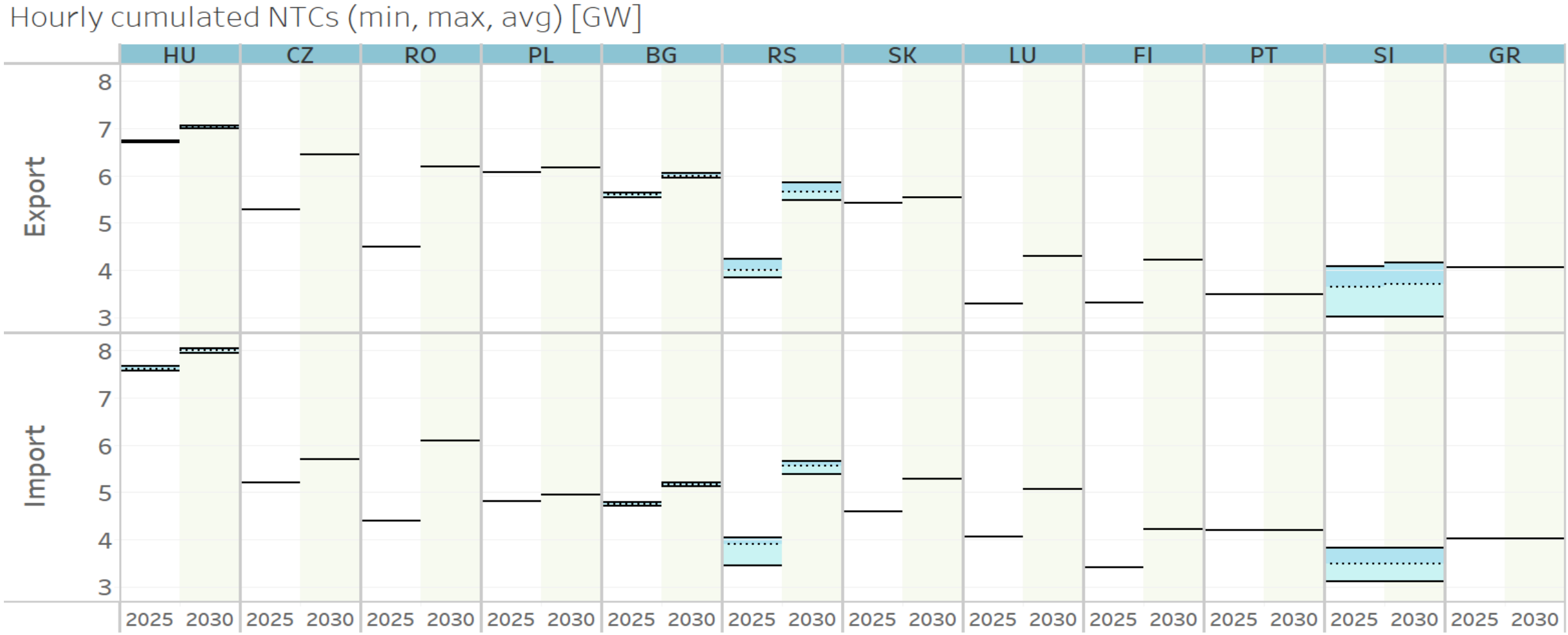
ERAA 2021 assumptions: grid



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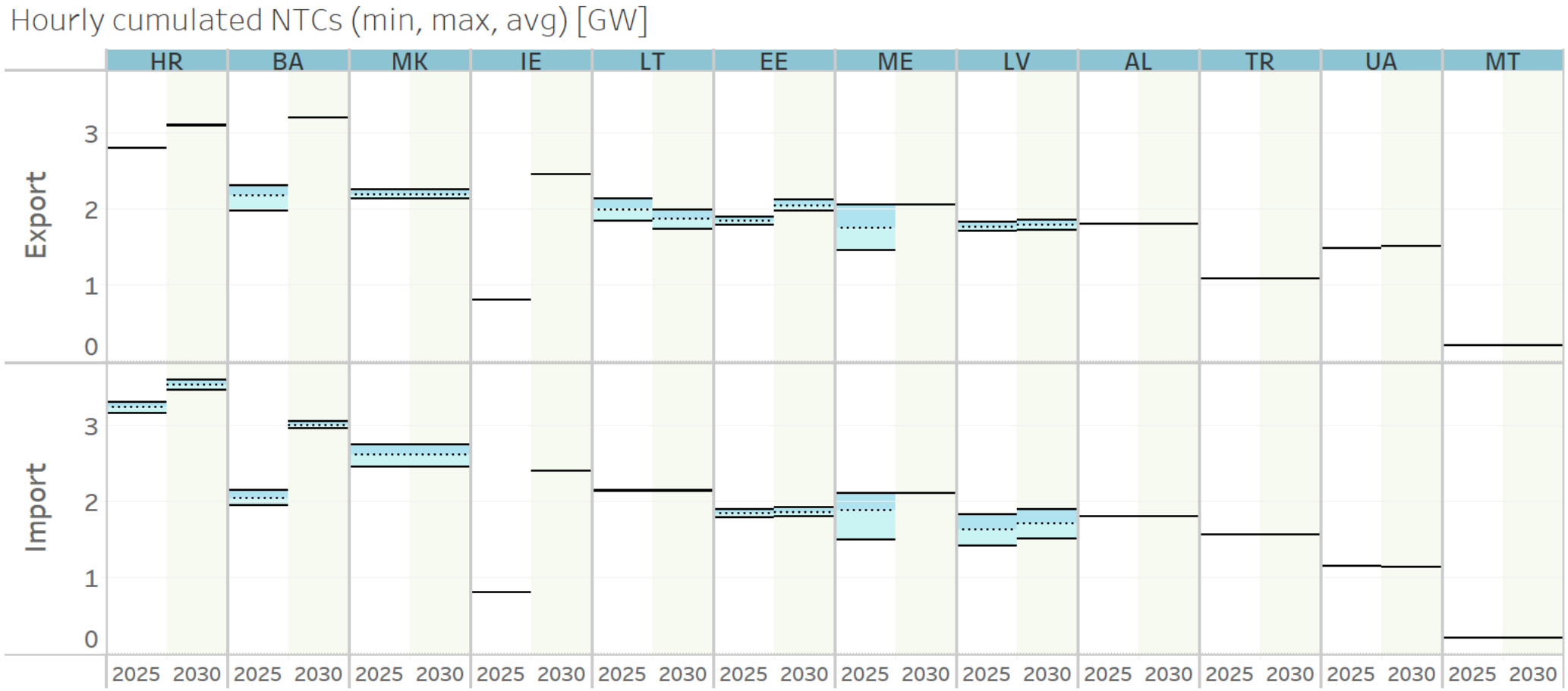
ERAA 2021 assumptions: grid



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Economic Viability Assessment (EVA) and Flow-Based (FB) modelling

Economic Viability Assessment in ERAA 2021

The EVA makes some important modelling assumptions and uses a linear cost minimization model, including hurdle rates to represent risk

Modelling assumptions

- Priority on target year 2025
- Gas-fired units (OCGT and CCGT) and non-policy Demand Side Response (DSR) considered as EVA candidates
- Consideration of DSR potential (for expansion) using ACER's 2017 study on VoLL estimation

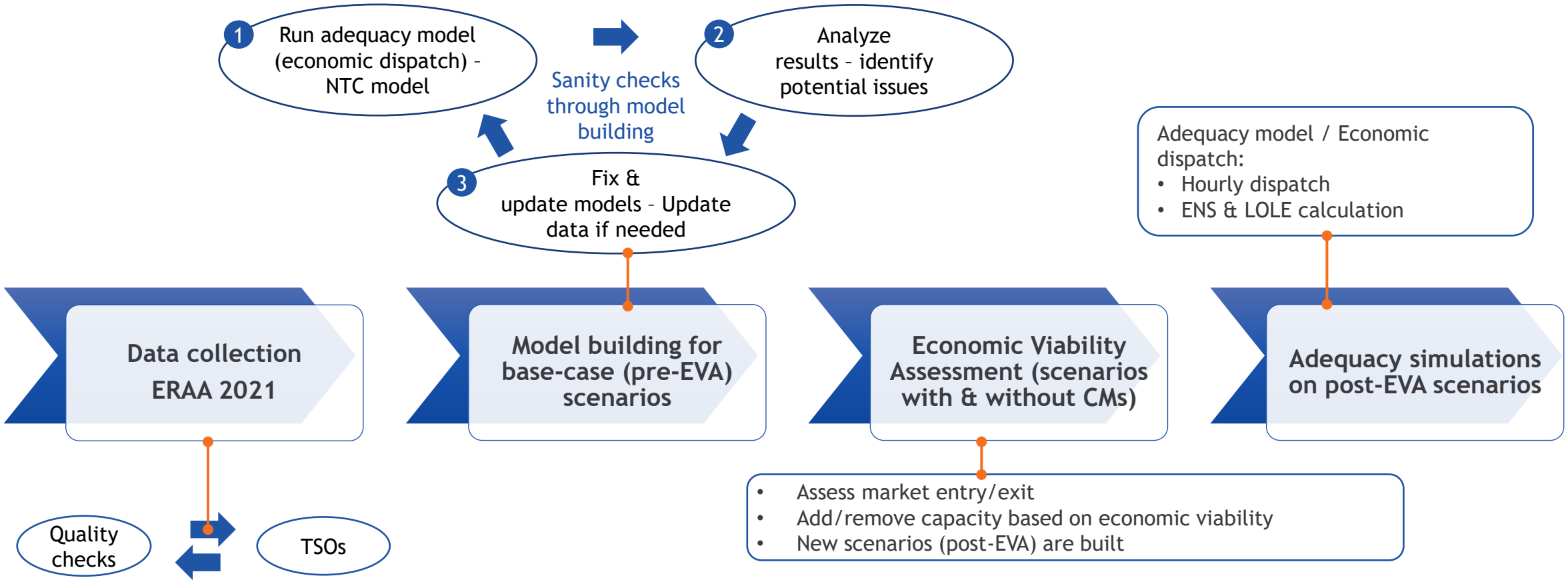
Modelling methodology

- Overall system cost minimization assuming perfect competition
- Linear optimization
- Stochastic model with a significant number of sample years (if computing bottlenecks, tests of Monte Carlo probabilistic model).
- Hurdle rates considered through WACC(*) to model risk

* Hurdle rate = WACC (weighted average of cost of capital) + hurdle premium, where hurdle premiums represent deviations of actual returns from expected returns caused by price volatility (risk).

ERAA Economic Viability Assessment Principle and Process

The EVA fits inside a four-step process, from initial data collection to post-EVA adequacy assessments



D&M = Working Group Data and Models

ERAA 2021 – Flow-based principle

Market simulations (from MAF2020)

The first step of the process is based on the latest MAF model instead of the ERAA 2021 since the latter is only available in June 2021.

Calculation of domains (CORE region)

Two domain sets will be compared and tested to understand the impact of the different assumptions.

FB test runs with ERAA preliminary inputs

Testing FB methodology on the 'initial estimates' scenario (before EVA)

Run FB after EVA

FB implementation on the final scenario with updated fleet after EVA

Thank you for your attention