ERAA 2023 Public Webinar: Preliminary Input Data – Call for Evidence

15 March 2023

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Today's Agenda

Subject	TIME	WHO
Welcome and scope of webinar	11.00 – 11.05	Lazaros Exizidis (ENTSO-E), ERAA 2023 Project Management
Introduction	11.05 – 11.20	Marlene Petz (APG) ERAA 2023 Steering group convener
Stakeholder involvement reinforces data quality	11.20 – 11.30	Daniel Ihász-Tóth (ACER) Policy Officer - Adequacy
Data collection process at ENTSO-E	11.30 – 11.40	Ilaria Federici (ENTSO-E) Working group Data & Models, Data Quality Task Force
Insights on ERAA 2023 preliminary data	11.40 – 12.10	Gregorio Iotti (APG) ERAA 2023 Market Study Team, Data Quality Task Force
Q&A	12.10 – 12.25	
Conclusions and next steps	12.25 – 12.30	Lazaros Exizidis (ENTSO-E) ERAA 2023 Project Management Office

Introduction

Marlene Petz (APG), ERAA steering group convener

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Background

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- ERAA is an ENTSO-E **legal mandate**, which aims to understand how the rapid changes to our energy system will affect security of supply.
- It is a **full pan-European monitoring assessment** of power system resource adequacy, based on a state-of-the-art, globally unparalleled **probabilistic analysis** looking up to a decade ahead.
- ERAA 2023 will be the 3rd edition towards the stepwise implementation of the methodology. **Full implementation** is expected with **ERAA 2024**.
- ERAA 2023 aims to be an effective tool to **identify adequacy risks**
- By proactively and factually identifying any system adequacy challenges, ERAA **supports decision-makers** in ensuring secure, affordable and sustainable energy to citizens and industries.

ENTSO-E is committed to Net-Zero

Role of the ERAA

- Understand how system changes interact
- Inform decision makers and stakeholders
- Strengthen Europe's trajectory to net-zero

NET ZERO

CO2

Objective of net-zero by 2050 structures all activities.

Central role of electricity means TSOs must manage an increasingly complex system.

FLEXIBILITY

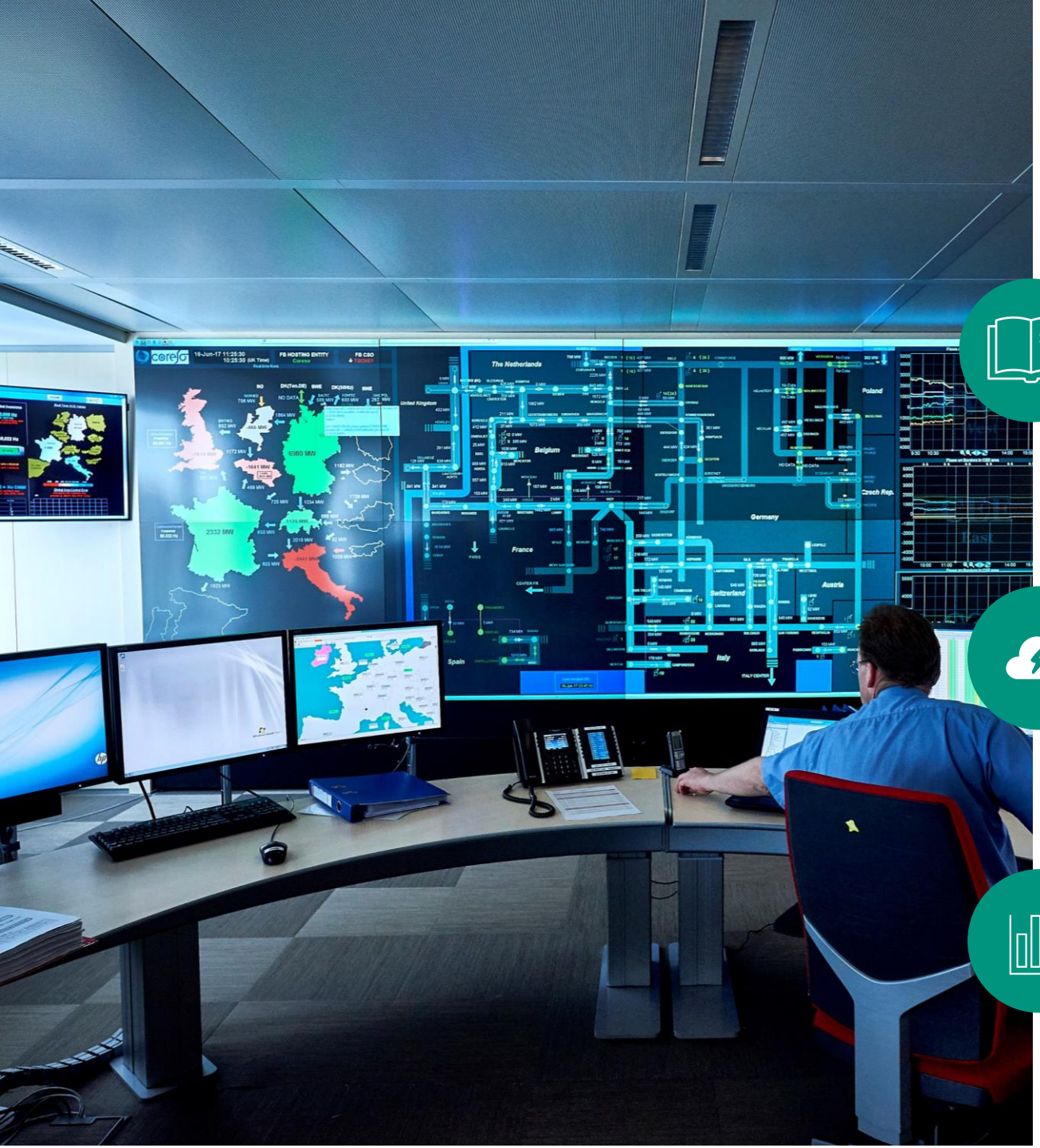
Wide range of factors influence resource adequacy.

New trends require forecasting adequacy years in advance.

EFFICIENT PLANNING

Public support for the energy transition requires security of supply at the lowest cost in the long run.

Sharing of resources in integrated markets enables this.



Main assumptions

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Fit-for-55 & NECPs

- *Data collected from TSOs comply with the National Energy and Climate Plans (NECPs)*
- *Pave the way towards Fit-for-55*

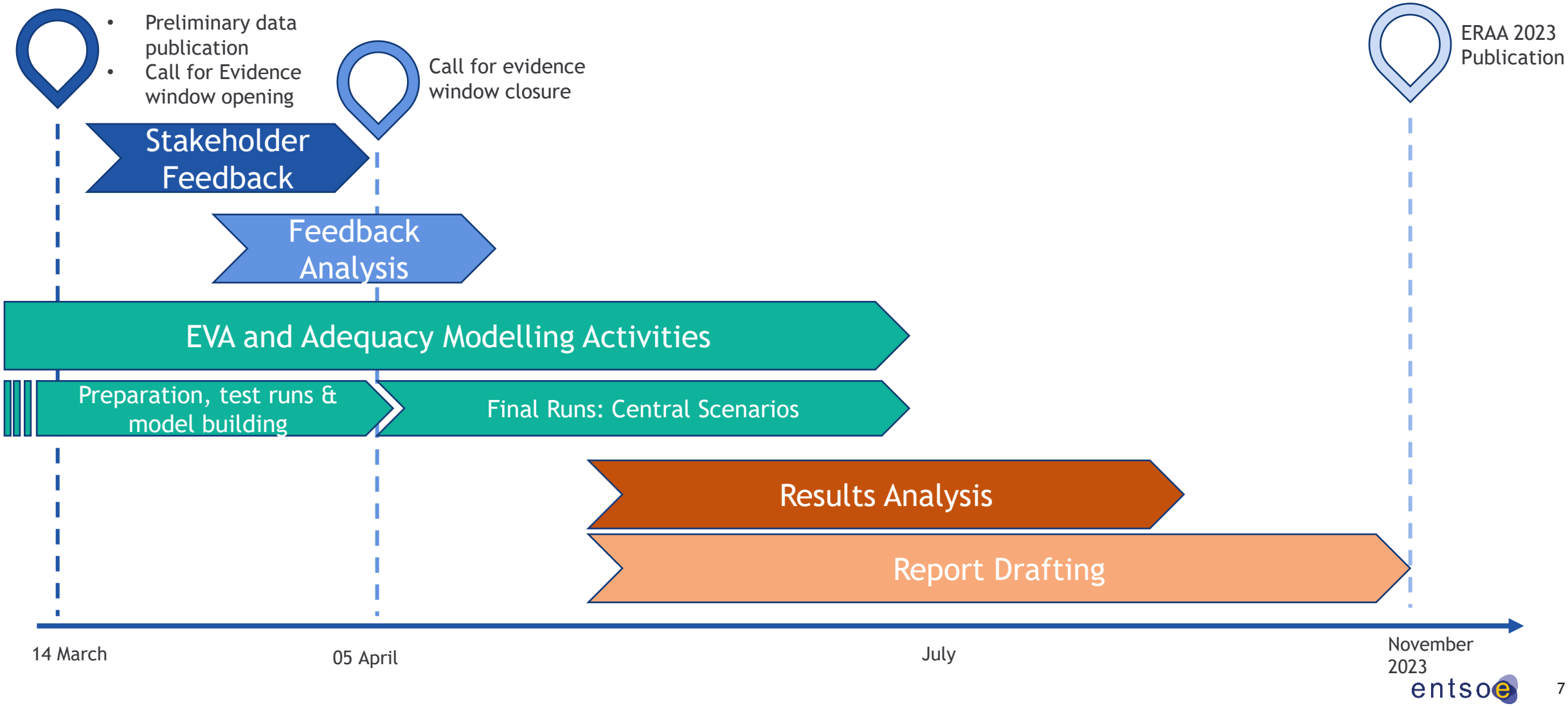
Climate

- *Climate change accounted through temperature detrending*

Interconnection

- *Flow-Based in central scenarios at least for the CORE region*
- *Net Transfer Capacities*

Call for Evidence timeline to ensure a robust basis for ERAA 2023



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ACER

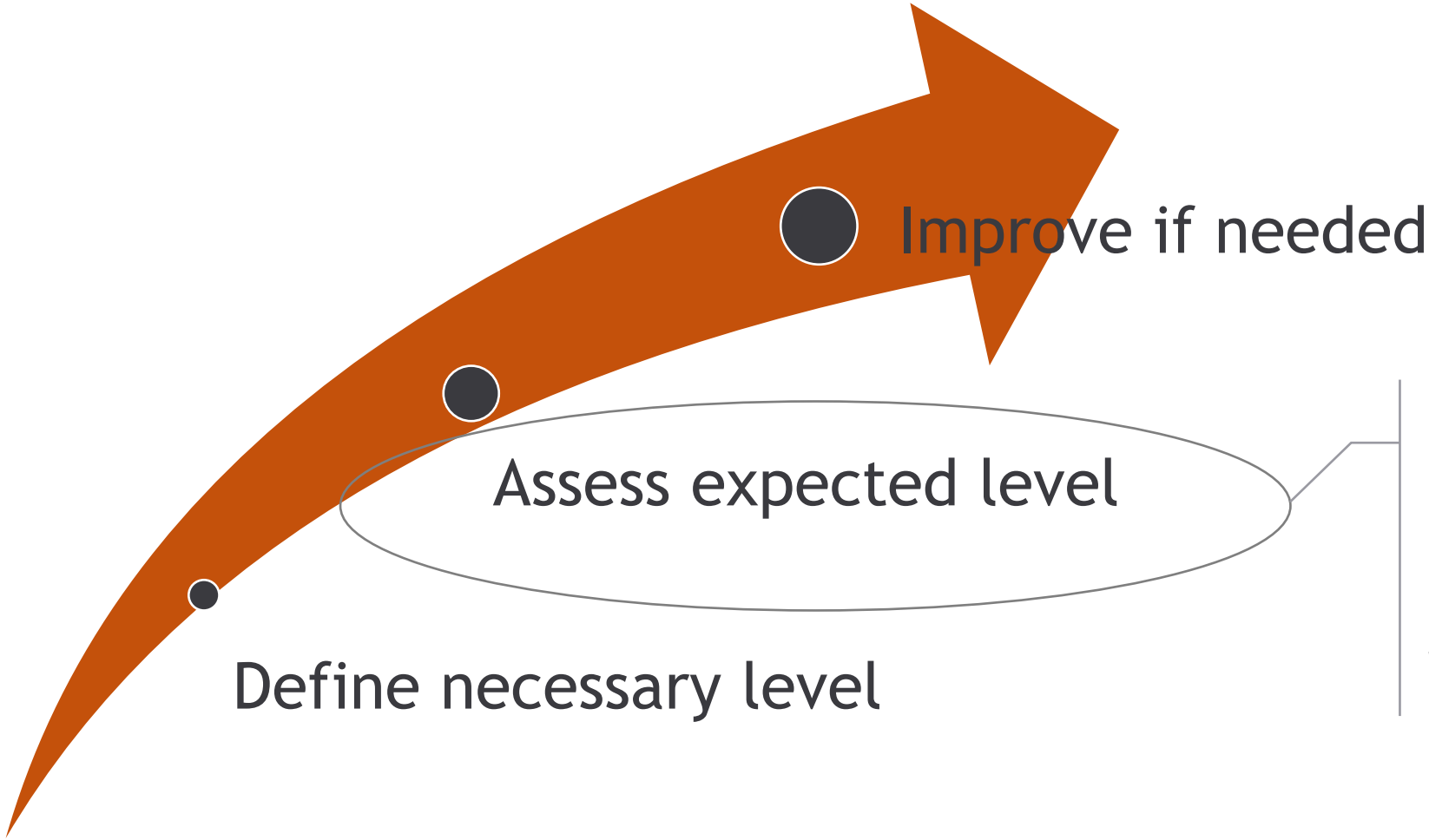
European Union Agency for the Cooperation of Energy Regulators

Stakeholder involvement reinforces data quality

ENTSO-E`s ERAA webinar

15 Mach 2023

Daniel Ihász-Tóth, Policy Officer - Adequacy



"The ENTSO for Electricity should carry out a robust medium to long-term European resource adequacy assessment to provide an objective basis for the assessment of adequacy concerns." *

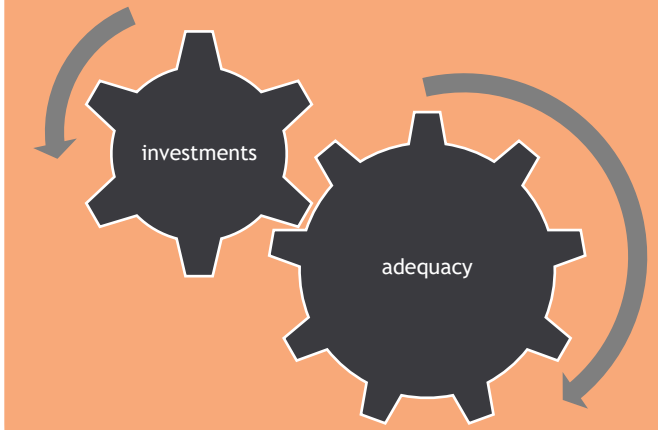
* According to Recital 43 of REGULATION (EU) 2019/943

INPUT

- NECPs
- Cross-border capacity
- Grid development
- Demand-Supply
- Fuel/CO_2 prices

…and many others

MODEL



RESULTS

Adequacy concern ?

ACER`s data focus this year

Robust
Adequacy Results

Consistency with greenhouse gas **emissions reduction targets**

Consistency with **network development plans & cross-zonal capacity targets**

Transparent & Reliable input data

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Thank you.
Any questions?

The contents of this document do not necessarily reflect the position or opinion of the Agency.

ACER
European Union Agency for the Cooperation of Energy Regulators

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Data Collection Process

Ilaria Federici (ENTSO-E), Market Modelling Analyst

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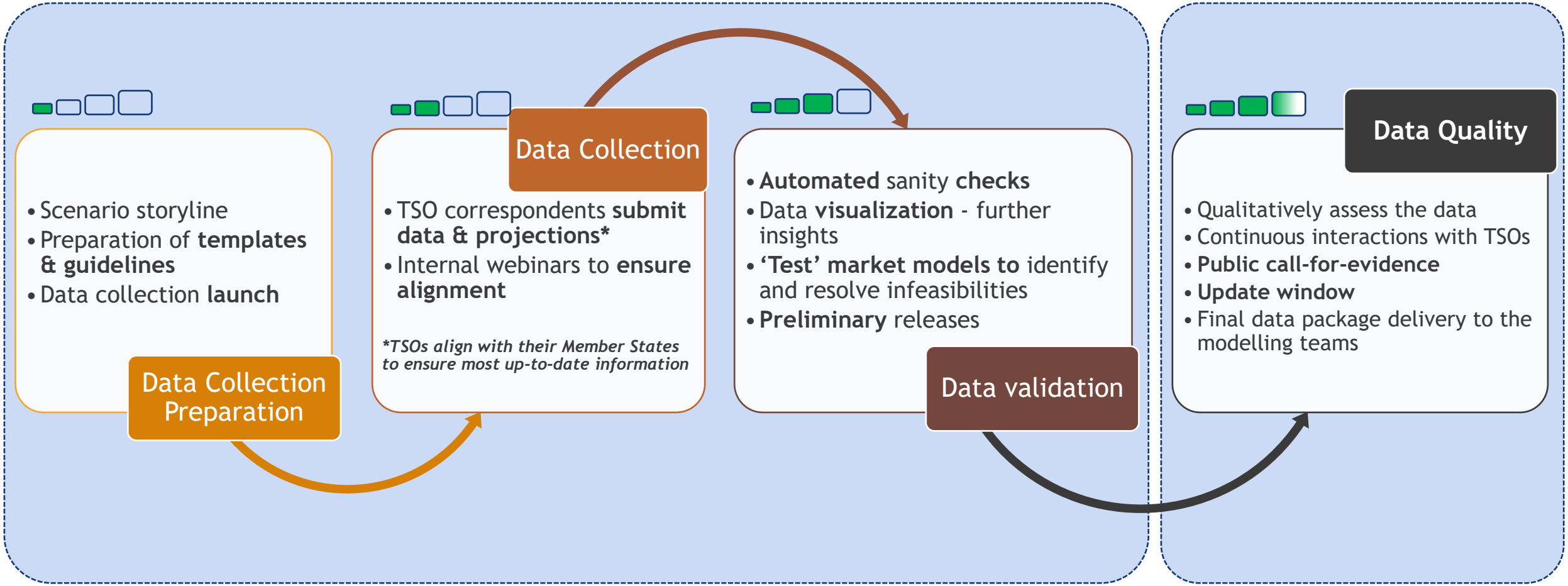
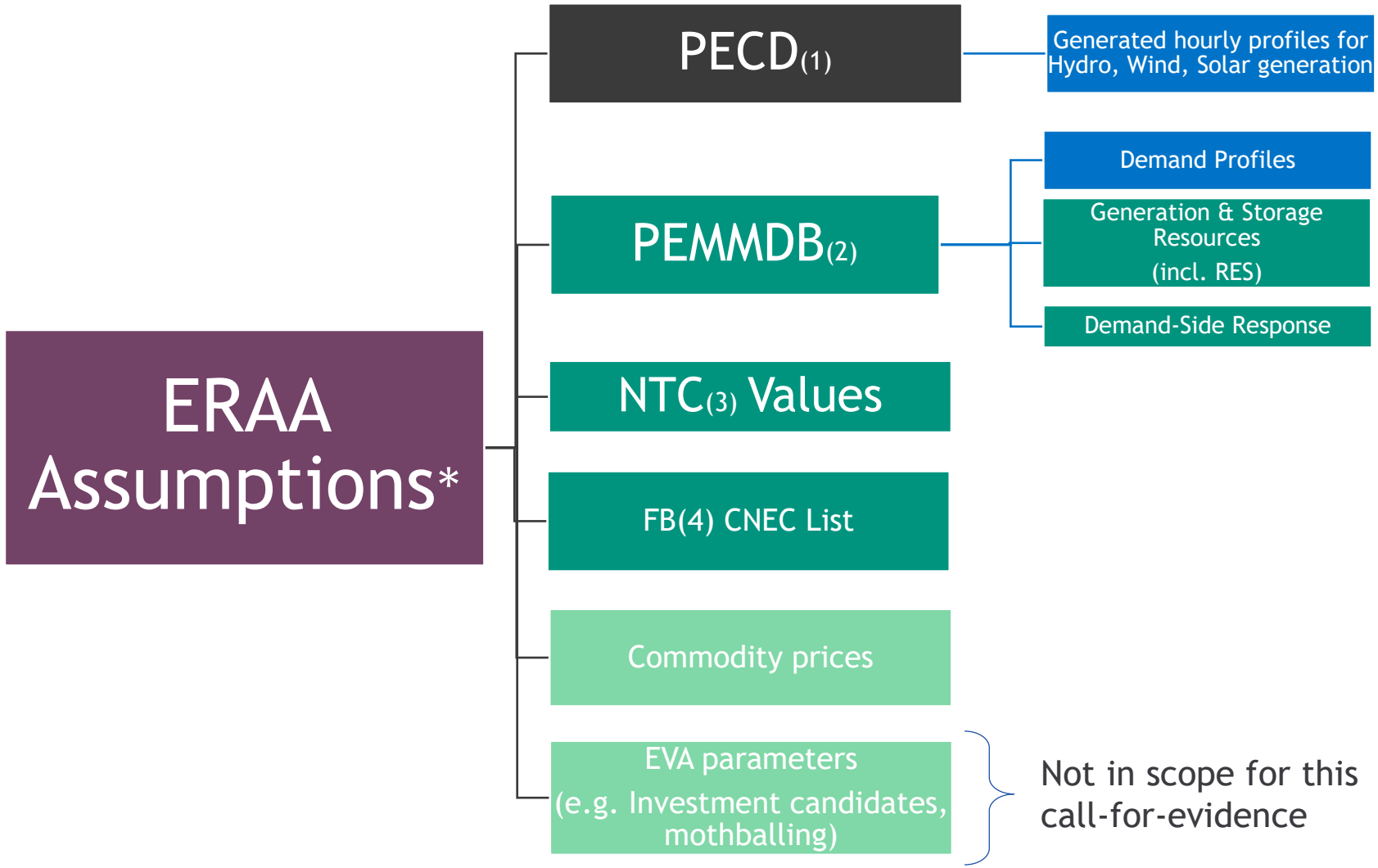
Data collection process



Data Structure



*ERAA scenarios are published by ENTSO-E, see ERAA Downloads

(1) **P**an-**E**uropean **C**limate **D**atabase
(2) **P**an-**E**uropean **M**arket **M**odelling **D**ata**B**ase
(3) **N**et **T**ransfer **C**apacities
(4) **F**low-**B**ased

Insights on ERAA 2023 preliminary data

Gregorio Iotti (APG)

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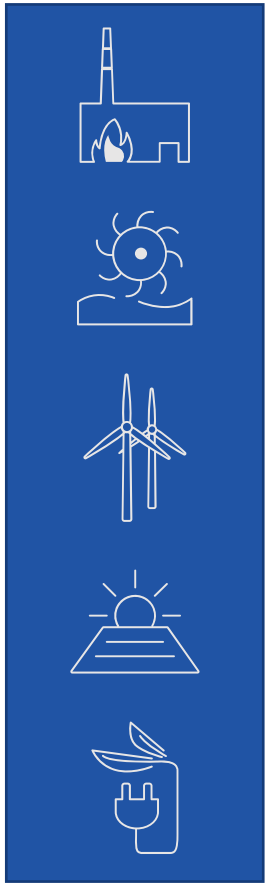
Data Assumptions and Introduction

- Call for evidence on preliminary dataset, still subject to partial updates or changes
- Dataset constituted by TSOs data prior to the Economic Viability Assessment
- Data available for the pivotal years of ERAA 2023: 2025, 2028, 2030, 2033
- Installed Capacity reported as on 1st of January. Unit- or technology-specific derating is not accounted
- Out-of-market capacity that would be available for adequacy purposes is included
- Electrolysers, Batteries & DSR reported include only explicit capacity on the market



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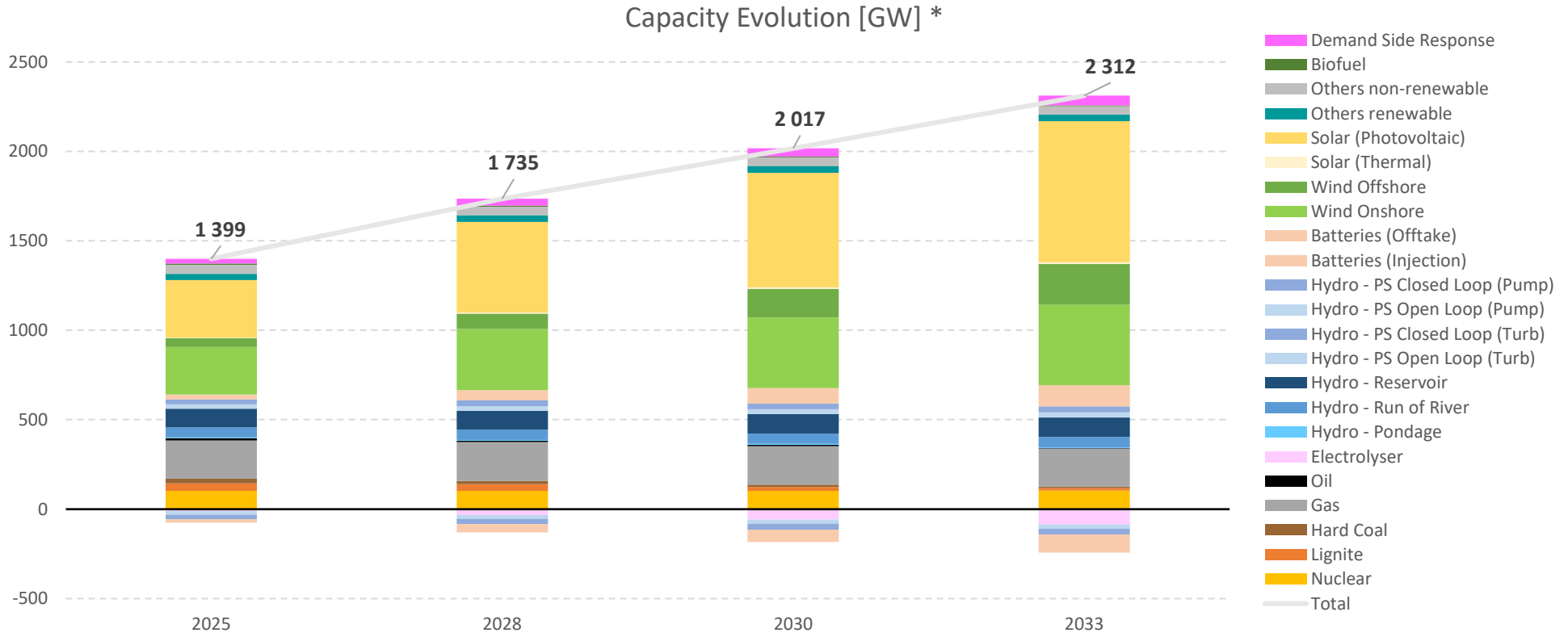
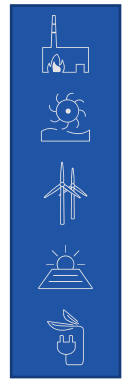
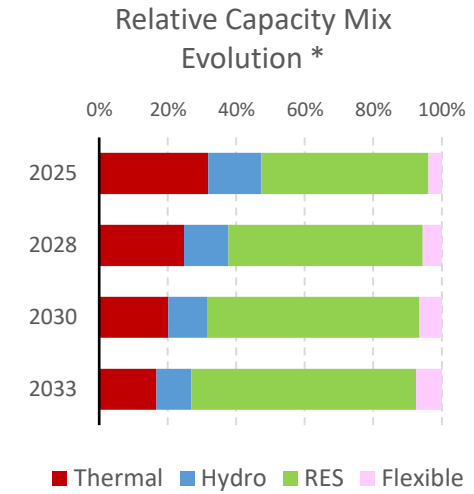
ERAA 2023 Capacity evolution: overall mix







- Steady increase of generation capacity over the horizon
- Renewables increase their share in the total mix up to more than 50% in 2028
- Consistent growth of flexibility (Electrolysers, Batteries and DSR)

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)

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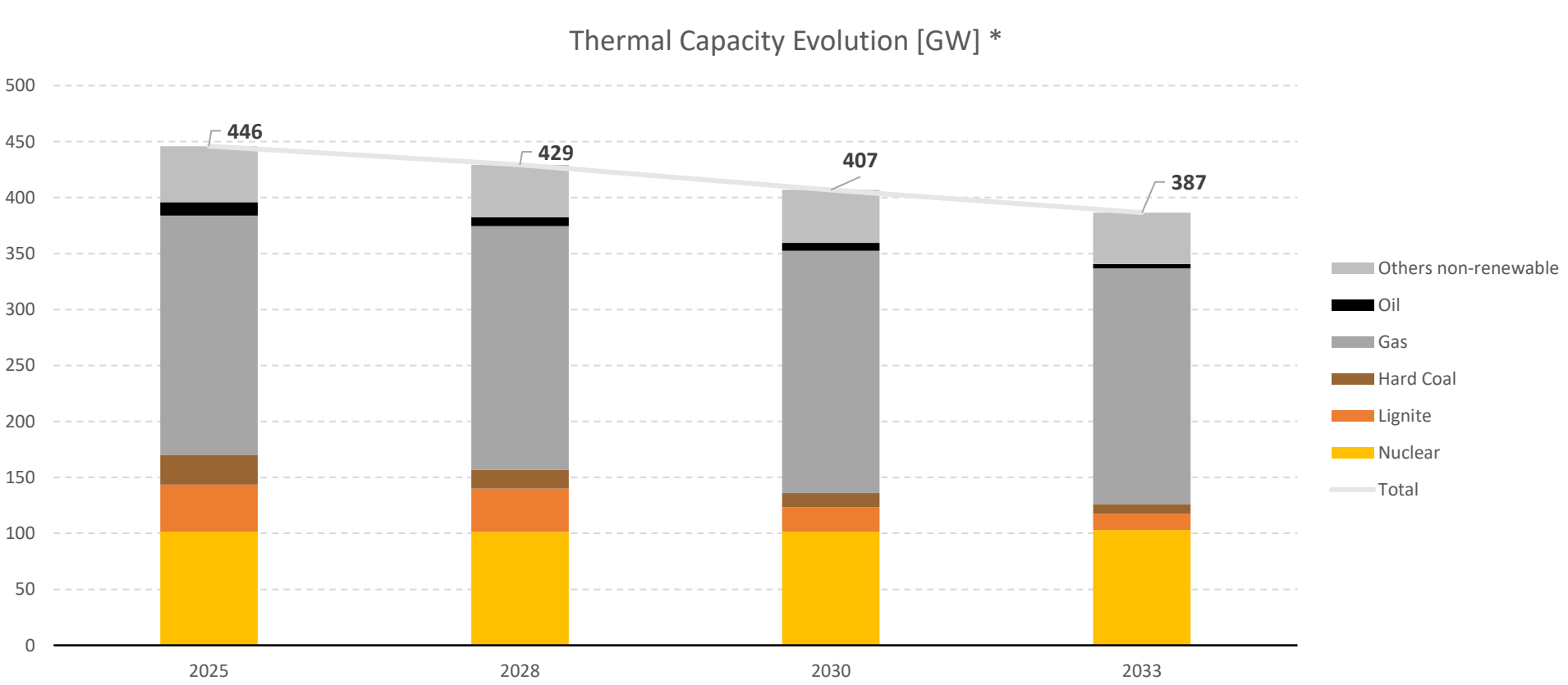
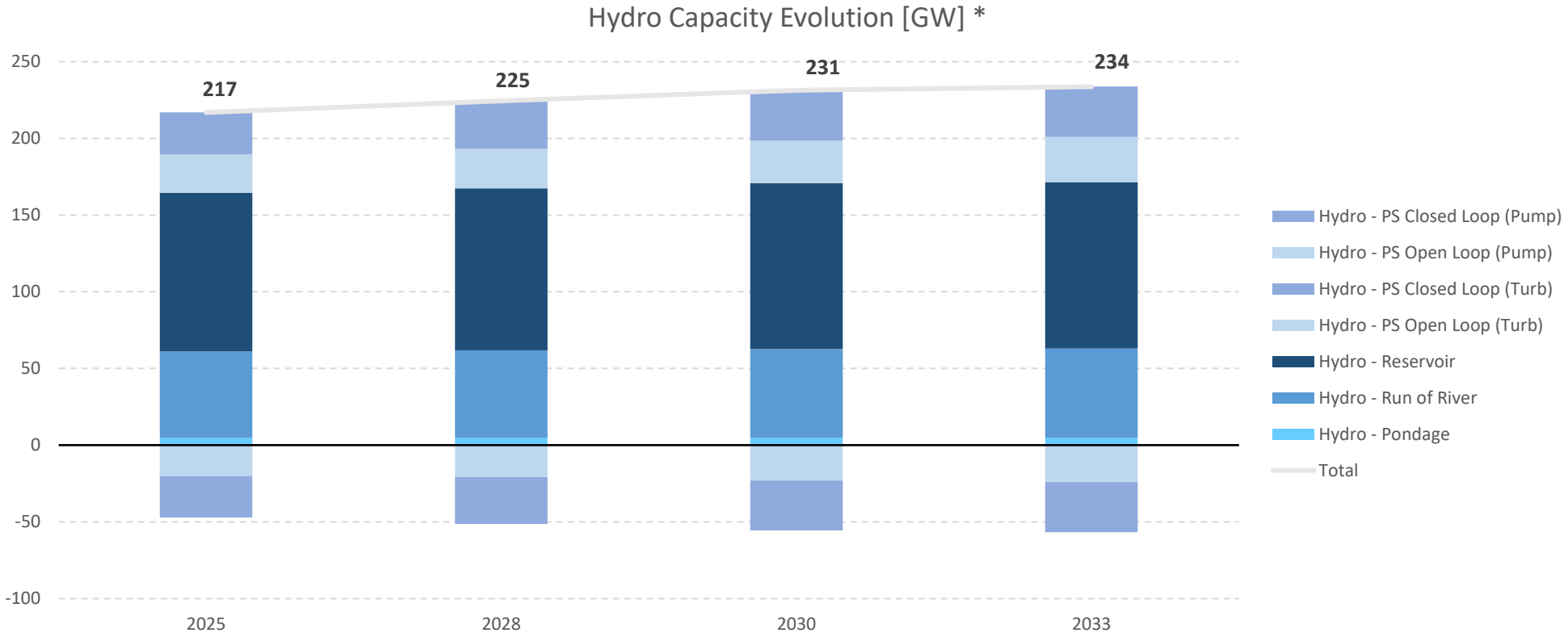
ERAA 2023 Capacity evolution: focus on Thermal capacity

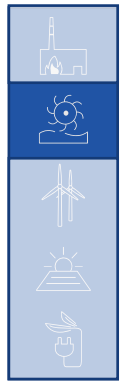


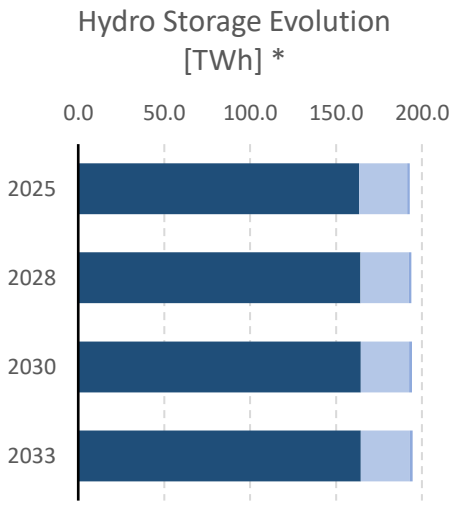
- Thermal capacity is decreasing over the horizon, mainly due to lignite and coal phase-out
- Gas stays as primary fossil source with new capacity replacing old units
- New nuclear capacity in some Member states compensates its phase-out in others

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)

ERAA 2023 Capacity evolution: focus on Hydro



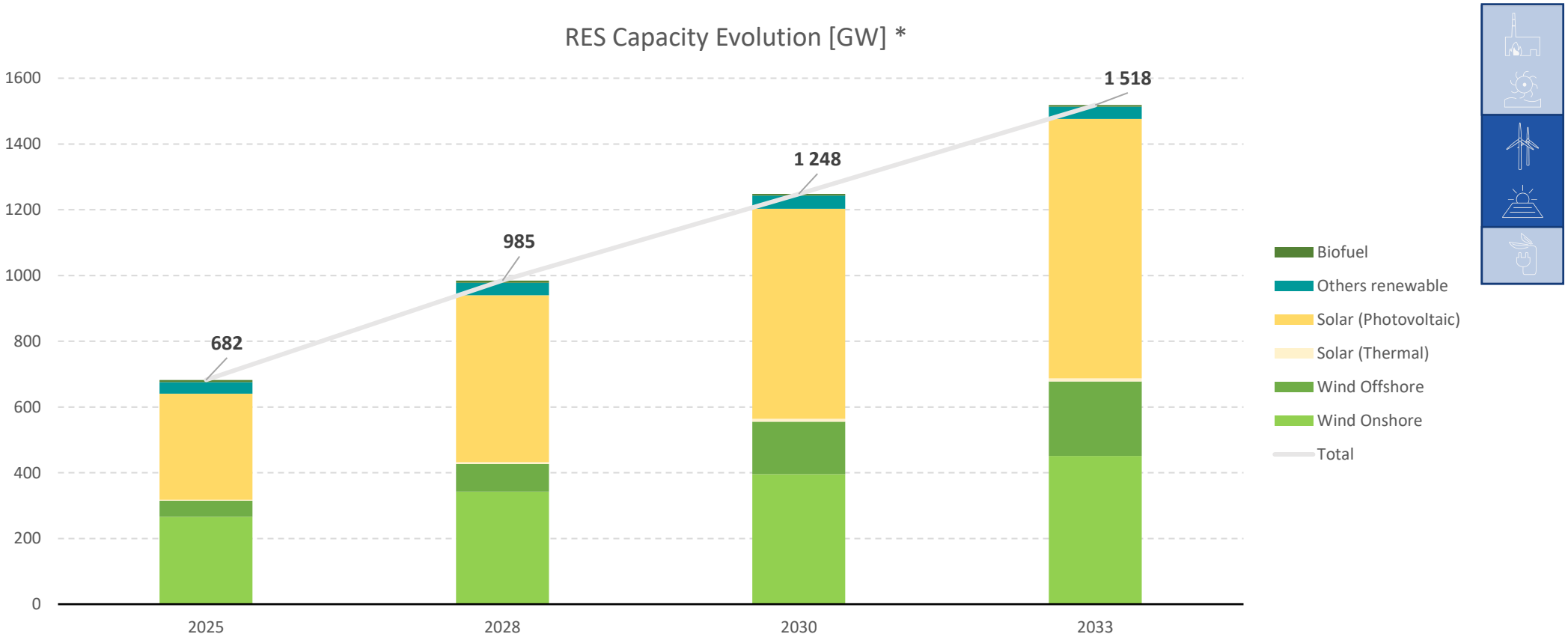




- Mild linear increase in hydro reservoir and PS capacity, with minor increase in storage size
- New hydropower projects include higher pumping capacity
- Run of River and Pondage capacity stays steady as almost the full potential has been exploited

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)

ERAA 2023 Capacity evolution: focus on Renewables



- Almost doubled total RES capacity between 2025 and 2030
- High RES penetration rate often higher than 100 GW of new capacity expansion per year
- Linear growth driven by solar PV and onshore wind, offshore wind contributing later within the horizon

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)

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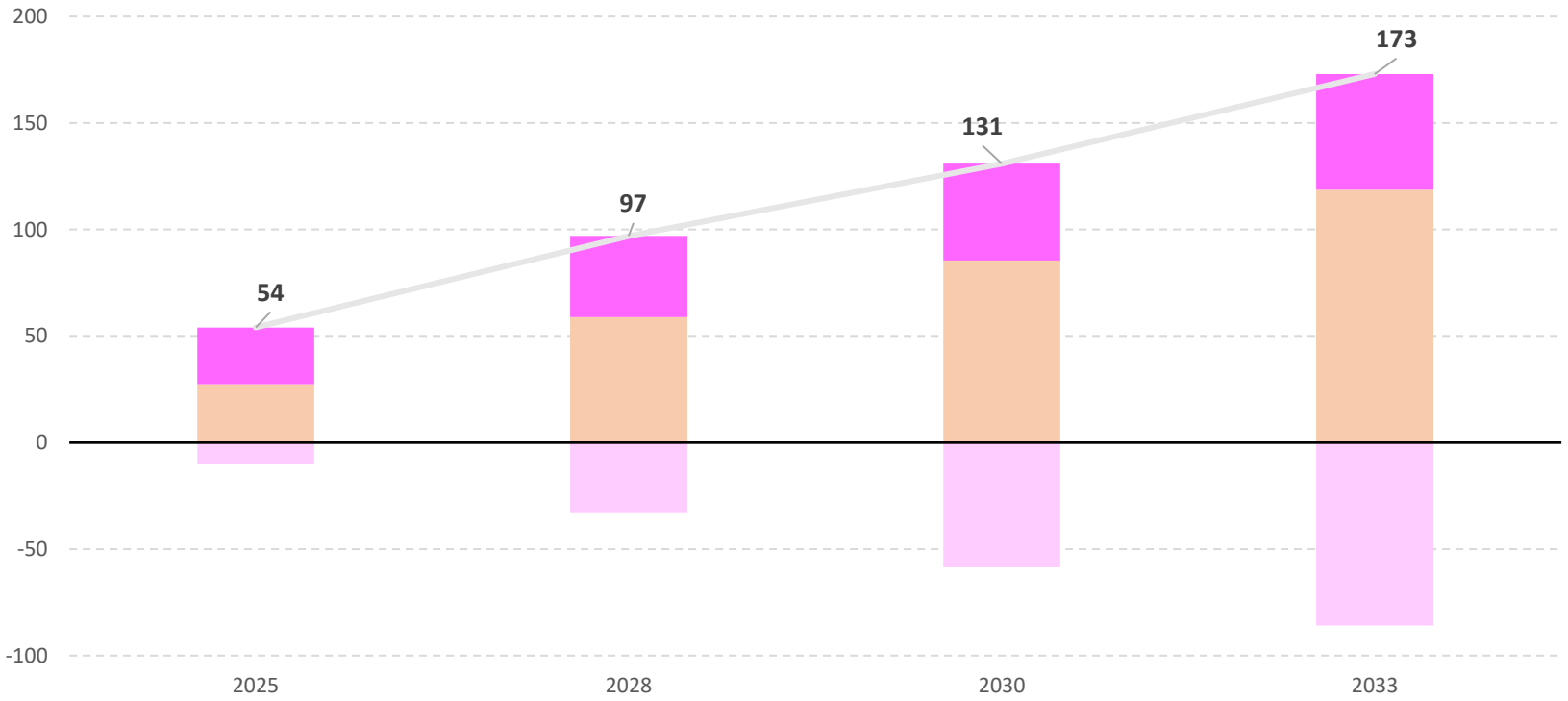
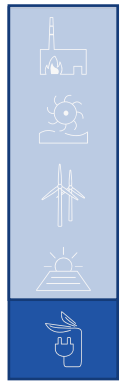
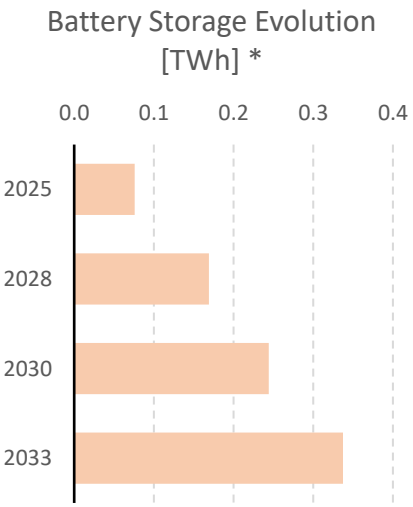
ERAA 2023 Capacity evolution: focus on Flexibility



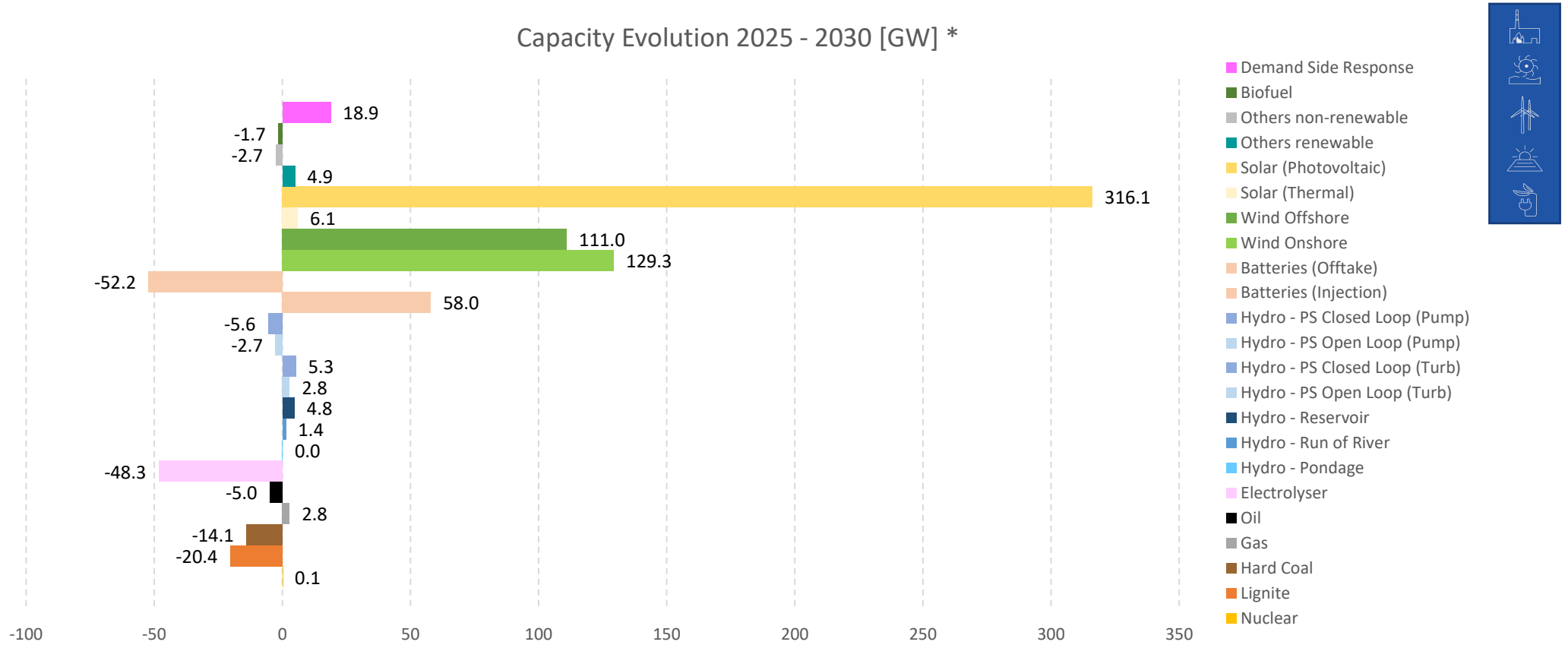




- Stable linear trend in flexible generation from 2025 to 2033
- Batteries capacity drives the growth, passing from 50% to more than 65% of flexible generation
- Electrolyser capacity mirrors the trend of batteries and DSR

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)

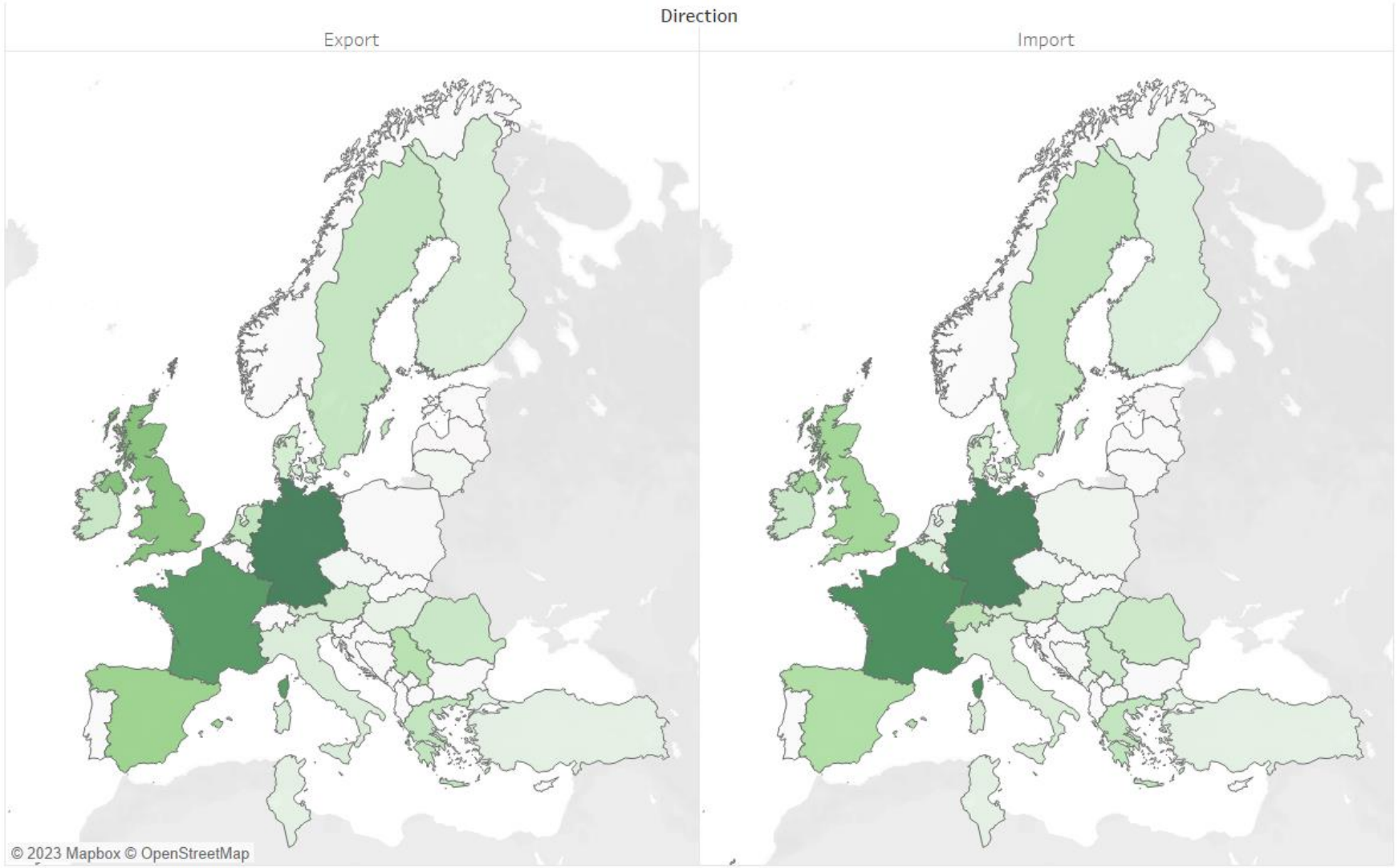
ERAA 2023 Capacity evolution: by technology



- Solar PV is the highest contributor, followed by onshore wind and offshore wind
- Important increase of flexibility, especially batteries (injection/offtake) and electrolysers
- Decrease of high-emitting thermal capacity, driven by lignite

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA)
Non-generating capacity (batteries for offtake, pumping hydro, electrolysers) is conventionally negative: a negative delta indicates growth in absolute terms

ERAA 2023 NTC evolution: import-export

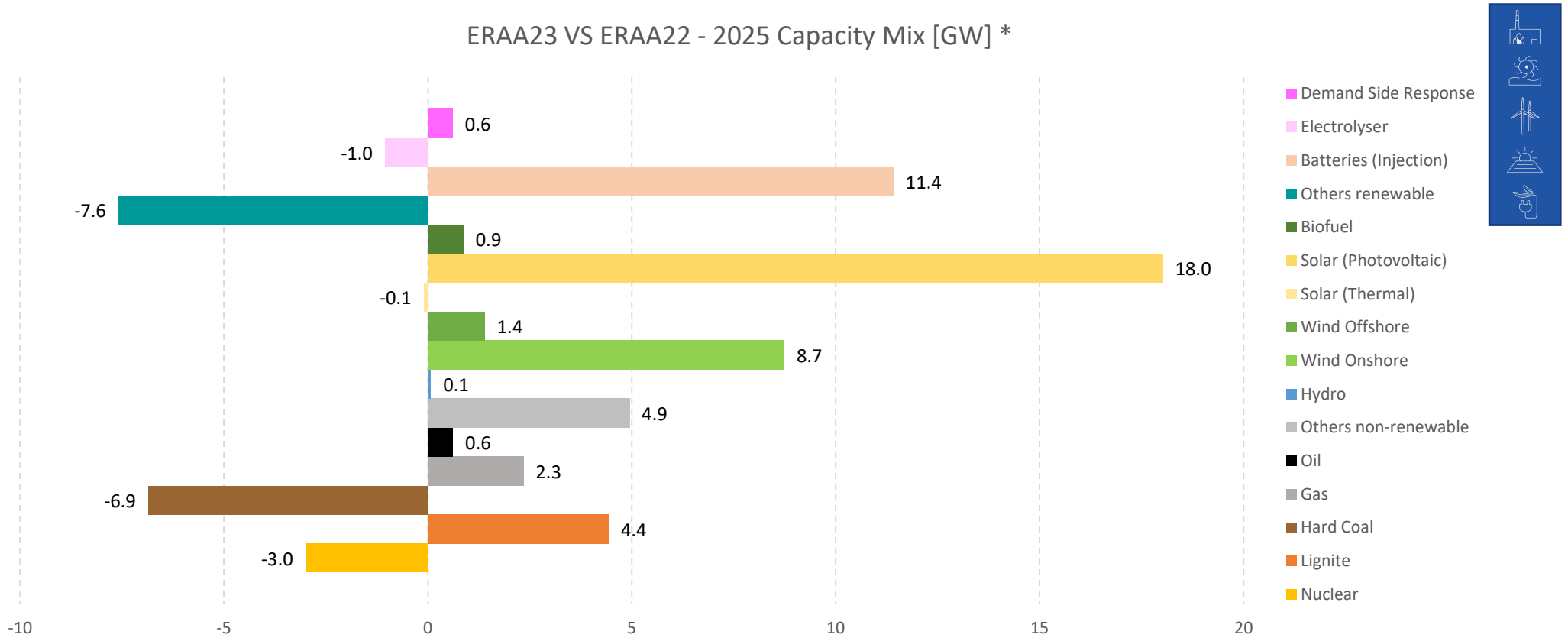


NTC evolution 2025-2030 [GW]

0 8.500

- Increase in NTC affecting mainly Germany, France, United Kingdom and Spain
- Rather stable import/export capacity expected in Finland and the Baltic region
- Slight increase in NTC from 2025 to 2030 for rest of countries

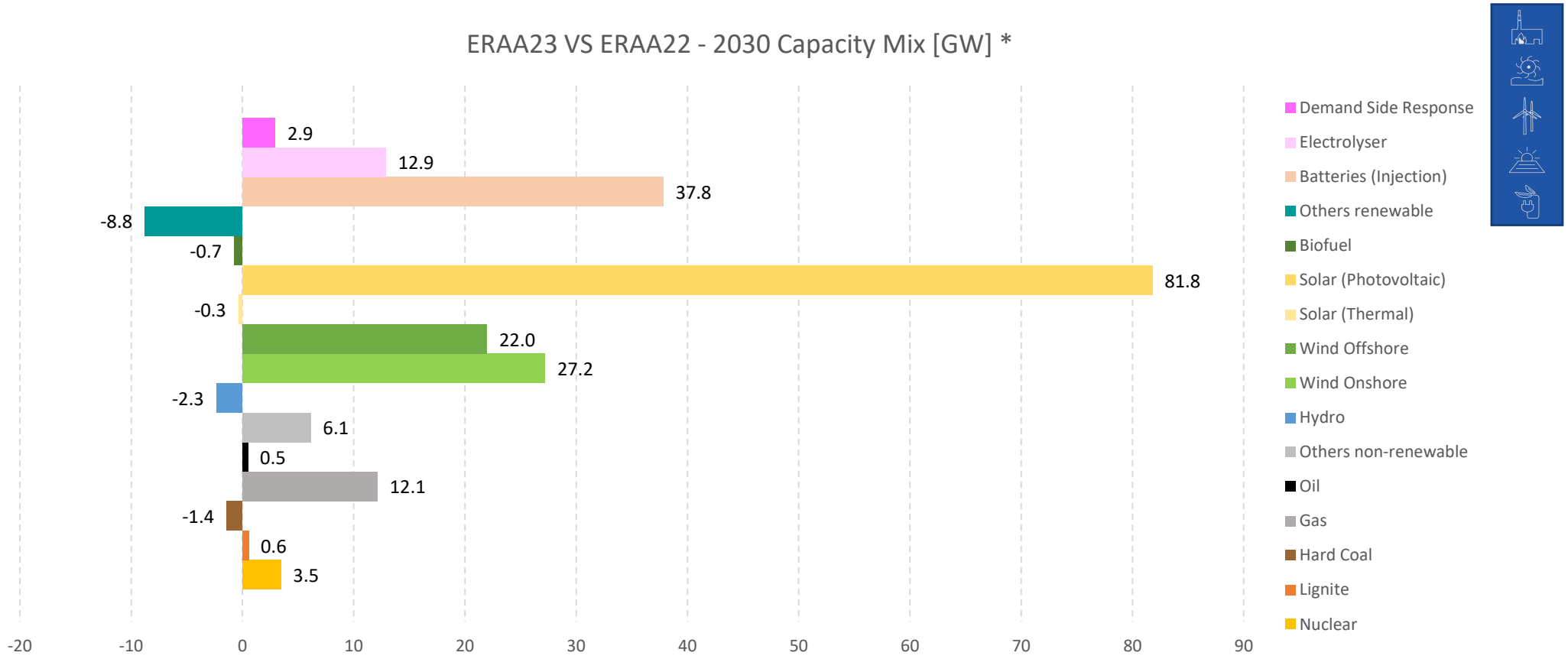
ERAA 2023 Capacity evolution: comparison with ERAA 2022



- Higher total capacity in 2025 (+36 GW generation) compared to ERAA 2022 (pre-EVA) data
- Solar PV drives the difference, followed by batteries and wind onshore
- Eterogeneous changes in thermal: increase in gas, oil and lignite more than offset by others

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA);
All capacities are here considered in absolute terms (no conventional signs)

ERAA 2023 Capacity evolution: comparison with ERAA 2022



- Higher total capacity in 2030 (+181 GW generation) compared to ERAA 2022 (pre-EVA) data
- Solar PV drives the difference, followed by batteries and wind onshore
- Increase in gas and nuclear and other non-RES dominates differences in thermal

*Data aggregated for the whole perimeter (EU 27 + 10, excluding TR and UA);
All capacities are here considered in absolute terms (no conventional signs)

ERAA 2023 proposal of commodity prices for call for evidence

Interpolated values

Fuel	Unit	Source	Assumptions	2023	2025	2028	2030*	2033	2040	2050
Nuclear	2021 €/GJ	ENTSO-E TYNDP 2022 (same as ERAA 2022)	Constant over the horizon.		0.47	0.47	0.47	0.47		
Lignite G1 (BG - MK - CZ)	2021 €/GJ	Booze&co (same as ERAA 2022)	Constant over the horizon.		1.4	1.4	1.4	1.4		
Lignite G2 (SK - DE - RS - PL - ME - UKNI - BA - IE)	2021 €/GJ	Booze&co (same as ERAA 2022)	Constant over the horizon.		1.8	1.8	1.8	1.8		
Lignite G3 (SL - RO - HU)	2021 €/GJ	Booze&co (same as ERAA 2022)	Constant over the horizon.		2.4	2.4	2.4	2.4		
Lignite G4 (GR - TR)	2021 €/GJ	Booze&co (same as ERAA 2022)	Constant over the horizon		3.1	3.1	3.1	3.1		
Hard coal	2021 €/GJ	Bloomberg (2023); IEA WEO 2022 (APS)[2] (2030, 2050)	Interpolation between 2023 – 2030 and 2030 – 2050.	4.0[1]	3.4	2.4	1.8	1.7		1.5
Natural Gas	2021 €/GJ	Bloomberg (2023); IEA WEO 2022 (APS) (2030, 2050)	Interpolation between 2023 – 2030 and 2030 – 2050.	15.0[1]	12.5	8.8	6.3	6.1		5.0
Biomethane	2021 €/GJ	Danish Technology catalogue (same as ERAA 2022)	Interpolation between 2030 and 2050 values.				18.2	18		16.9
Gas Blend	2021 €/GJ	EC Data	100% NG until 2028; 14% Biometh. in 2030; 35% Biometh. in 2040. 2033 interpolated.[3]	15.0	12.5	8.8	7.9	8.7		
Crude oil	2021 €/GJ	Bloomberg (2023); IEA WEO 2022 (APS) (2030, 2050)	Interpolation between 2023 – 2030 and 2030 – 2050.	10.8[1]	10.3	9.6	9.2	9.1		8.6
Light oil	2021 €/GJ	Crude oil price (+28%)	Interpolation between 2023 – 2030 and 2030 – 2050.	13.8	13.2	12.3	11.7	11.6		11.0
Heavy oil	2021 €/GJ	Crude oil price (+5%)	Interpolation between 2023 – 2030 and 2030 – 2050.	11.3	10.8	10.1	9.6	9.5		9.0
Shale oil	2021 €/GJ	ENTSO-E TYNDP 2022 (same as ERAA 2022)	Interpolation between 2025 - 2030 and 2030 - 2040.		1.56	1.74	1.86	2.12	2.71	3.93
CO_2 price	2021 €/ton	Bloomberg (2023); IEA WEO 2022 (APS) (2030, 2050)	Interpolation between 2023 – 2030 and 2030 – 2040.	78[1]	88	103	113	123	147	168

* Aligned with current TYNDP estimates for 2030.

1: Average price of January and February 2023; 0.905 discount factor applied to convert to 2021 €.

2: APS stands for Announced Pledges Scenario from IEA.

3: Average shares of biomethane as per FF55 and Repower EU data shared by EC.

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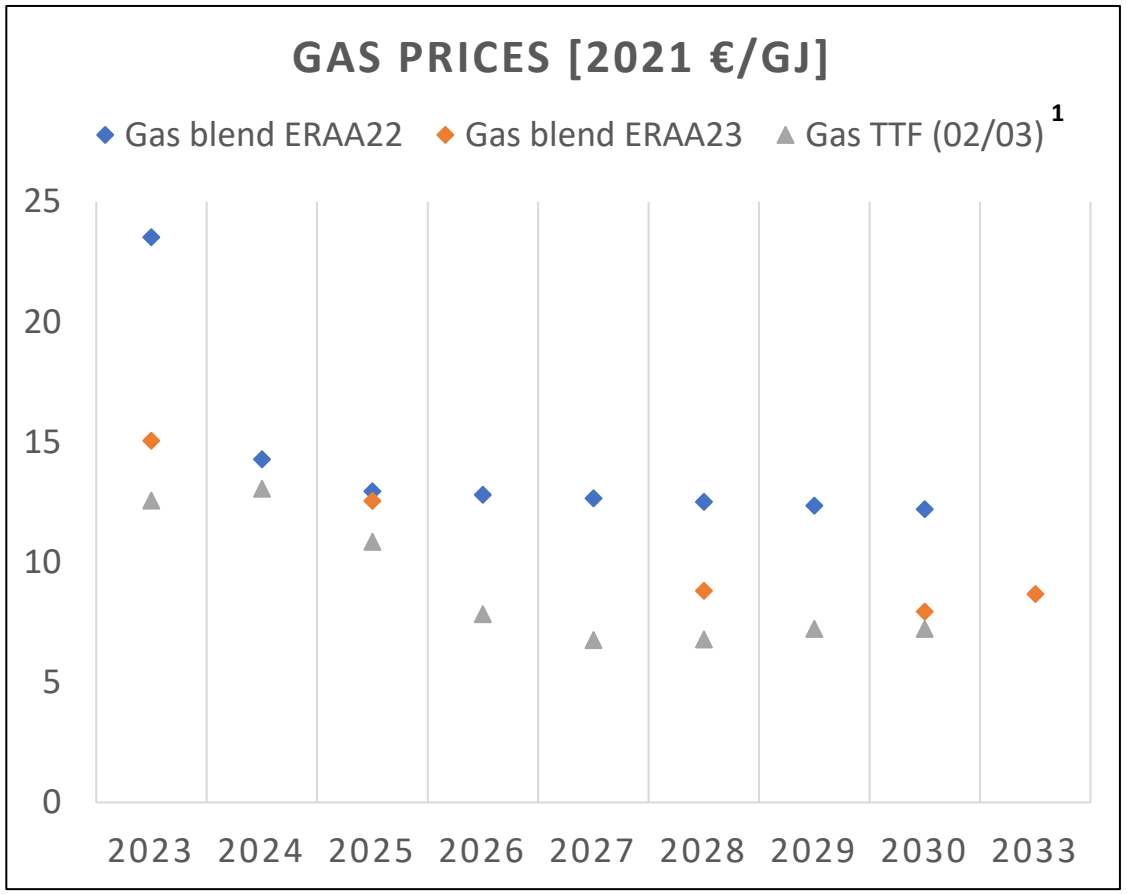
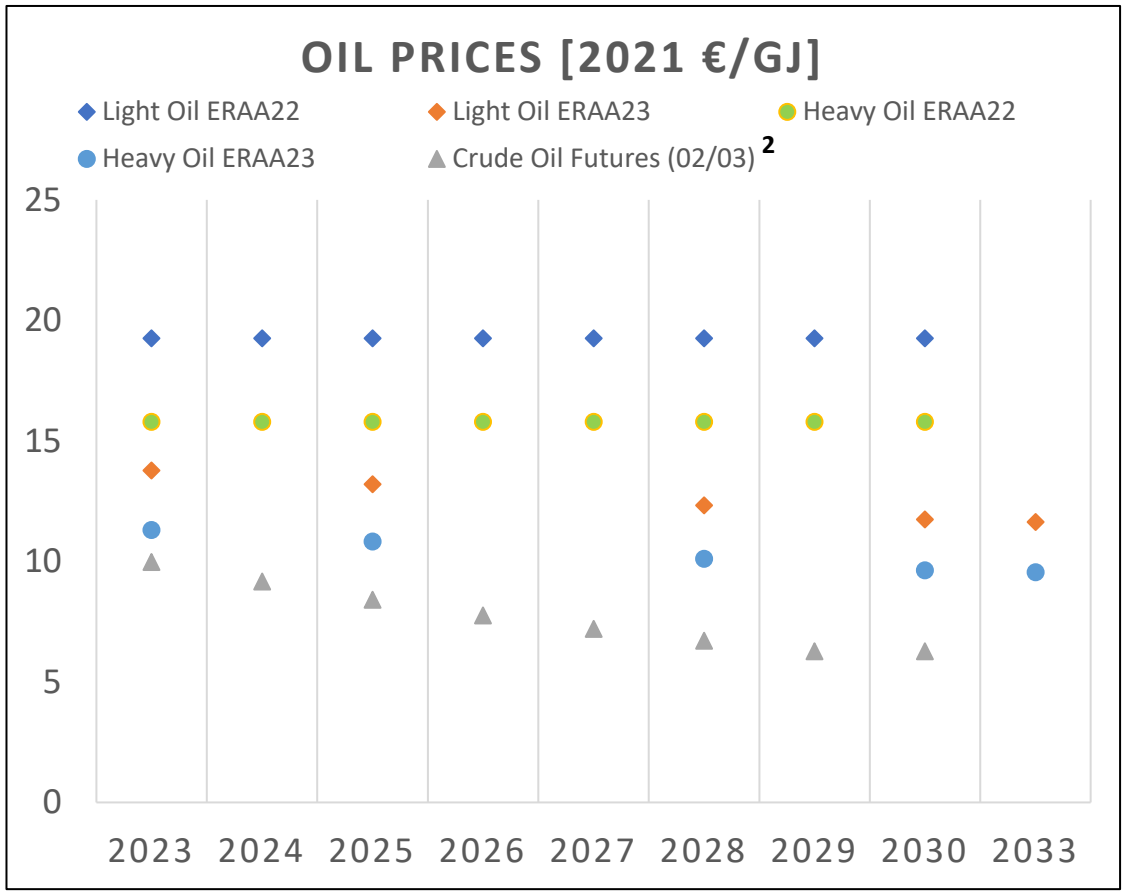
Overview on commodity price points evolution





1: Gas TTF prices as of 02/03/2023, discounted to 2021 €. Source: CME Group.
2: WTI Crude Oil Futures as of 02/03/2023, discounted to 2021 €. Source: CME Group.

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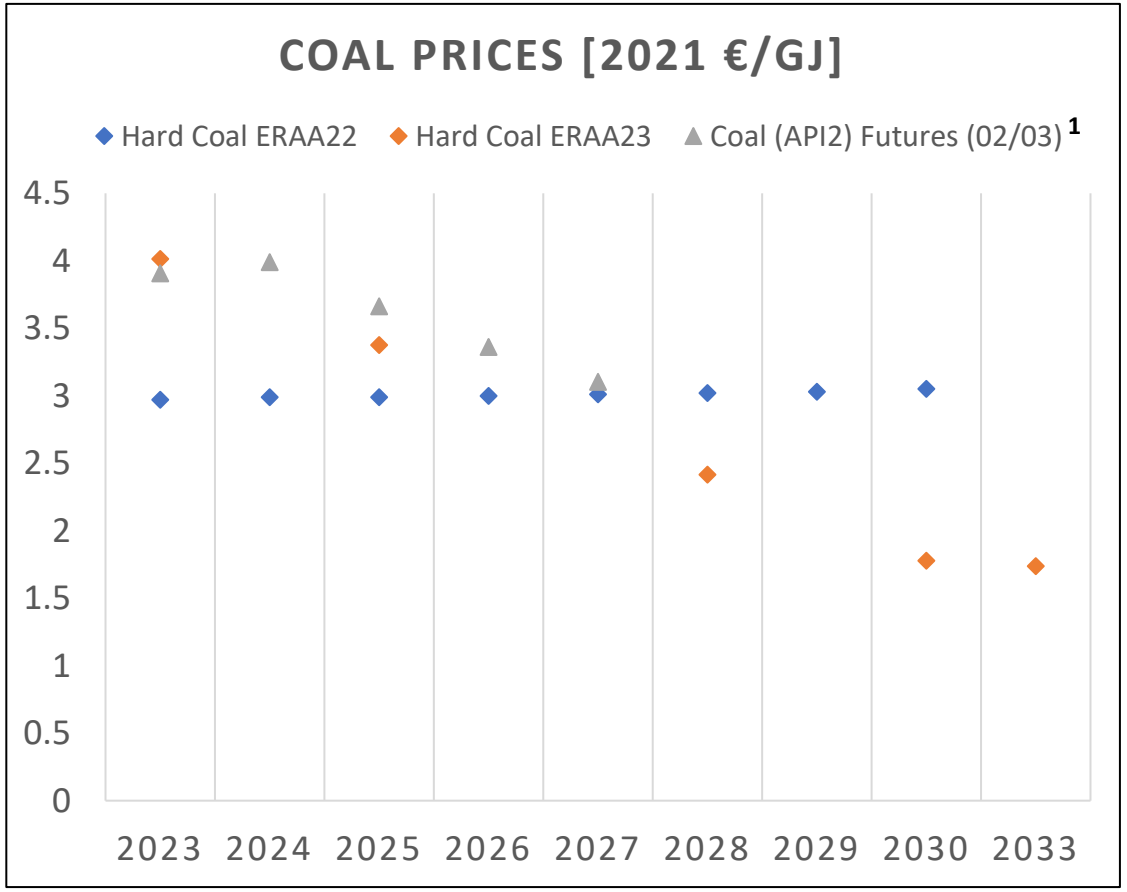
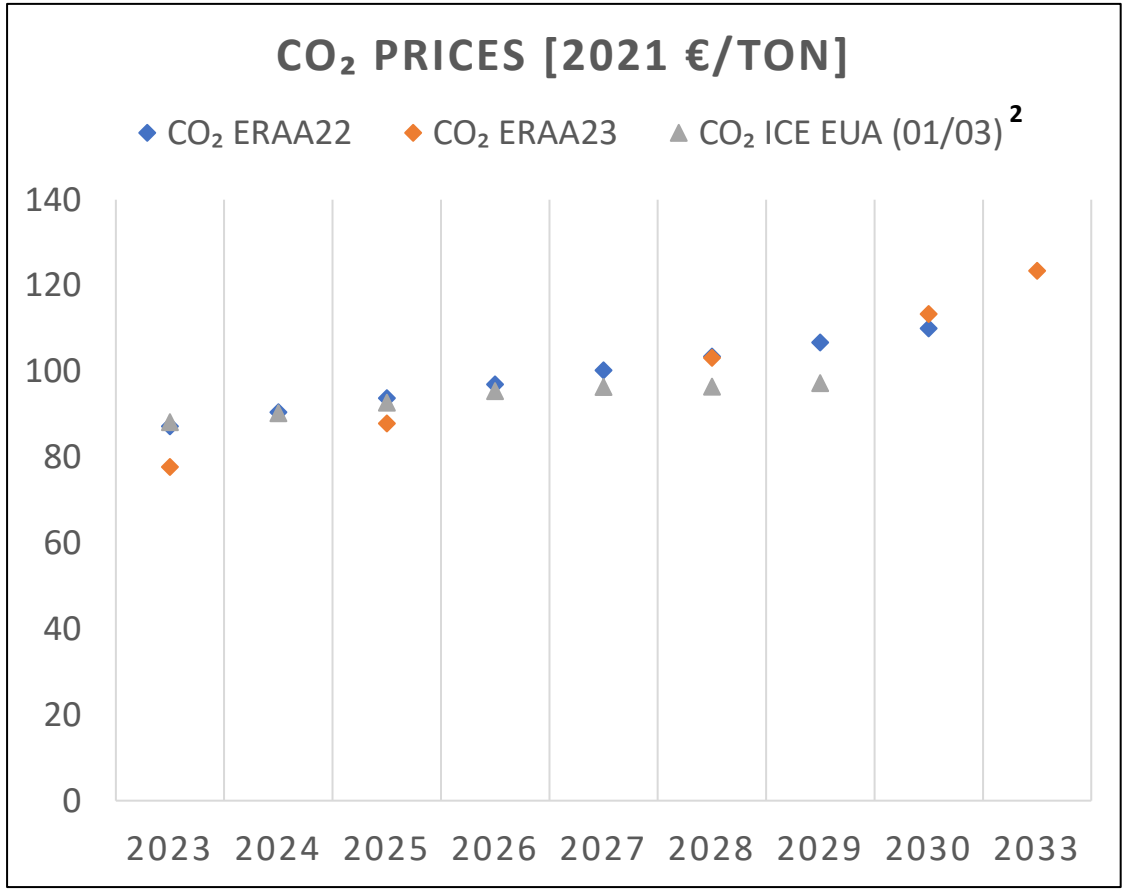
Overview on commodity price points evolution





1: Coal API2 CIF ARA Futures as of 02/03/2023, discounted to 2021 €. Source: CME Group.
2: ICE EUA Futures as of 01/03/2023, discounted to 2021 €. Source: Barchart.com.

Conclusion and next steps

Lazaros Exizidis (ENTSO-E),
Adequacy Expert, ERAA Project Management

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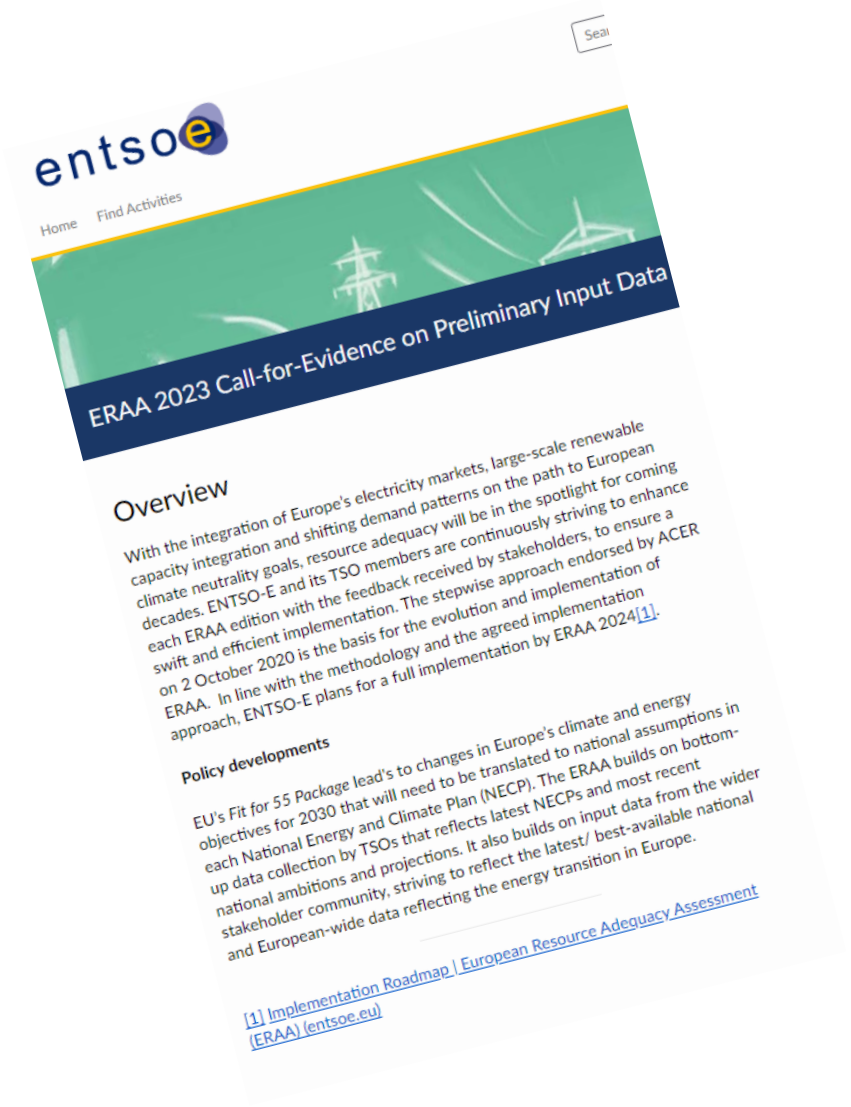
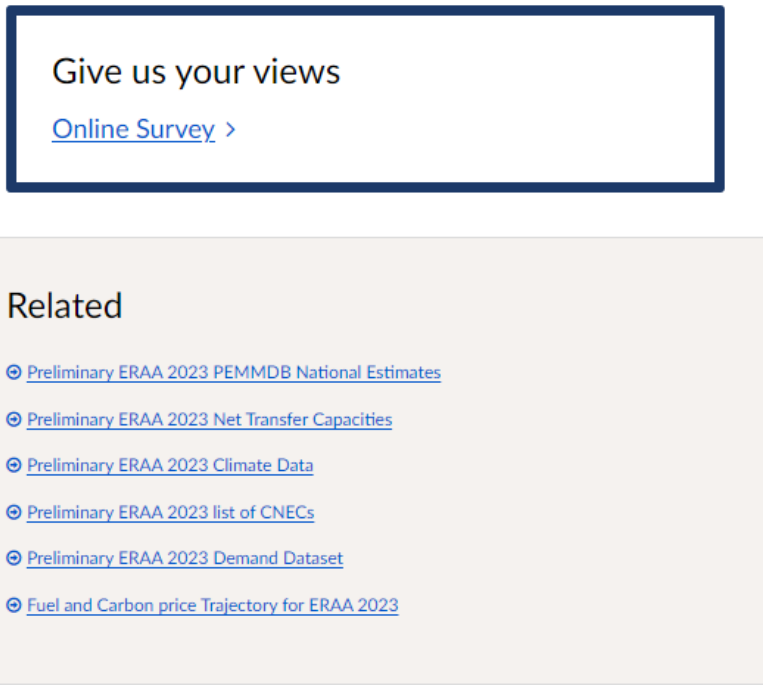
Call for Evidence on the ENTSO-E consultation hub





Call for Evidence by 05 April 2023

6 domains to provide your feedback

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Don’t forget to join us for the next public webinars & workshops

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Thank you for your attention

Cooperation

Planning, cooperation and targeted measures are key for a secure electricity system.

Coordination

Adequacy issues deeply interlinked; regional coordination is crucial.

Visit www.entsoe.eu/outlooks/eraa for more information on the ERAAs, the interactive data visuals, past and future stakeholder interactions

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