Closing of the 2024 and kick-off of the 2026 TYNDP Scenarios cycle

Joint ENTSO-E - ENTSOG workshop

Brussels, 4 July 2024

10:00 – 15:15 CEST

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Scenario Building

Introduction

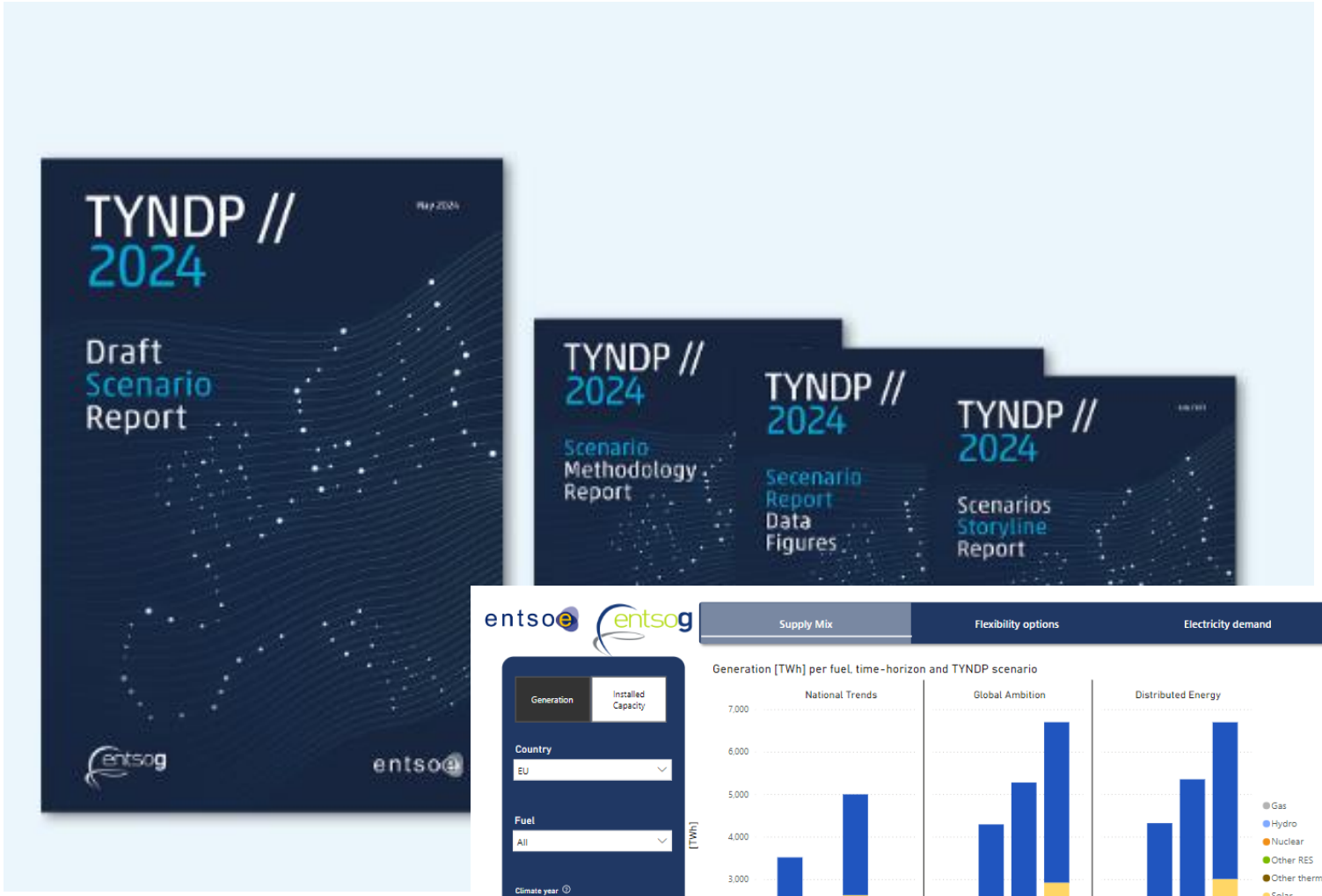
Roberto Francia, ENTSOG
5 minutes

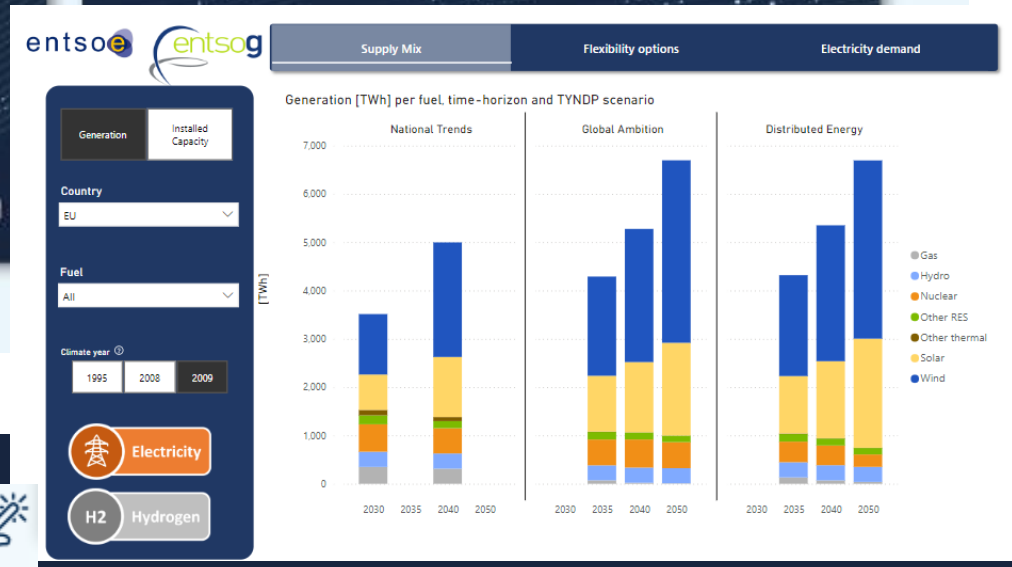
Privacy disclaimer

This is a public workshop. Please be aware that:

- the workshop is going to be recorded
- the video recording and the presentations will be made available online to allow for a dissemination of the workshop content to a wider public
- pictures will be taken during the workshop for use in the ENTSO-E and ENTSOG social media accounts

The TYNDP 2024 Scenarios package was published in May 2024





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Full datasets & results
Visualisation Platform
Consultation Summary Report

entsog entsoe

AGENDA

MORNING SESSION (in-person and online)

No	Subject	TIME	WHO
01.	Introduction	10:00 - 10:05 5 min	Roberto Francia (ENTSOG)
02.	2024 Scenarios high-level messages	10:05 - 10:20 15 min	Thilo von der Grün (ENTSOG) and Alan Croes (ENTSO-E)
03.	EC views on the TYNDP 2024 scenario cycle and expectations for the 2026 cycle	10:20 - 10:30 10 min	Maciej Grzeszczyk (European Commission ENER C4)
04.	ACER's views on the TYNDP 2024 scenario cycle and expectations for the 2026 cycle	10:30 - 10:40 10 min	Kristy Louise Rhades (ACER) - *online*
05.	European Scientific Advisory Board on Climate Change advice on TYNDP 2024 scenarios	10:40 – 10:45 5 min	Lena Kitzing (DTU) - *online*
06.	Collaboration for TYNDP 2024 scenario cycle and SRG expectations for the 2026 TYNDP cycles	10:45 - 10:55 10 min	Eva Hennig (SRG Co-Convenor)
07.	Presenting the 2024 TYNDP scenarios: - TYNDP 2024 scenarios strategy and target alignment - Modelling Methodologies	10:55 – 11:05 10 min	- Alexander Kättlitz (ENTSOG) and Nalan Buyuk (ENTSO-E) - Laura López (ENTSO-E) and Dante Powell (ENTSOG)
	Q&A Session	11:05 – 11:15 10 min	All
	Coffee Break	11:15 – 11:35 20 min	All

AGENDA (cont'd)

08.	Presenting the 2024 TYNDP scenarios: - Demand figures - Supply figures	11:35 – 11:45 10 min	Alexander Kättlitz (ENTSOG) and Nalan Buyuk (ENTSO-E)
	Q&A Session	11:45 – 11:55 10 min	All
09.	Framework for the 2026 TYNDP scenario cycle & next steps	11:55 – 12:10 15 min	Alexander Kättlitz (ENTSOG) and Nalan Buyuk (ENTSO-E)
	Q&A Session	12:10 - 12:25 15 min	All
10.	ENNOH involvement in the scenario building process	12:25 – 12:35 10 min	Abel Enríquez (pre-ENNOH)
11.	Closing remarks	12:35 – 12:40 5 min	Alan Croes (ENTSO-E)
	Lunch	12:40 – 13:45 65 min	All

AFTERNOON SESSION (in-person only as from 14:10)

12.	Building economic variants: introduction - Objectives - ACER views on economic variants - SRG views on economic variants	13:45 – 14:10 25 min	- Alexander Kättlitz (ENTSOG) and Nalan Buyuk (ENTSO-E) - Kristy Louise Rhades (ACER) *online* - Andrzej Ceglarz (SRG Co-Convenor)
13.	Interactive Session - Discussions on the economic variants: parameters & differentiation	14:10 – 15:00 50 min	All *Format: fishbowl*
14.	Concluding remarks	15:00 – 15:15 15 min	Thilo von der Grün (ENTSOG)

Get involved in the Workshop!

Throughout the workshop you can ask your own questions, like other participants' questions, and leave comments.

What to do:

1. Go to **slido.com**
2. Enter the event code **#2733380**
3. Enter your name and surname (NB: anonymous questions will not be answered)
4. Start asking your questions
5. Like other participants' questions - the most liked ones will rank higher on the list

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Scenario Building

TYNDP 2024 Scenarios high-level messages

Alan Croes, Scenario Steering Group Convenor from ENTSO-E, TenneT
Thilo von der Grün, Scenario Steering Group Convenor, ENTSOG
15 minutes

A sound basis to develop a fit-for-purpose infrastructure for a net-zero energy system

Scenarios built in line with policy targets, taking into account the latest available data at the time and aligns with the Guidelines to the extent possible

- Central scenario NT+ aims to capture NECPs: reflect Member States policies on fuel phase-out, takes the latest available Commission scenarios
- DE and GA scenarios reflect other possible futures if the story unfolds in a different manner.

Scenarios input parameters and GHG methodology are the result of extensive stakeholder engagement

The 2024 scenarios provide a sound basis to develop an infrastructure that is fit for purpose for a net-zero energy system, with the current available knowledge.

2024 Scenarios are the result of extensive stakeholder engagement

Extensive engagement especially on input parameters and methodologies

➔ Earlier engagement, focused on input rather than output, to maximise the consideration of stakeholder views

Stakeholder roundtables additional to public consultation: new engagement method proved successful, will be replicated in 2026 process

Set-up of the Stakeholder Reference Group

Enhanced transparency: availability of input and output datasets, enhanced data visualisation tool

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European Commission's views on the TYNDP 2024 scenario cycle and expectations for the 2026 cycle

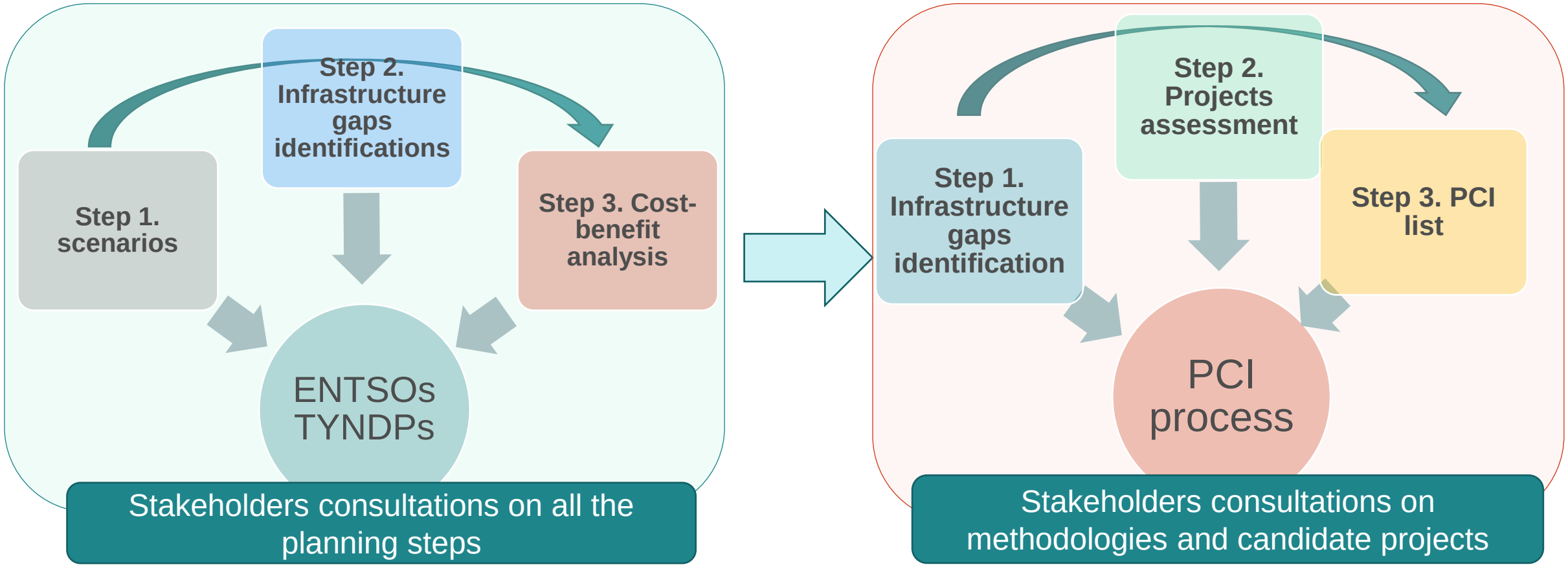
Maciej Grzeszczyk (European Commission)
10 minutes

Views on the TYNDP 2024 scenarios and expectations for the 2026 cycle

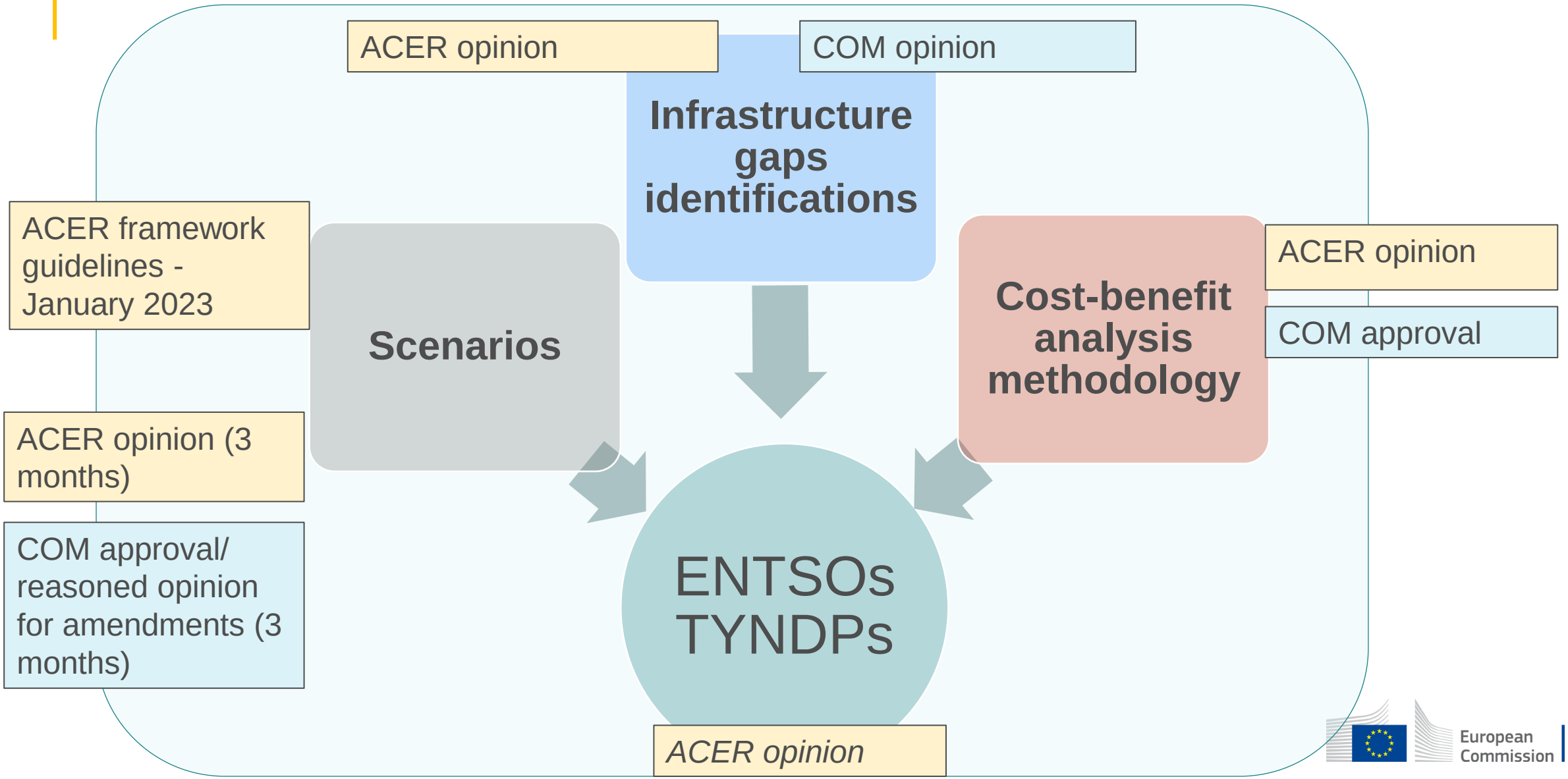
European Commission, ENER C4, Maciej Grzeszczyk

Joint ENTSOE-ENTSOG workshop 4 July 2024

TEN-E regulation & TYNDP



TEN-E framework - governance



European Commission

TEN-E requirements for the scenarios (Article 12)

- The ENTSOs shall follow the guidelines → ACER to verify the compliance
- Stakeholder involvement on key elements - assumptions and how they are incorporated
- A long-perspective until 2050 and intermediary steps as appropriate
- Input and output data published in a sufficiently clear and accurate form
- ESABCC opinion
- ACER and MS opinion
- EC approval/ request to amend the scenarios

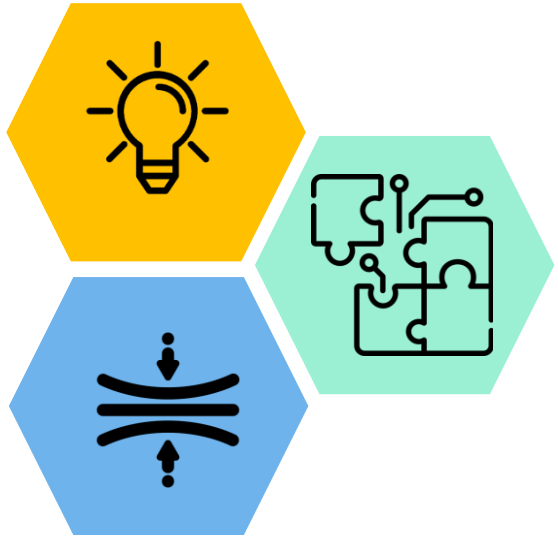
European Commission

Framework guidelines for the joint scenarios

- The guidelines shall establish criteria for a **transparent, non-discriminatory and robust development of scenarios** taking into account best practices in the field of infrastructures assessment and network development planning. The guidelines shall also aim to ensure that the underlying ENTSO for Electricity and ENTSO for Gas scenarios are fully **in line with the energy efficiency first principle and with the Union's 2030 targets for energy and climate and its 2050 climate neutrality objective** and **shall take into account the latest available Commission scenarios**, as well as, **when relevant, the national energy and climate plans**.

2024 scenarios – checks (1)

- **Transparent, non-discriminatory and robust development**
  - Stakeholder involvement – Stakeholder Reference Group
  - Publication of the data – consistency with Eurostat
  - Timing – submission 30 May 2024 vs planning for February 2024
- **Energy efficiency first principle**
  - Compliance with the energy efficiency targets
  - Demand-side solutions

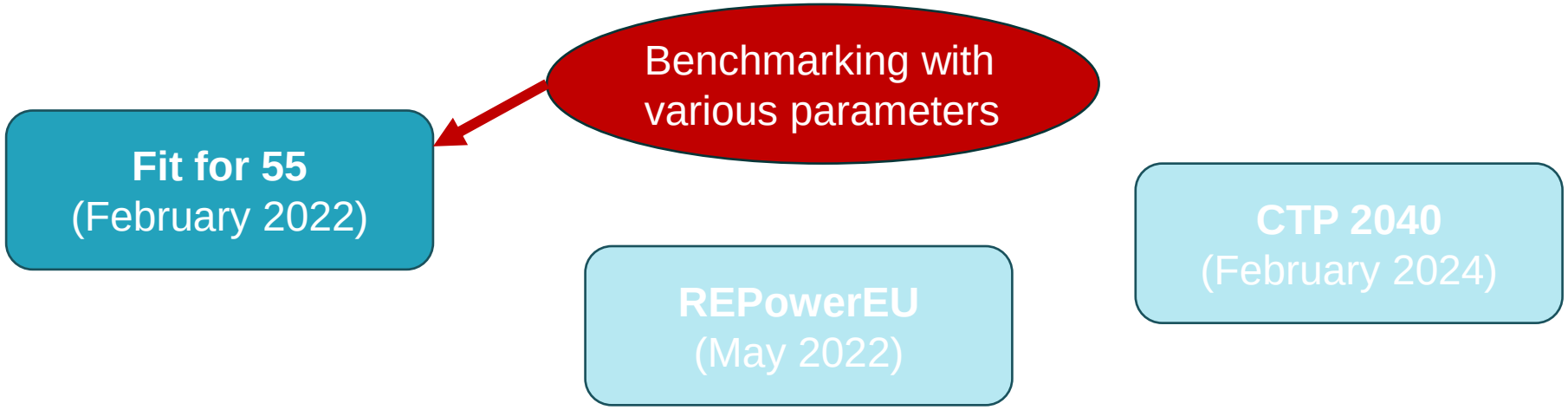


2024 scenarios – checks (2)

- **Union's 2030 targets for energy**
  - FEC - 763 Mtoe
  - PEC (indicative) - 992.5 Mtoe
  - RES - at least 42.5% share in GFEC
- **Climate and its 2050 climate neutrality objective**
  - Net-zero emissions in 2050
  - ESABCC opinion

2024 scenarios – checks (3)

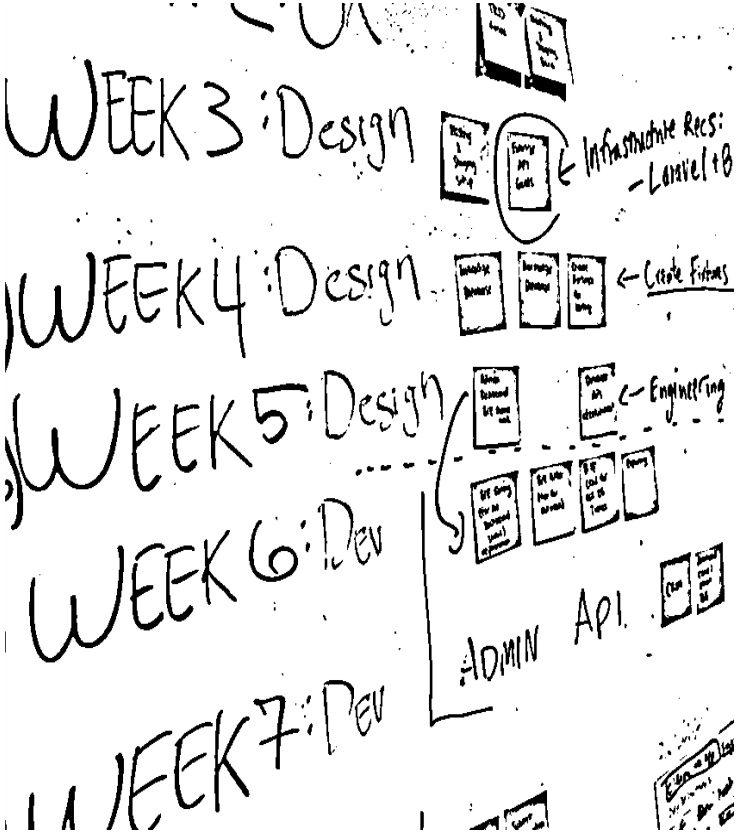
- **The latest available Commission scenarios**



- **The national energy and climate plans**
  - Timeliness of data collection
  - Only draft scenarios available, various quality, partial data

2026 TYNDP cycle expectations (1)

- **Clear timeline and planning of activities**
  - cut-off dates for data collection
  - long-term planning and clarity on innovations going beyond one cycle
- **Streamlined data collection**
  - 2025 reference scenario – Q1 2025 – cooperation with EC and MS
  - final NECPs
- **Timely delivery → 31 December 2025**
- **Stakeholders' involvement (SRG)**



European Commission

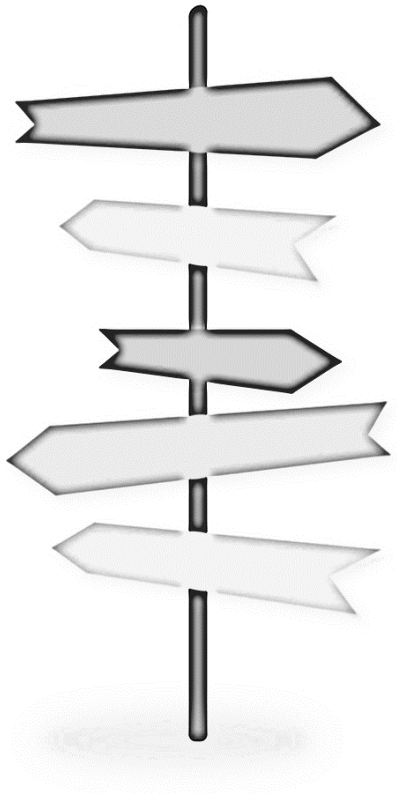
2026 TYNDP cycle (2)

- **Scenarios fit for purpose**
  - NT+ to become a full-fledged central scenario
  - Coherent variants – DE and GA variants are not clear enough → more understandable rationale behind the parameters' deviation → economic variants
  - Flexibility and sensitivities to reflect the uncertainties and dynamic environment
  - Robust analysis of 2035 and 2040 time-horizon
  - Scenarios that are used in the subsequent deliverables of the TYNDP and beyond
- **Strong cooperation ENTSO-E - ENTSOG - ENNOH**

European Commission

2026 TYNDP cycle (3)

- **Application of the Framework Guidelines**
- **Follow-up of the SRG recommendations**
- **Consideration of the ESABCC opinion**
- **Presentation of the results:**
  - clear definition of the data and reference/consistency to the ESTAT indicators
  - aggregates at country level



European Commission

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ACER’s views on the TYNDP 2024 scenario cycle and expectations for the 2026 cycle

Kristy Louise Rhades (ACER) - *online*
10 minutes

ACER

European Union Agency for the Cooperation of Energy Regulators

Views on the 2024 scenario cycle and expectations for the 2026 cycle

Kristy Louise RHADES
Infrastructure Needs Team,
Energy System Needs department

4th of July 2024, Brussels and online

Public

ACER
European Union Agency for the Cooperation of Energy Regulators

Agenda

1. **What** are the ACER TYNDP Scenario Guidelines?
2. **Why** are the TYNDP Scenario Guidelines so important?
3. What is ACER's **upcoming opinion** on the ENTSOs scenarios?
4. What does ACER **endorse** for the 2026 cycle?

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TYNDP Scenarios

Framework Guidelines

References from regulation (EU) 2022/869 ‘TEN-E Regulation’:

- Article 12(1)
- Article 12(2)
- Article 12(5)

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1. **What** are the ACER TYNDP Scenario Guidelines?

Guidelines

ACER developed and published framework guidelines for joint scenarios in 2023 based on the principles of transparency, robustness, and inclusivity.

Scenarios

ENTSO-E and ENTSOG use ACER's framework guidelines to jointly develop scenarios that are made use of for a sound union-wide network development plan.

Opinion

ACER assesses the compliance of the scenarios with the guidelines and sends the results as an opinion to the ENTSOs, member states and the Commission.

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European Union Agency for the Cooperation of Energy Regulators

TEN-E Requirements for the framework guidelines

Establish criteria for transparent, non-discriminatory and robust development of joint scenarios.

Ensure that the scenarios are in line with the Energy Efficiency First Principle.

Take into account the latest available Commission scenarios and NECPs.

Take into account recommendations from Member States, stakeholders and the European Scientific Advisory Board on Climate Change.

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2. **Why** are the TYNDP Scenario Guidelines so important?

The guidelines build a framework that streamline the development process whose scenarios are used in the union-wide 10-year network development plan.

This way, the scenarios consider stakeholders, benchmark external sources, and handle information in an unbiased manner which is both realistic and explanatory to the audience.

The guidelines aim to ensure full compliance with the Union's 2030 targets for energy and climate and its 2050 climate neutrality objective.

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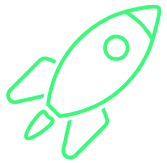
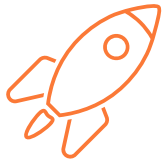
3. What is ACER's **upcoming opinion** on the ENTSOs scenarios?



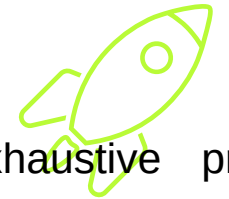
- All **technical requirements** as stated in the Framework Guidelines have been **ticked off**.
- The **Stakeholder Reference Group** (SRG) has been initiated successfully.



- **Some delays** in instalment of Framework Guidelines and the Stakeholder Reference Group.
- **Inconsistencies**, ambiguity of assumptions, data imperfections, lack of data availability to Stakeholder Reference Group and unthorough benchmarking.
- **Strike a balance** between SRG's independence and their scrutiny of input, assumptions and modelling methodologies throughout process timeline.

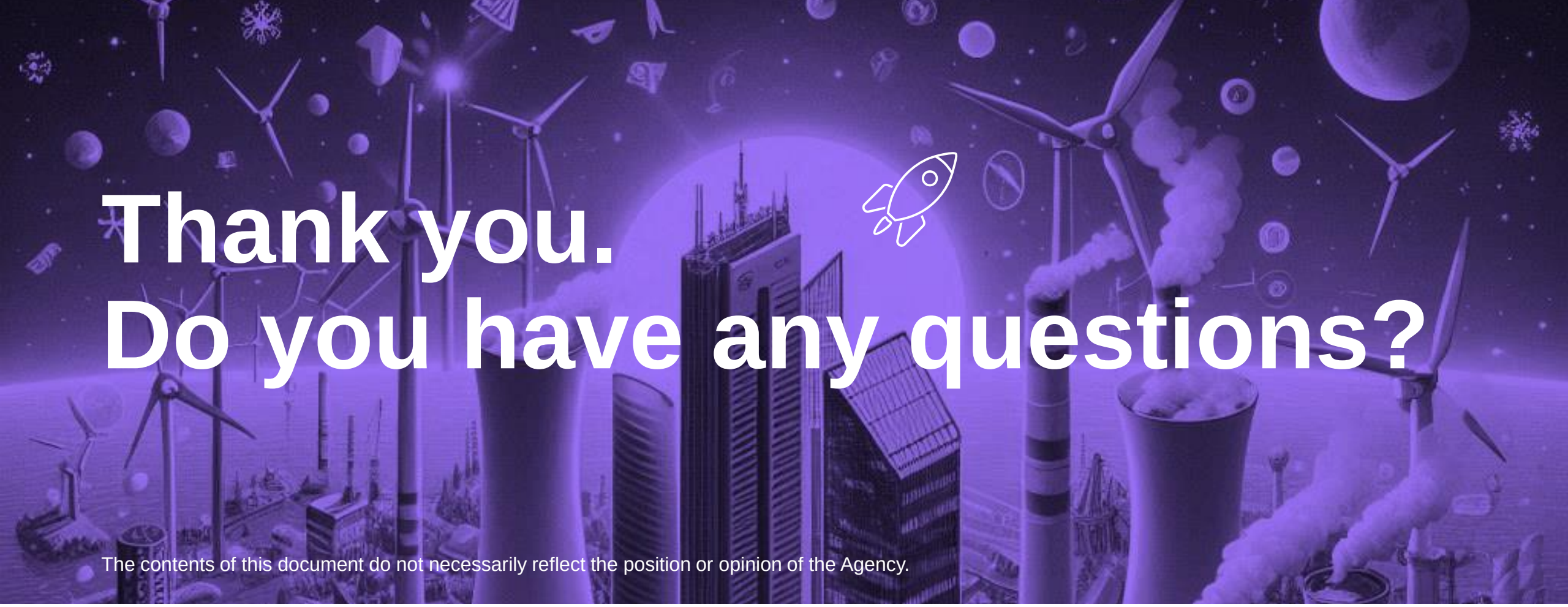
More to come in *ACER's opinion on the compliance of ENTSO-E's and ENTSOG's draft TYNDP 2024 Scenarios Report with ACER Scenario Guidelines* in mid-July.

4. What does ACER **endorse** for the 2026 cycle?



1. Write down and execute an exhaustive process timeline and stakeholder engagement plan.
2. Close collaboration with the Stakeholder Reference Group and other very important associates; take from their input to ensure that external and ENTSO predictions resonate with each other.
3. A national and European target-driven scenario development that includes low and high economic variants.
4. Appropriation of all energy carriers to supplement sector integration.
5. 2024 data collection can already be adapted into the 2026 scenario development.

The SRG's active contribution to the 2024, 2026 and future scenario development cycles.



Thank you.
Do you have any questions?

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

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ACER role and governance

- **Supporting the integration of energy markets in the EU** (by common rules at EU level). Primarily directed towards transmission system operators and power exchanges.
- **Contributing to efficient trans-European energy infrastructure**, ensuring alignment with EU priorities.
- Monitoring energy markets to ensure that they function well, **deterring market manipulation and abusive behaviour**.
- Where necessary, **coordinating cross-national regulatory action**.
- Governance: **Regulatory oversight is shared** with national regulators. **Decision-making** within ACER is collaborative and joint (formal decisions requiring 2/3 majority of national regulators). **Decentralised enforcement** at national level.
- Headquartered in Ljubljana, Slovenia. **Engaged across the EU**.

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European Scientific Advisory Board on Climate Change advice on TYNDP 2024 scenarios

Lena Kitzing from the European Scientific Advisory Board on Climate Change - *online*
5 minutes

The 2022 draft energy scenarios under the TEN-E regulation are not compatible with EU's climate and energy objectives

European Scientific Advisory Board on Climate Change

3 recommendations in the European Scientific Advisory Board on Climate Change's recent advice on the TYNDP draft scenarios:

1. **Improve draft scenarios to better align with climate and energy objectives:**
    - Update core **assumptions on costs, hydrogen, CCU/CCS**
    - Improve **GHG budget calculation**, particularly on CCS and non-energy emissions
    - Use most **up-to-date** plans and projections
    - Further **differentiate scenarios** to capture a broader spectrum of possible climate neutrality pathways.
2. **Factor climate risks to enhance EU energy infrastructure's climate resilience**
3. **Further enhance transparency, timeliness, and participation in the scenario building process**

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Collaboration for TYNDP 2024 scenario cycle and SRG expectations for the 2026 TYNDP cycle

Eva Hennig (SRG Co-Convenor)
10 minutes

SRG

STAKEHOLDER REFERENCE GROUP

FOR THE TYNDP SCENARIOS

Eva Hennig, SRG co-convenor (Thüga AG)

Workshop: Closing of the 2024 and Kick-off of the 2026 TYNDP Scenarios Cycle

Brussels, 04.07.2024

What is the SRG? A Short History

May 2022 — Revised TEN-E Reg. → ACER tasked with developing Framework Scenario Guidelines

Summer 2022 — **ACER consultation** with stakeholders (experts, NGOs etc.)

Nov 2022 — **Public consultation** of the Guidelines' draft (final in January 2023)

May/June 2023 — **Application** process opened by the ENTSOs

Autumn 2023 — SRG formally **established**, in accordance with ACER Scenario Guidelines

Feb 2024 — SRG published its **36 recommendations** on the 2024 TYNDP draft scenarios (and 2026)

April 2024 — SRG began work on the **2026 TYNDP** scenarios

Stakeholder Reference Group (SRG) – overview

Responsibilities:

1. Timely, independent, expert input to the ENTSOs' development of scenarios
   Scrutiny of inputs, assumptions and modelling methodologies
   Informed and balanced view, reflecting majority and minority views
2. Co-creation of stakeholder engagement plans (published by the ENTSOs)
3. Evaluation of the scenario-development process and recommendations for improvements of the next cycle

Who are the **SRG Members**?

- Associations involved in the electricity market
- Associations involved in the gas (methane and hydrogen) market
- Heating and cooling stakeholders
- Carbon capture & storage and carbon capture & utilisation stakeholders
- Independent aggregators
- Demand-side operators

- Supply-side operators
- Organisations involved in energy efficiency solutions
- Energy consumer organisations
- Civil society representatives
- Other organisations
- Independent experts

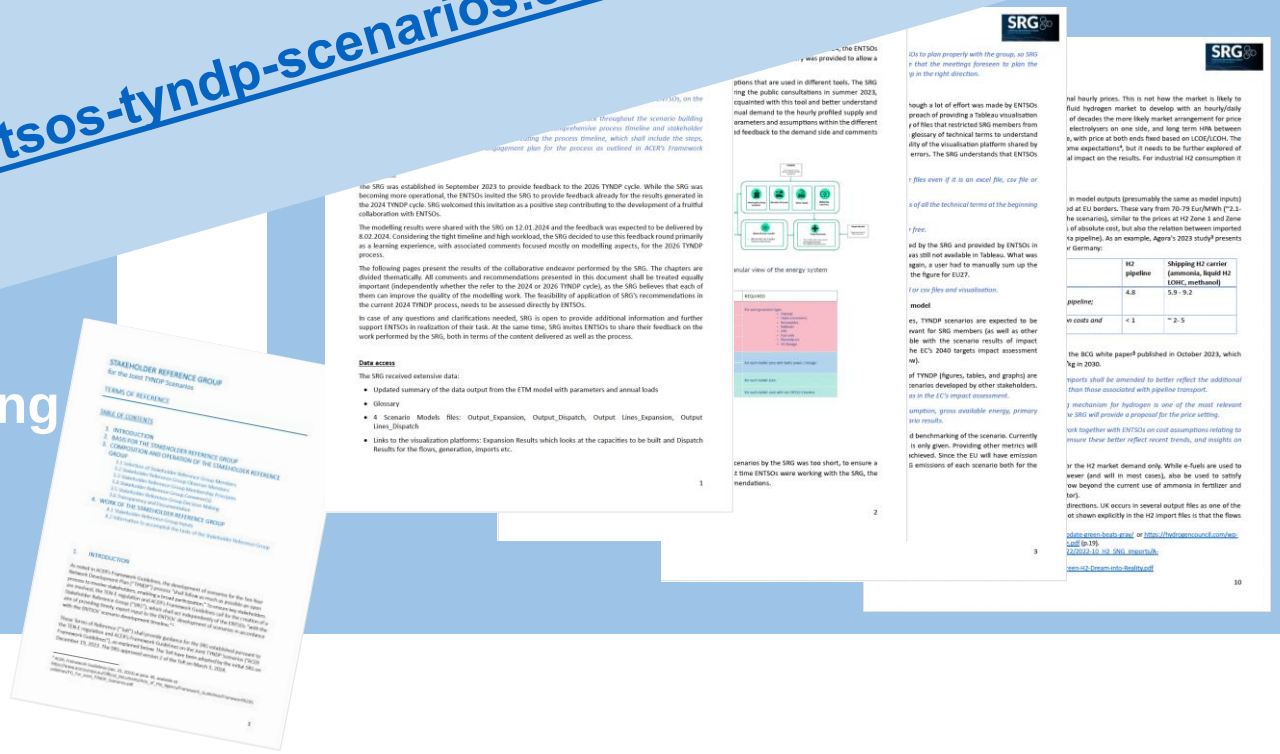
SRG's tasks and activities

Governance & Management

- Selection of convenors and vice convenors
- Putting in place Terms
- Org meet
- Mana SRG M bers and observers (ENTSOs, EC, ACER, ESABCC)

Content – rol

See more at: https://www.entsos-tyndp-scenarios.eu/stakeholder-involvement/



SRG's first results

On Feb 9th 2024, the SRG delivered 36 recommendations to the ENTSOs building on the preliminary scenario results. 12 recommendations were in regards of the 2024 results.

Nr.	Topic	Number of recommendations
1	Timeline	1
2	Quality of provided files and visualisation	2-5
3	Comparability with European Commission's scenarios and output model	6-7
4	Transparency and availability of modelling assumptions and methodologies	8
5	Accessibility	9
6	Modelling approach	1-12
7	Demand	13-21
8	Hydrogen	22-26
9	Wind energy	27
10	Electricity production	28
11	Demand response	29-30
12	Batteries and EV´s	31-32
13	District heating	33-34
14	CO2 supply	35
15	PEMDB (Pan-European Modelling Database)	36

Topics under scrutiny in WGs

These topics further deepened in 4 working groups:

WG 1	WG 2
- High-level observations + review of the process - Timeline of the TYNDP/SRG processes - Roadmap document (innovations in scenarios) - Scenario Storylines - Modelling methodology + model features - Climate change impacts	- Demand Residential (incl. district heating) - Demand Non-Residential - Demand – industry - Transport (incl. electrification)
WG 3	**WG 4**
- Hydrogen (import, pricing), ammonia & e-fuels - Development of generation - Offshore wind & grids - Flexibility (incl. demand-side response and EV batteries) - Storage (gases, thermal, battery) - Commodity prices	- Carbon dioxide removal - GHG emissions + Carbon budgets

Key takeaways

Consisting of 23 members with diversified background and knowledge, the SRG is a relatively new body within the TYNDP process, however, fully operational and fulfilling its responsibilities.

The SRG delivered relevant feedback already to the 2024 TYNDP results and actively contributes to activities related to the TYNDP 2026 cycle.

Very intense, but fruitful and constructive collaboration with the process owners (ENTSOs) and with the organisations, that the SRG mandate comes from (ACER & EC).

The SRG functioning proves the importance of transparency, stakeholder scrutiny and participatory approaches within the TYNDP process (see also: ESABCC's Recommendation no. 3).

The convenors of the SRG

Dr. Andrzej Ceglarz
Director – Energy Systems
Renewables Grid Initiative (RGI)

Co-Convenor SRG

Eva Hennig
Head of Brussels Office
Thüga AG

Co-Convenor SRG

Dr. Vasiliki Klonari
Head of Energy System Integration at WindEurope

Vice-Co-Convenor SRG

Bram Clayes
Senior Advisor at Regulatory Assistance Project (RAP)

Vice-Co-Convenor SRG

The work performed in working groups is full on so stay tuned!

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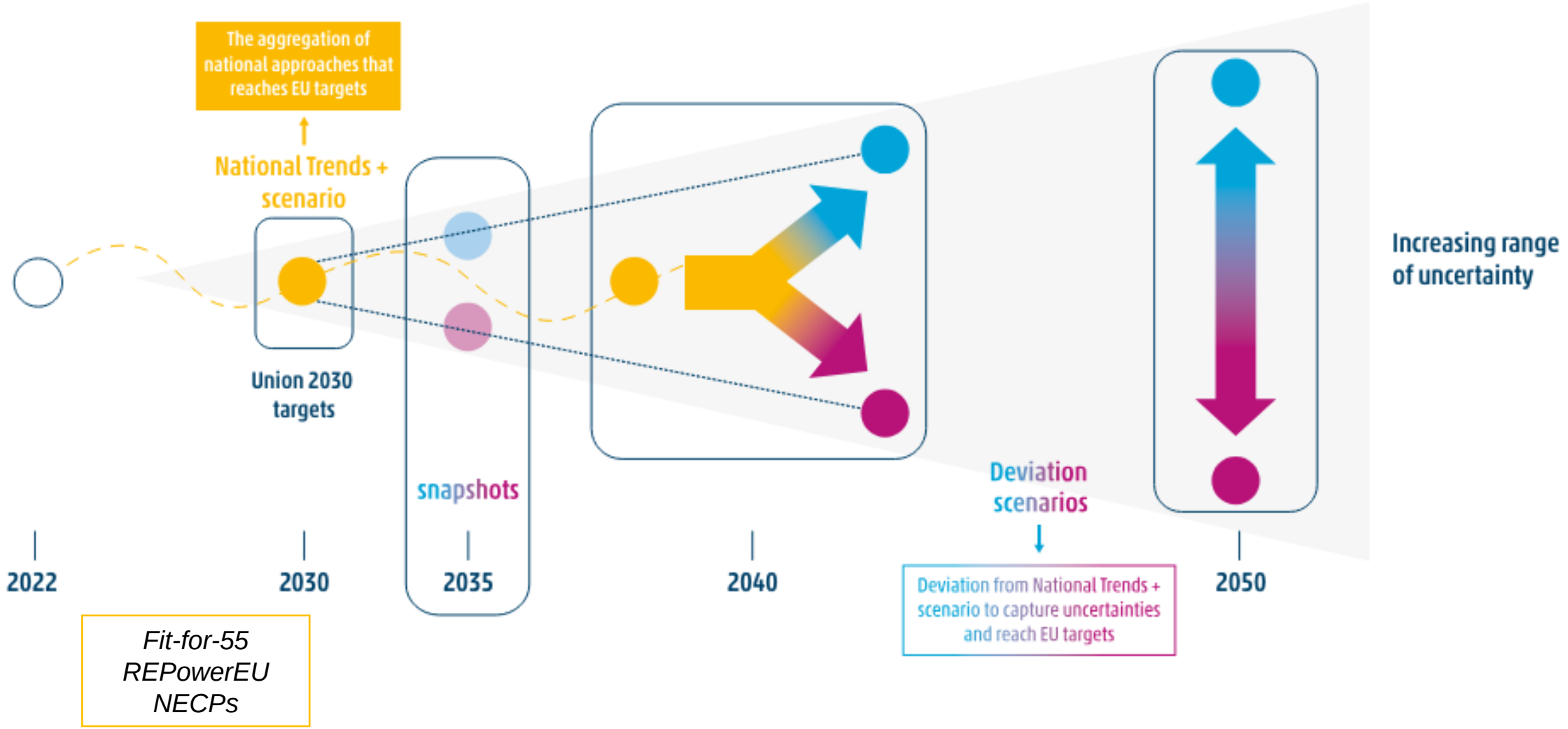
TYNDP 2024 scenarios strategy and target alignment

Alexander Kättlitz, Scenario Subject Manager, ENTSOG
Nalan Buyuk, Scenario Building Project Manager, ENTSO-E
5 minutes

TYNDP 2024 scenario strategy



Alignment TYNDP 2024 scenario with ACERs Framework Guideline

Elements added to the 2024 scenario cycle to ensure compliance:

- National Energy and Climate Plans (NECPs), whose drafts are due by 30 June 2023, are considered in the scenario preparation to the extent possible
- Intermediate update to all parties involved about the innovations to be implemented in the 2024 cycle
- Development and publication of the 2035 scenario time-horizon (snapshot)
- Launching call for setting the Stakeholder Reference Group ('SRG') within 3 months after the adoption of these Guidelines
- Engagement with SRG on
  - Feedback on the TYNDP 2024 scenario results
  - Start of the discussion on how to expand scenarios to take into account "low"-economy and "high"-economy given that it has never been selected as a primary driver before

The TYNDP 2024 scenarios align with the energy efficiency first principle, the EU's 2030 energy and climate targets, its 2050 climate neutrality objective

Scenarios captures NECPs and latest national policies *(Q1 2023, for offshore August 2023)*
Take into account the latest Commission Scenarios *(Fit for 55 & REPowerEU)*
Extensive stakeholder engagement on the inputs and methodologies & enhanced transparency

Energy Efficiency First and Union's 2030 targets for energy

- ✓ EE1st 11.7% reduction (compared to 1990),
  - ✓ FEC – 763 Mtoe (aligns with binding target)
  - ❖ PEC – 1013.9 Mtoe (indicative target 992.5 Mtoe)
- ✓ Up to 45.4% RES share in GFEC
- ✓ 55% GHG reduction (compared to 1990)
- ✓ Offshore targets (Latest MS non-binding agreements – August 2023)

Climate and its 2050 climate neutrality objective

- ✓ Net-zero emissions in 2050
- ✓ Offshore targets (Latest MS non-binding agreements – August 2023)

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TYNDP 2024 Modelling Methodologies

Laura Lopez, Modelling Lead, REE (*online*)
Dante Powell, Innovation Lead, ENTSOG (*online*)
5 minutes

Overview of 2024 Innovations

1 Hydrogen Modelling

H_2 zones modelled considering a market and dedicated production.
Domestic production of synthetic fuels.
Explicit hydrogen to power modelling

2 EV Modelling

Improvement of 2022 scenarios.
Transport modelling includes demand side shifting and Vehicle to grid.

3 Offshore Modelling (*)

Hub modelling wind farms, electricity grid, hydrogen pipelines and electrolysers.
Hubs interconnect with each other and mainland Europe.

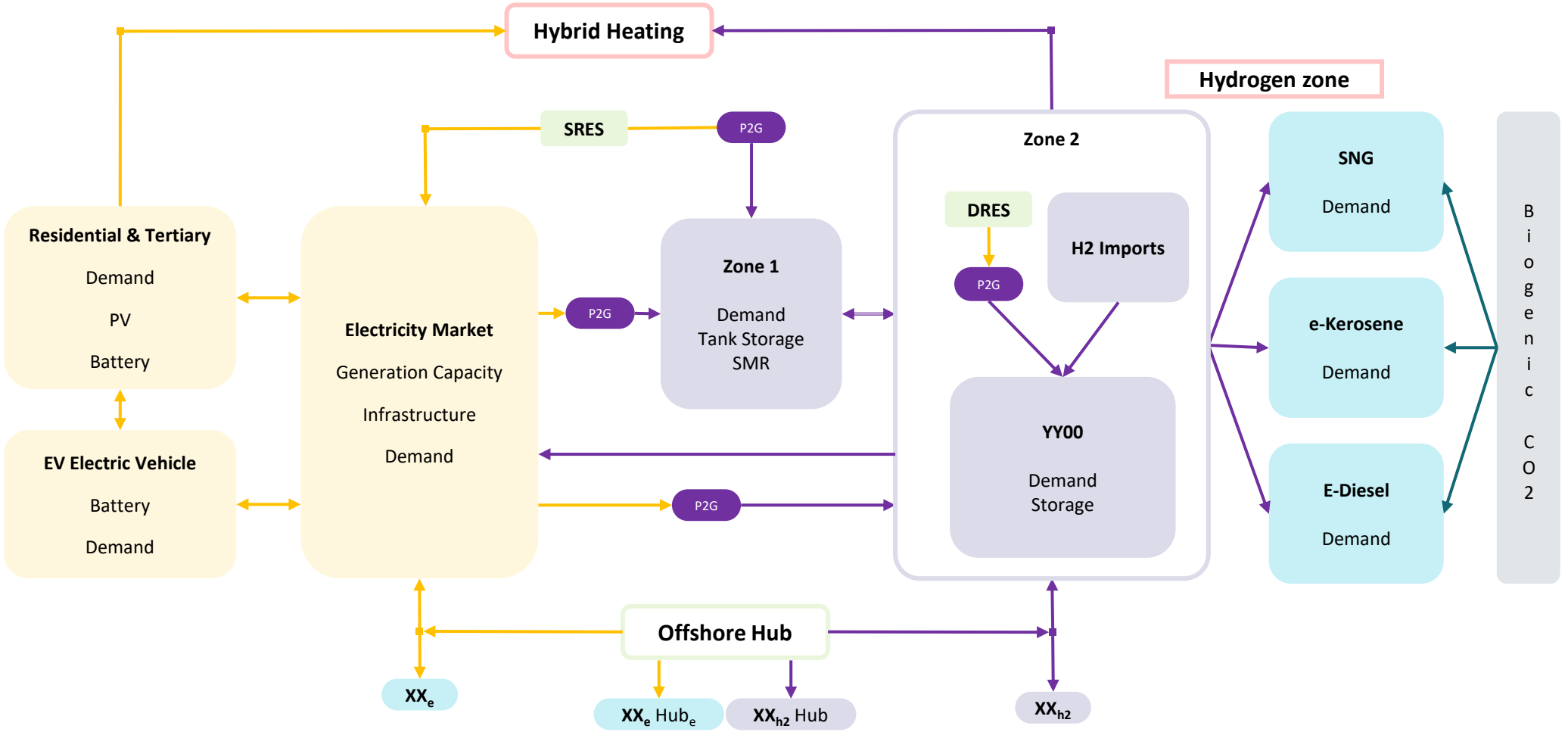
4 Heat Modelling

Hybrid heat pumps as heating that use energy produced by three carriers (electricity, hydrogen and methane).

5 Expansion Modelling

New approach that enhances run times over previous cycle, and allows for a larger model to be run

2024 Modelling Methodologies



Modelling Methodologies After Public Consultation

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Q&A

Participants can join at **slido.com** with code **#2733380**
10 minutes

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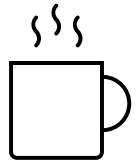
Scenario Building

Coffee Break



20 minutes

TYNDP
Scenario Building

2024 TYNDP scenarios: demand and supply figures

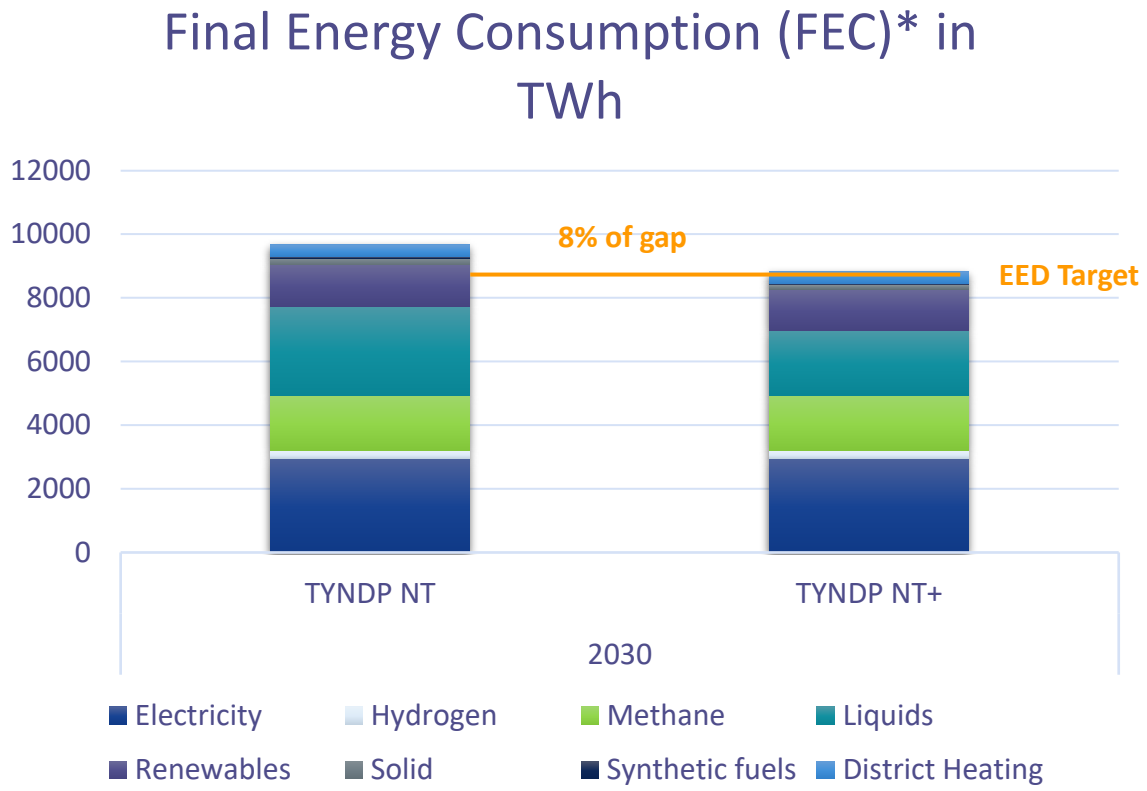
Nalan Buyuk, Scenario Building Project Manager, ENTSO-E
Alexander Kättlitz, Scenario Building Project Manager, ENTSOG
10 minutes

The National Trends (+) scenario built based on TSOs input according to the NECP and latest national policies

A binding final energy demand (FEC*) binding **target of 8,873 TWh in 2030 at EU27 level** – in line with the EED agreement reached in Mar 23.

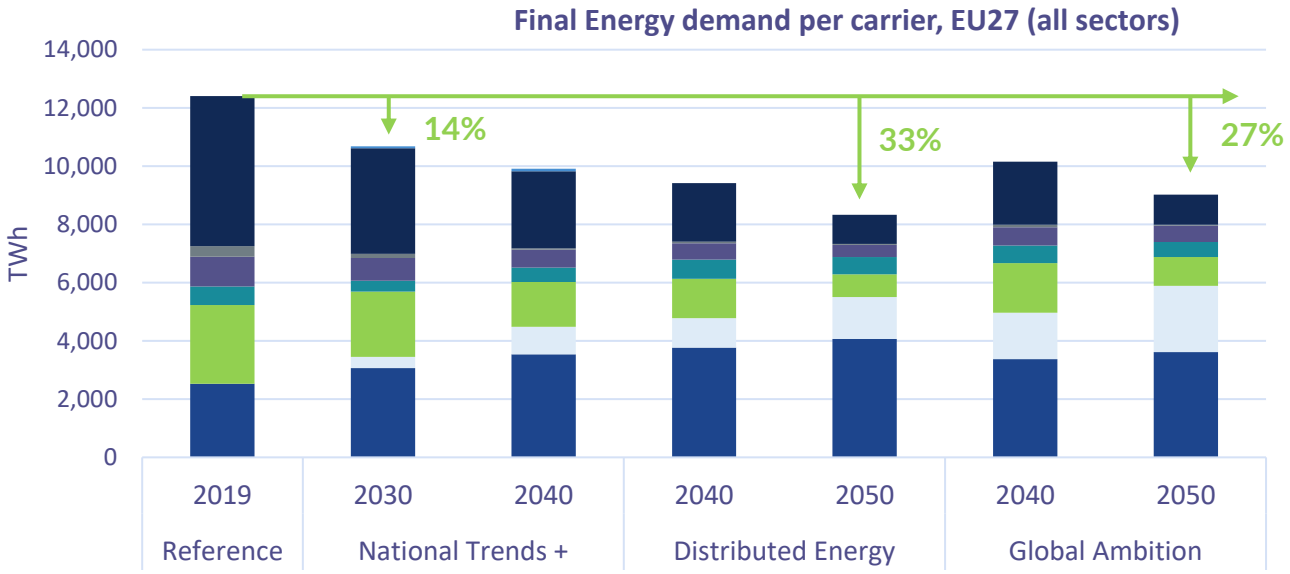
NECP-based data was **collected from electricity and gas TSOs** and spanned a variety of economic sectors and energy carriers. Results of the joint collection reflects **an overall overshoot of 8% (818 TWh).**

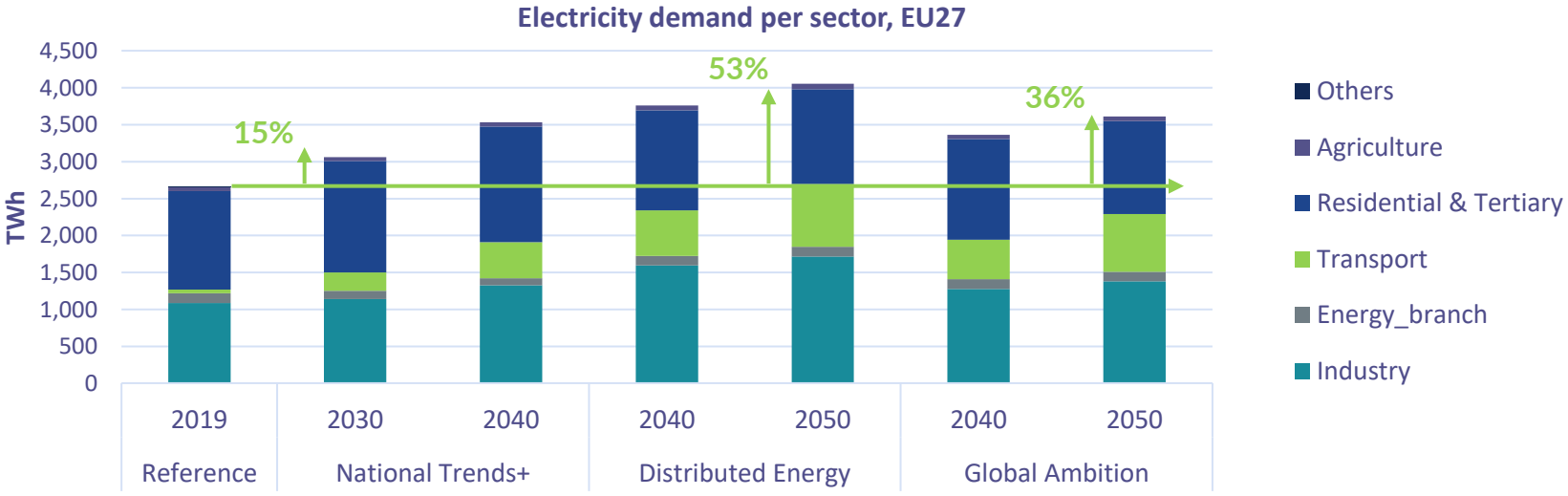
In this context, a gap closing methodology is developed to **further reduce the demand for highly-polluting fuels** (solids, crude) proportional to the country- and fuel-specific numbers. This methodology is consulted during July 2023. The majority of stakeholders found the methodology fair and pragmatic.



*FEC = all energy supplied to industry, transport (incl. international aviation), households, services, agriculture & forestry and other end-users. Excludes international shipping, ambient heat, non-energy use and energy branch. TYNDP analysis follows the same approach as the regulation, additionally part of energy branch is included (as some are reported under industry)

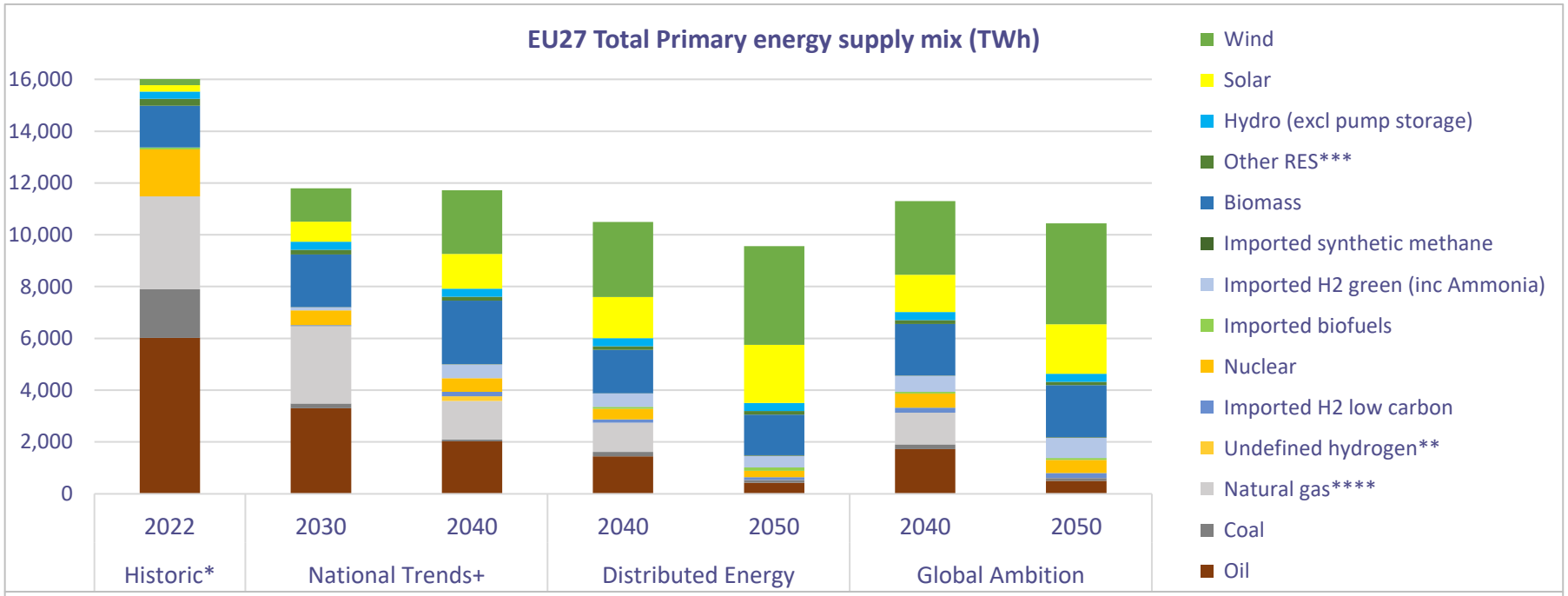
Energy efficiency is key step to achieve the EU Climate and Energy objectives

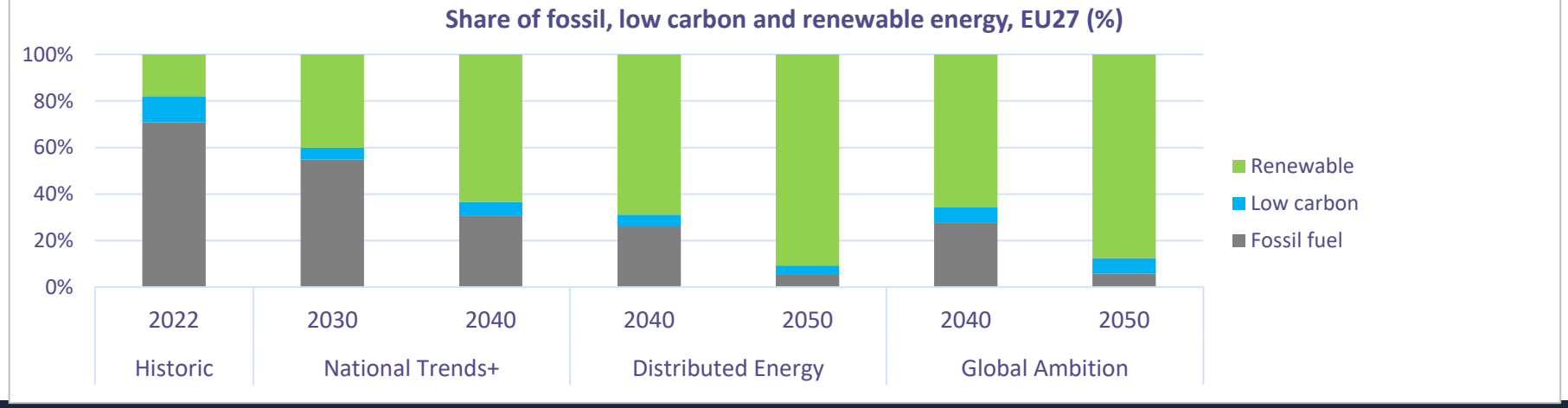




- ✓ Increase in direct electricity is most energy efficient solution to achieve EU's energy and climate targets.
- ✓ Active participation of end consumers through behavioural adaptation
- ✓ Continued improvement of existing technology options and emerging technologies
- ✓ Sector integration, further integration of the H2 system

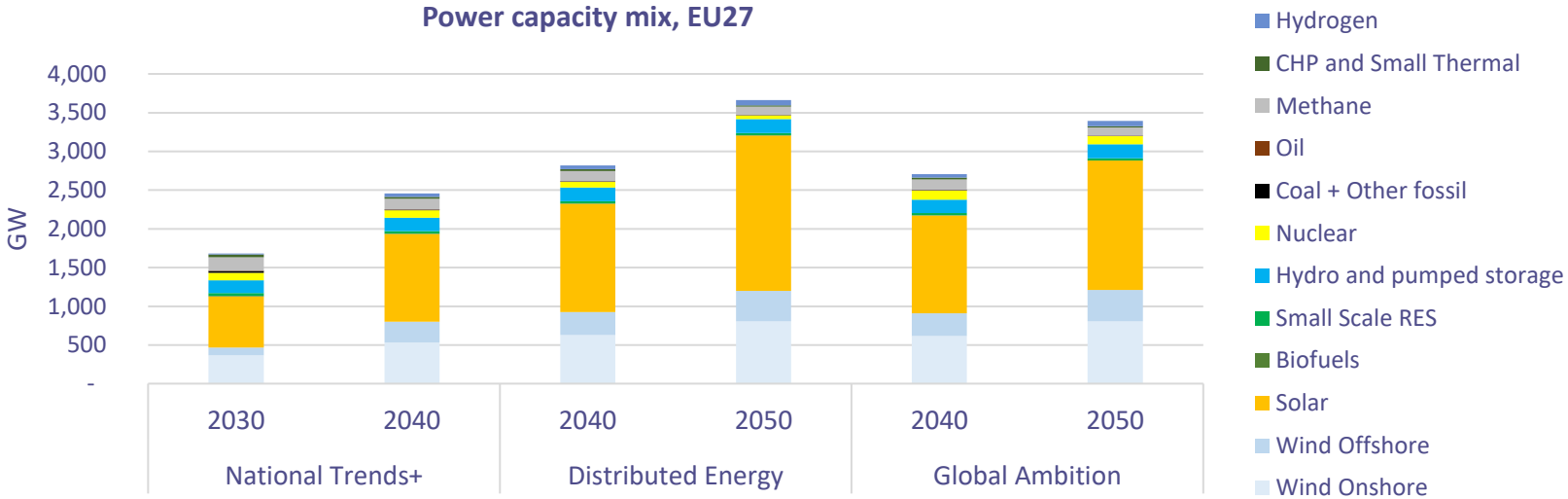
Ambitious development of renewable energy across Europe

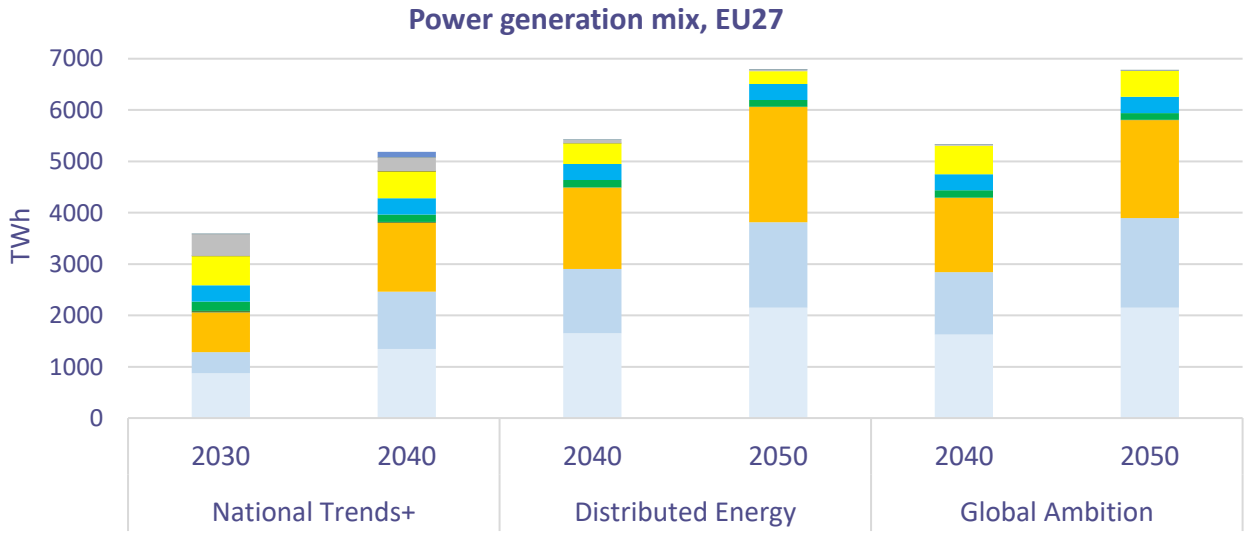




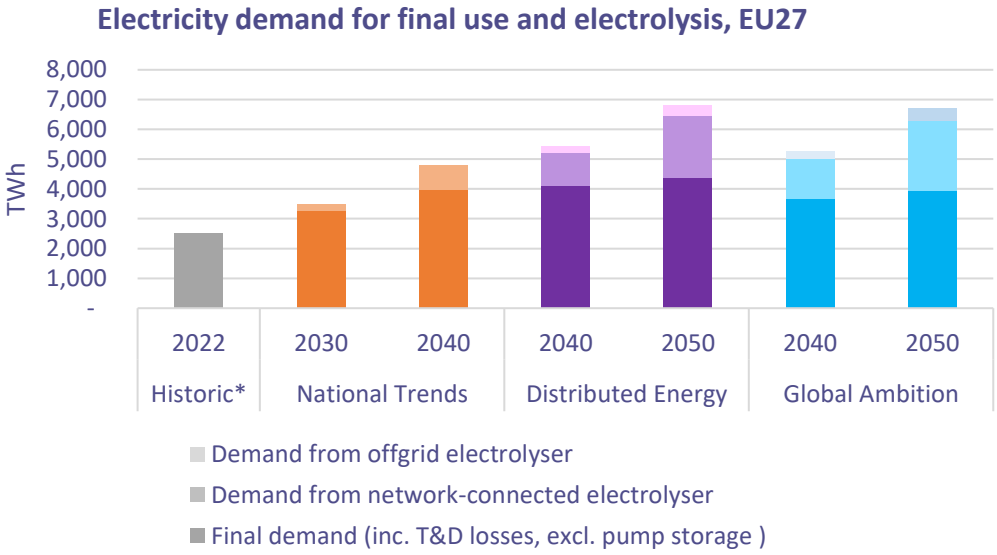
- ✓ Solar and wind generation witness remarkable growth, reaching threefold by 2030 and approximately ninefold by 2050 in the envisioned scenarios
- ✓ Natural gas supply phased out by 2050
- ✓ Low carbon sources like nuclear and blue hydrogen supply also contribute to decarbonise the energy system

By 2050, wind and solar contributing 86% - 89% to power generation, supplemented by other renewables and low carbon sources



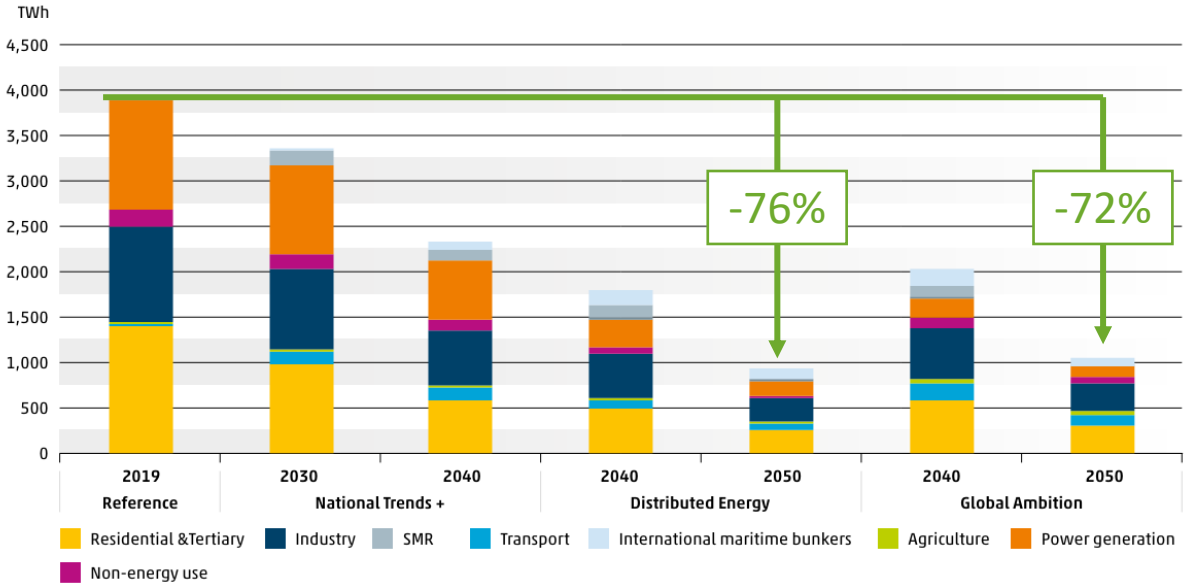


- ✓ By 2050, the electricity required for electrolysis is expected to represent nearly one-third of the total electricity demand
- ✓ By 2040, renewables are projected to supply around 99,3-99,8% of the electricity supply



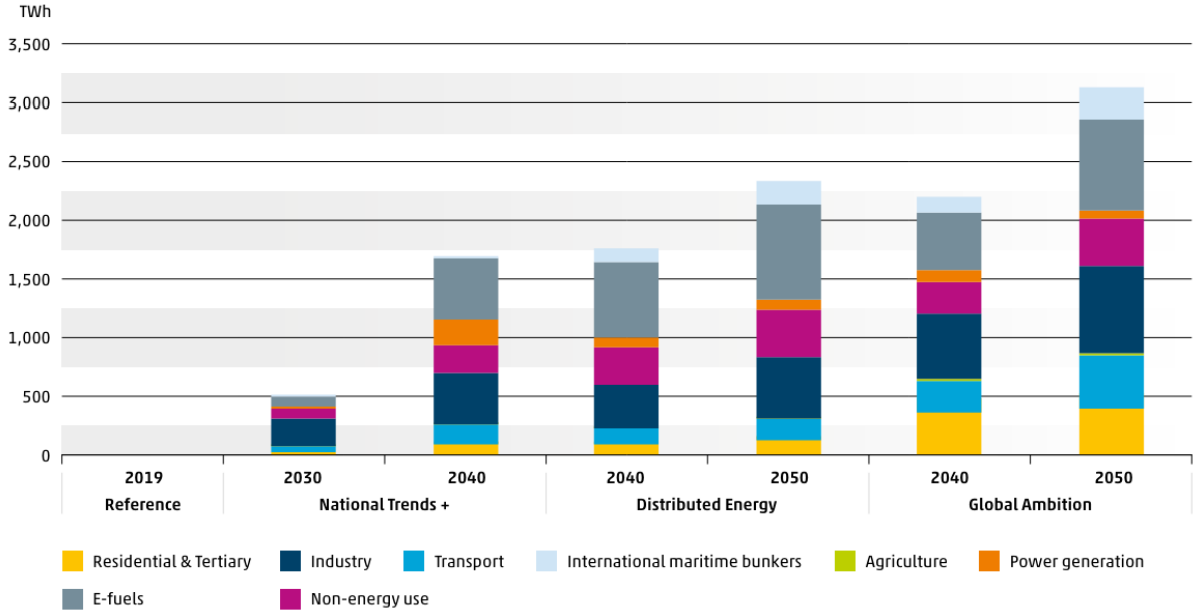
The role of methane and hydrogen is crucial in the energy transition scenarios

Methane demand per sector, EU27 (TWh)



- ✓ Up to 2030, a slight decrease in methane demand is anticipated, followed by a more pronounced decline thereafter
- ✓ In deviation scenarios, methane demand primarily relies on final uses, including non-energy applications

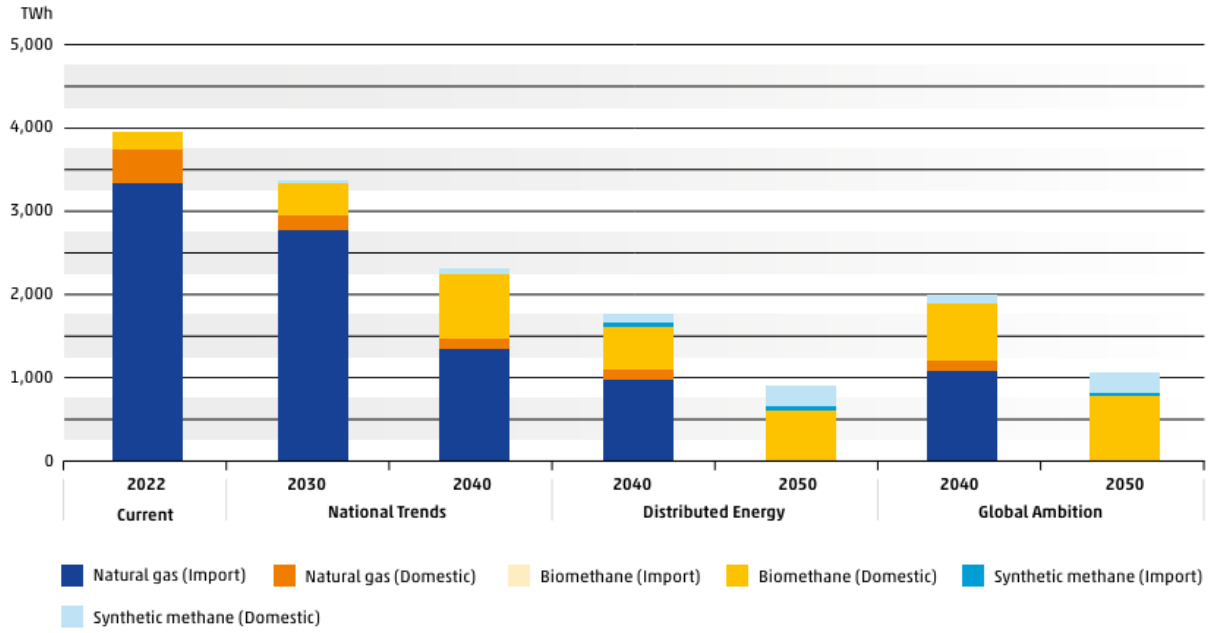
Hydrogen demand per sector, EU27 (TWh)



- ✓ The National Trends scenario foresees in 2030 an increase in the hydrogen demand, notably in the transport sector
- ✓ The deviation scenarios show in the long-term a broader use of hydrogen across the sectors

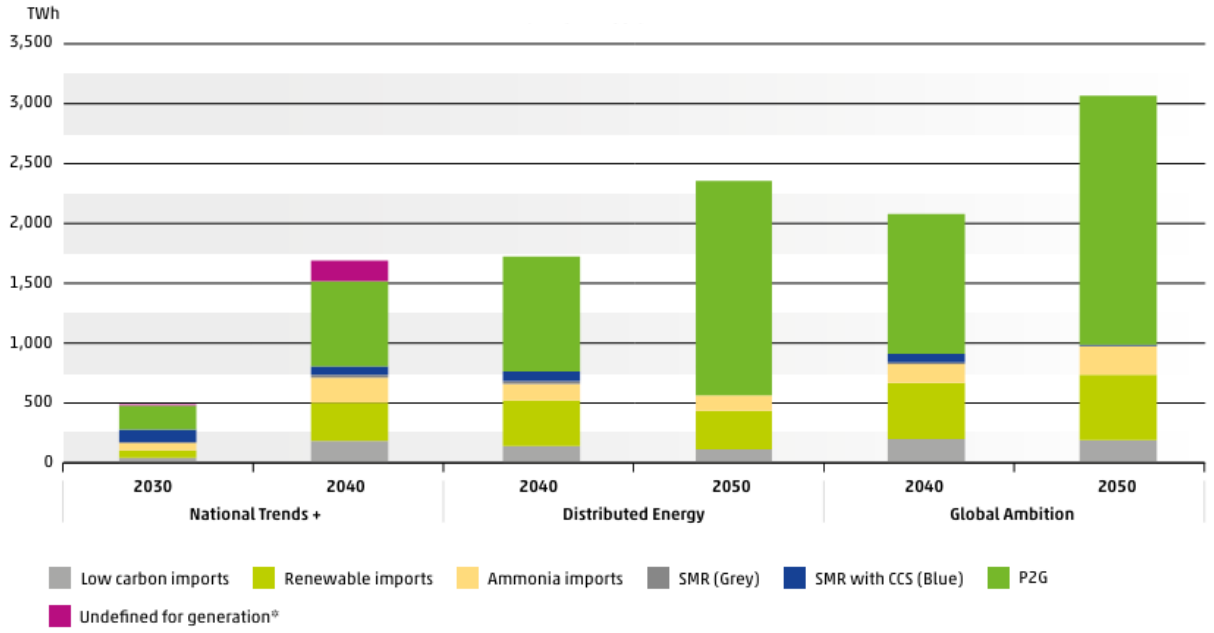
The EU methane and hydrogen production can decarbonise by 2050 to ensure a competitive, resilient, and reliable energy system

Methane supply, EU27 (TWh)



- ✓ Biomethane plays a major role in the decarbonisation of the methane supply, and it is the main source of decarbonization of the methane supply in both deviation scenarios
- ✓ Synthetic methane is the key to complement the supply needs and reach carbon neutrality by 2050
- ✓ Natural gas import levels are reduced to zero by 2050

Hydrogen supply, EU27 (TWh)



- ✓ Today the EU-27 hydrogen supply is a domestic production of about 250 TWh, mainly used as a feedstock
- ✓ National Trends considers an uptake of hydrogen production already in 2030
- ✓ Deviation scenarios: the key role of hydrogen to decarbonise the energy system

TYNDP
Scenario Building

Q&A

Participants can join at **slido.com** with code **#2733380**
10 minutes

TYNDP
Scenario Building

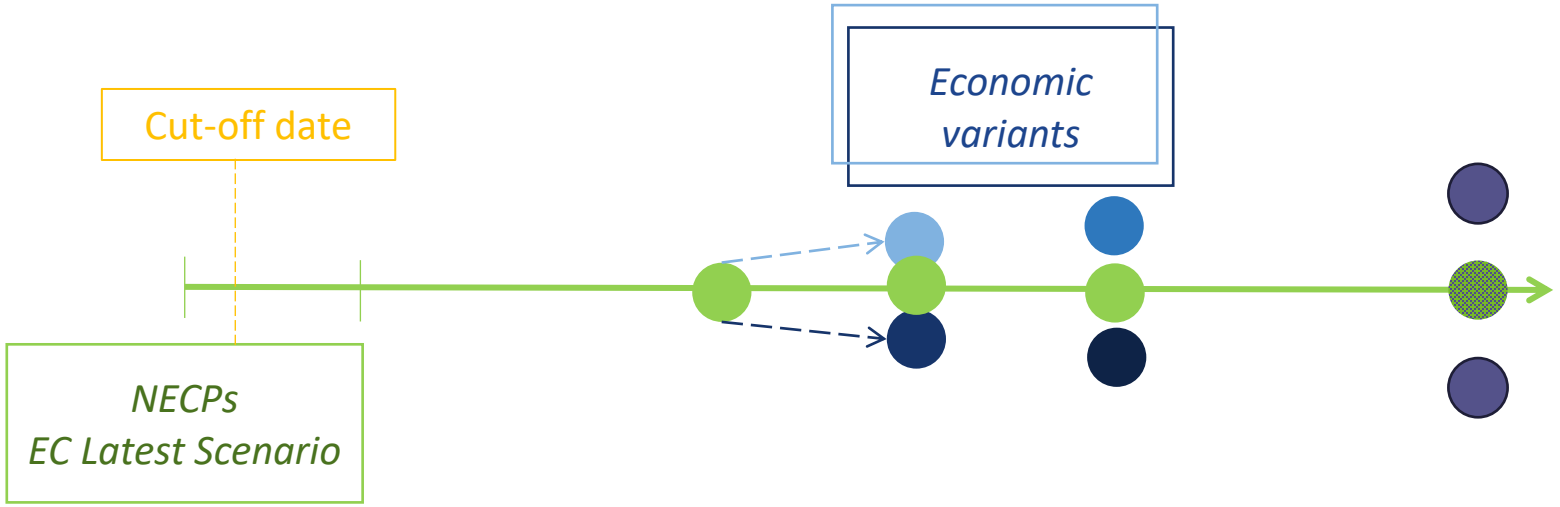
Framework for 2026 TYNDP scenario cycle & next steps

Alexander Kättlitz, Scenario Subject Manager, ENTSOG
Nalan Buyuk, Scenario Building Project Manager, ENTSO-E
15 minutes

TYNDP 2026 Scenarios Framework

Bottom up and detailed central scenario (National Trends+) reflecting latest updated national strategies*

** where they are outdated bring them in line with the latest policies and technology cost developments*



Economy variants scenarios

- ✓ *Deviates from the NT+ scenario in a balanced way (e.g. high and low)*
- ✓ *Aligns with European targets*
- ❖ *Decision to be made on parameters & differentiation*

Include to demonstrate the net-zero compliancy

- ❖ *Decision to be made on the methodology for developing central scenario in 2050 horizon*

TYNDP 2026 Scenarios Framework

- ✓ In March 2024, analysis of the scenarios' framework carried out to ensure alignment with the Framework Guidelines
- ✓ In May 2024, possible options have been discussed with SRG, EC and ACER
- ✓ In June 2024, ENTSOs concluded on the option that can be considered as compliant with the Guideline

More policy-driven and goal-oriented scenarios → **The differentiation between variants are less significant**

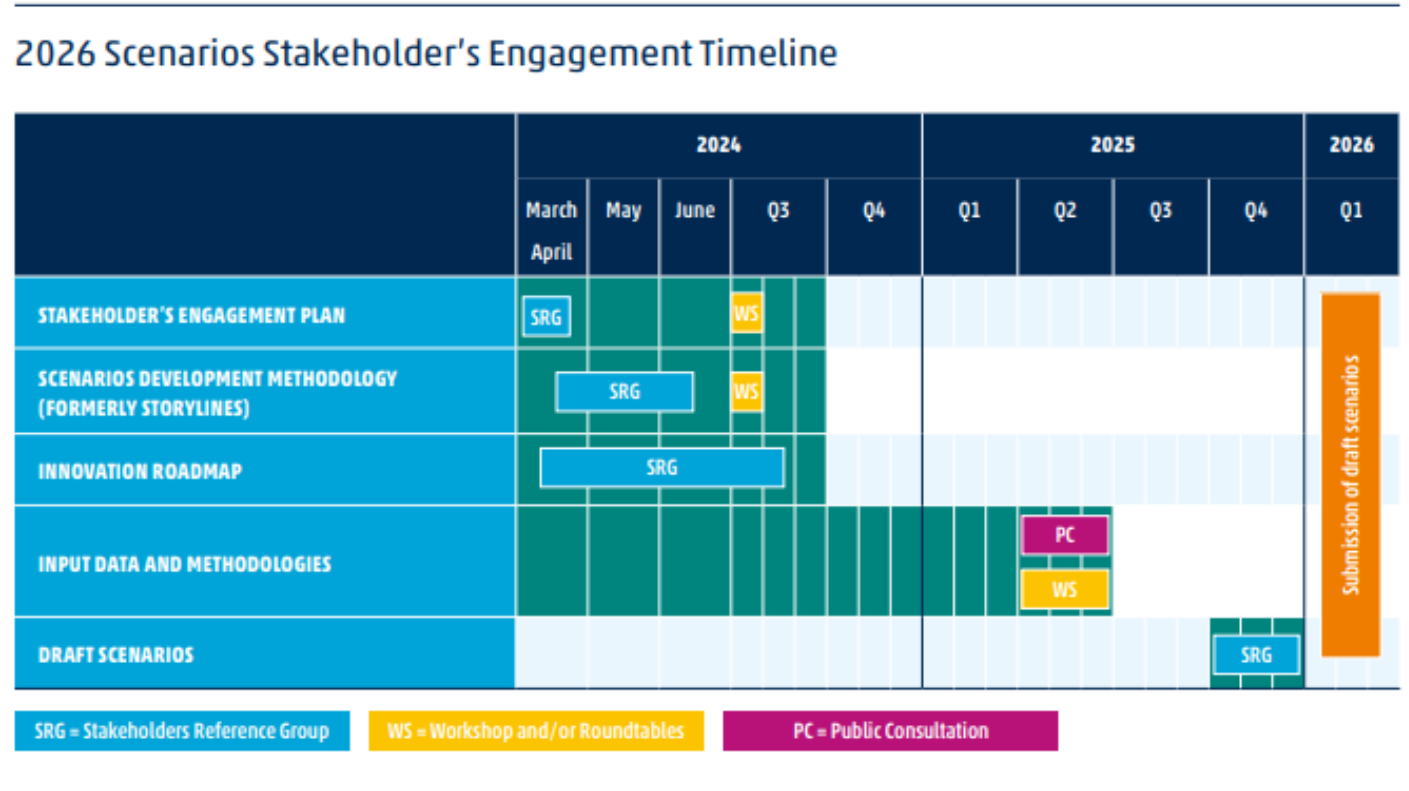
Development of scenarios within the timeframe as indicated in Guideline → **Less complex way to develop variant scenarios**
Limited room for further innovations

TYNDP 2026 timeline and engagement opportunities

Stakeholder engagement plan available online at 2026.entsos-tyndp-scenarios.eu

-> More detailed timeline & calendar of public webinars coming up soon

! Mark your agendas: public consultation on input parameters and methodologies in May-June 2025



TYNDP
Scenario Building

Q&A

Participants can join at **slido.com** with code **#2733380**
10 minutes

TYNDP
Scenario Building

ENNOH involvement in the scenario building process

Abel Enríquez (pre-ENNOH)
10 minutes

(PRE-)

Workshop ENTSOG / ENTSO-E Closing of the 2024 and Kick-off of the 2026 TYNDP Scenarios Cycle

Brussels

4 July

ENNOH Foundational Process (1/2)

ENNOH
960 followers
2w • Edited •

🌍 A new important milestone for ENNOH! 🌍

Today marks a significant step in shaping Europe's energy future. 37 infrastructure companies from across the EU met in Brussels. Our goal? To finalise the agreements for setting up the European Network of Network Operators for Hydrogen (ENNOH).

🤝 In a landmark meeting with EU Energy Commissioner Kadri Simson, we handed over the agreements reached between the companies in line with the Hydrogen and Decarbonised Gas Market Package. This pivotal moment follows six months of intense collaboration among future Hydrogen Transmission Network Operators (HTNOs).

ACER and the European Commission will soon start reviewing the ENNOH deliverables. For the operators, the focus now shifts towards creating an ambitious Work Programme for the coming period before ENNOH is formally established. Collaborating with **ENTSO-E**, **ENTSOG**, the **EU DSO Entity**, and other stakeholders, we are looking forward to tackling our initial tasks in 2025.

For more insights and updates as we progress, stay tuned or contact us at **info@ennoh.eu**.

ENNOH Foundational Process (2/2)

ENNOH
960 followers
5d • Edited •

🌟 (pre)ENNOH at the 10th Energy Infrastructure Forum! 🌟

Today, at the 10th Energy Infrastructure Forum, ENNOH Moderator Pieter van Artsen intervened at the High-level session titled "A fast-track to EU's net zero energy infrastructure."

This high-level session, moderated by DDG Mechthild Wörsdörfer, featured distinguished speakers such as the EU Energy Commissioner, the Director of the Danish Agency, and high-level representatives from **CINEA - European Climate, Infrastructure and Environment Executive Agency EU Agency for the Cooperation of Energy Regulators (ACER) ENTSO-E ENTSOG EU DSO Entity** and the **European Investment Bank (EIB)**

During his speech, Pieter van Artsen elaborated on:
📍 Preparing ENNOH: 37 (future HTNOs) have been working since January on an inclusive and dynamic foundational process. A political agreement on the main principles was reached last week, and a handover ceremony with the Commissioner was organised.
📍 Towards ENNOH foundation: The future HTNOs will hand over the draft articles of the association, the draft rules of procedure (including the rules of procedure for consulting stakeholders), and the draft list of members to ACER, and the European Commission for their opinion, before September 1st as required by the Hydrogen and Gas decarbonised Market Package.
📍 Building tomorrow's Hydrogen Market: He referred to the ongoing efforts to provide additional certainty through ENNOH deliverables, as part of creating the EU Hydrogen market.
📍 ENNOH next steps: The future ENNOH members will take the next steps after the summer to start the preparatory work and building the team to deliver on ENNOH tasks planned for the coming years. Collaboration between ENNOH and existing entities (ENTSO-E, ENTSOG, and EU DSO Entity), and the involvement of stakeholders, will be essential.

Many thanks to the European Commission for the invitation to participate.

TYNDP Process - Role of ENNOH

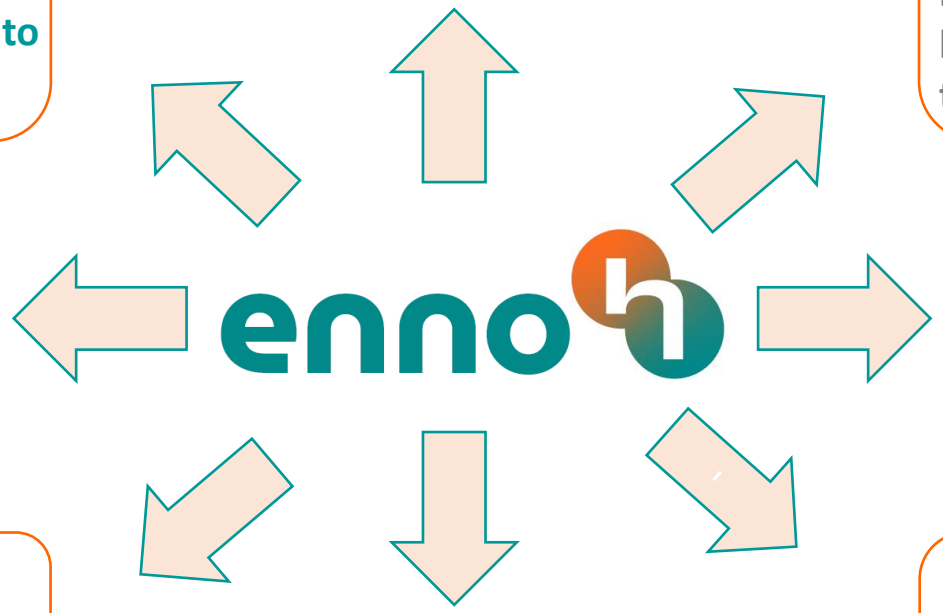
According to EU **Hydrogen and Gas Decarbonised Market Package**

ENNOH cooperation with ENTSOG and ENTSOE will be crucial for the whole TYNDP process
→ may set up common WGs to prepare deliverables

ENNOH should participate in the development of draft single sector methodology for the ESW CBA

ENNOH to work on the interlinked energy market and the network model electricity, including natural gas and hydrogen transport infrastructure as well as natural gas storage, hydrogen storage, LNG and hydrogen terminals and electrolysers

ENNOH shall submit the draft TYNDP to ACER; ENNOH will duly take ACER's opinion and recommendations into account.



ENNOH to work on
- Joint Scenarios for the TYNDP
- Infrastructure gaps identification report
- European supply adequacy outlook

Contributions from stakeholders are essential. ENNOH to set up an effective consultation process

ENNOH to develop TYNDP 2028 (without ENTSOG support)

Until the 1st of Jan 2027, ENTSOG will develop the 2026 TYNDP; ENTSOG to involve H_2 stakeholders and ENNOH asap. TYNDP 2026 to have two chapters: one for gas, one for H_2.

(PRE-)

Workshop ENTSOG / ENTSO-E Closing of the 2024 and Kick-off of the 2026 TYNDP Scenarios Cycle

Brussels

4 July

TYNDP
Scenario Building

Morning session closing remarks

Alan Croes, Scenario Steering Group Convenor from ENTSO-E, TenneT
5 minutes

TYNDP
Scenario Building

Lunch Break

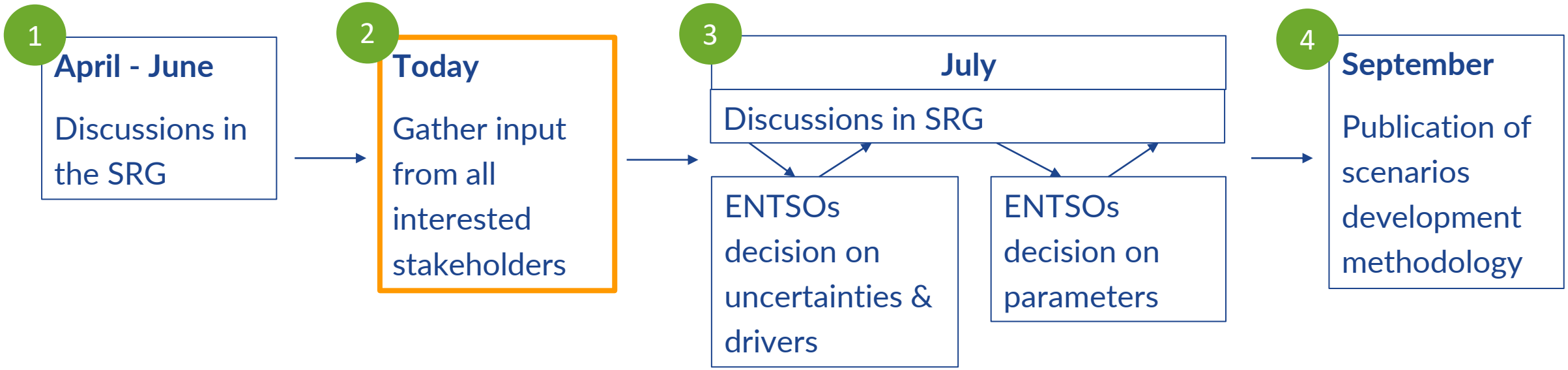
65 minutes

TYNDP
Scenario Building

Building economic variants: objectives

Alexander Kättlitz, Scenario Subject Manager, ENTSOG
Nalan Buyuk, Scenario Building Project Manager, ENTSO-E
5 minutes

Process for the development of the economic variants methodology

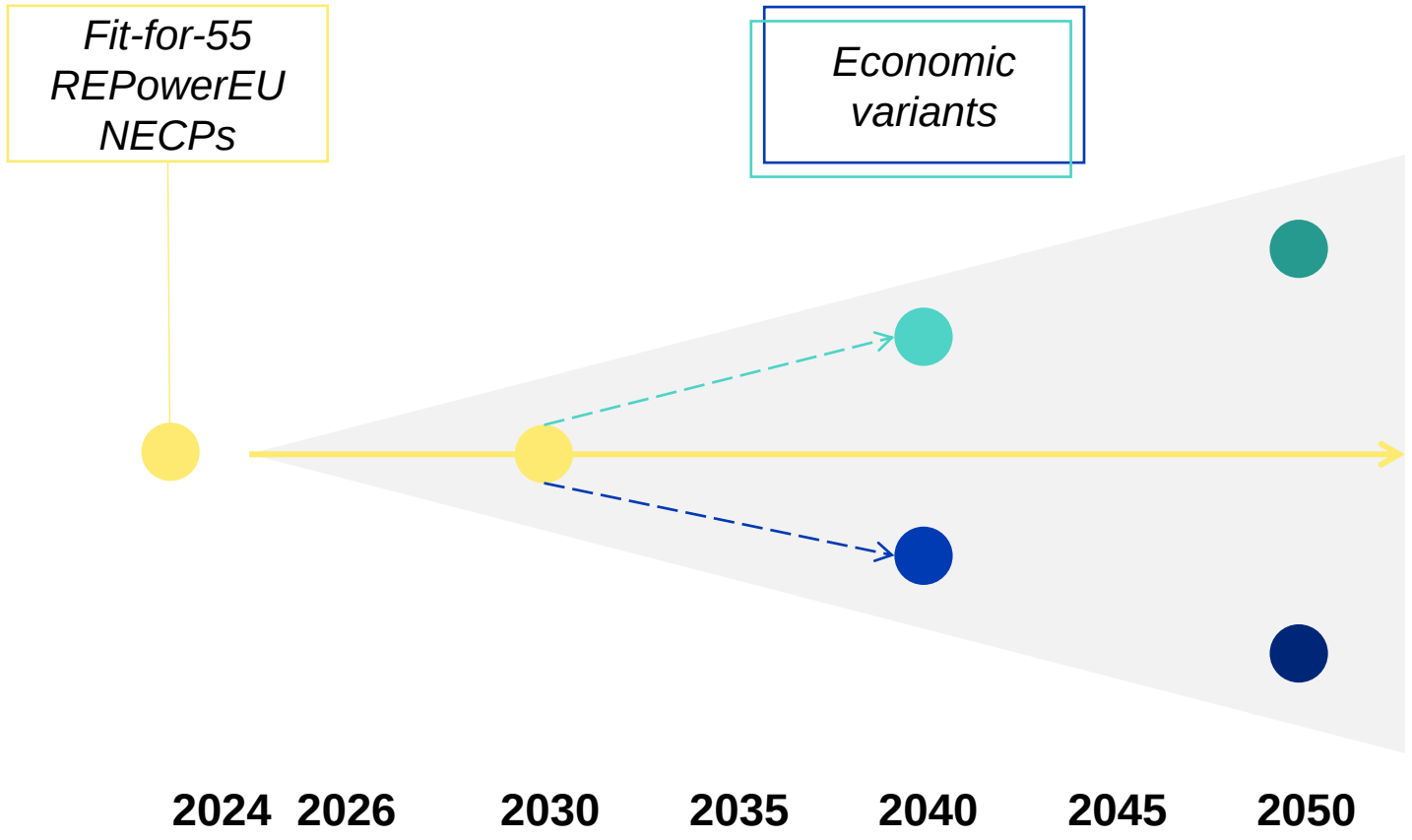


TYNDP
Scenario Building

Building economic variants: ACER views

Kristy Louise Rhades (ACER) - *online*
10 minutes

What is the mindset behind **1 central scenario** and **2 economic variants**?



- Aggregation of national approaches that reach EU objectives (Fit-for-55, REPowerEU, NECPs) set the target.
- Increasing range of uncertainty over time.
- Deviations from central scenario to capture uncertainties (high/low economic variants).
- Relatability of economic variants to EU targets.
- Variants are stress tests of the central scenario and offer additional information but should not be considered a stand-alone product.

TYNDP
Scenario Building

Building economic variants: SRG views

Andrzej Ceglarz (SRG Co-Convenor)
10 minutes

SRG

STAKEHOLDER REFERENCE GROUP
FOR THE TYNDP SCENARIOS

Andrzej Ceglarz, SRG co-convenor (Renewables Grid Initiative)

Insights from the SRG's work on economic variants

Workshop: Closing of the 2024 and Kick-off of the 2026 TYNDP Scenarios Cycle

Brussels, 04.07.2024

Background behind economic variants

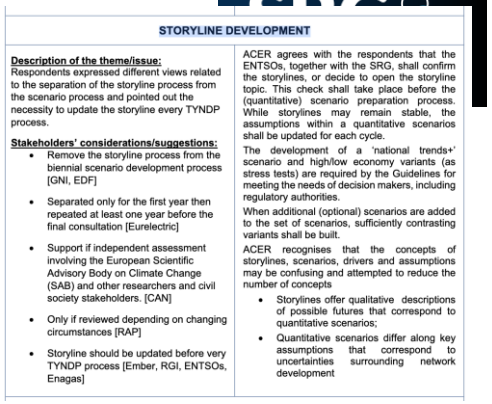
Oct/Nov 2022

Topic included in the ACER Framework Scenario Guidelines shared for public consultation

Jan 2023

(37) The set of mid-term and long-term scenarios shall include **the best-estimate central scenario**, based on NECPs, and **contrasting "low"-economy and "high"-economy variants** that serve as stress-tests of the central scenario. The Agency finds that stress-testing network development along the dimension of **a more conservative ('low') and a more optimistic ('high') view** on the economy resonates with decision makers.

(38) For the mid-term and long-term time horizons, the ENTSOs **can propose additional scenarios**. Before including such additional scenarios, **the ENTSOs shall consult stakeholders on the key uncertainties** concerning network development and the choice of corresponding storylines. Thereafter, **the ENTSOs, together with the SRG**, shall confirm the storylines before each cycle, or decide to re-open the storyline topic (as per recital (21)). If additional scenarios are added to the set, a sufficient spectrum of contrasting scenario variants shall be included to ensure the set of scenarios remains balanced. The included variants should be adequately differentiated and contrasted already from the year considered for the mid-term horizon (i.e. after the short term single scenario year(s)).



STORYLINE DEVELOPMENT

Description of the theme/issue:
Respondents expressed different views related to the separation of the storyline process from the scenario process and pointed out the necessity to update the storyline every TYNDP process.

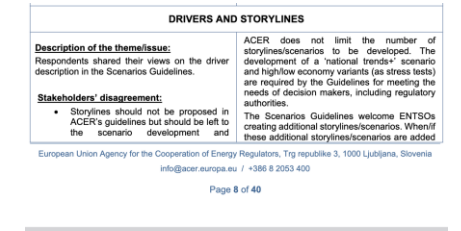
Stakeholders' considerations/suggestions:
- Remove the storyline process from the biennial scenario development process [GNI, EDF]
- Separated only for the first year then repeated at least one year before the final consultation [Eurelectric]
- Support if independent assessment involving the European Scientific Advisory Body on Climate Change (SAB) and other researchers and civil society stakeholders. [CAN]
- Only if reviewed depending on changing circumstances [RAP]
- Storyline should be updated before very TYNDP process [Ember, RGI, ENTSOs, Enagas]

ACER agrees with the respondents that the ENTSOs, together with the SRG, shall confirm the storylines, or decide to open the storyline topic. This check shall take place before the (quantitative) scenario preparation process. While storylines may remain stable, the assumptions within a quantitative scenarios shall be updated for each cycle.

The development of a 'national trends+' scenario and high/low economy variants (as stress tests) are required by the Guidelines for meeting the needs of decision makers, including regulatory authorities.

When additional (optional) scenarios are added to the set of scenarios, sufficiently contrasting variants shall be built.

ACER recognises that the concepts of storylines, scenarios, drivers and assumptions may be confusing and attempted to reduce the number of concepts
- Storylines offer qualitative descriptions of possible futures that correspond to quantitative scenarios;
- Quantitative scenarios differ along key assumptions that correspond to uncertainties surrounding network development



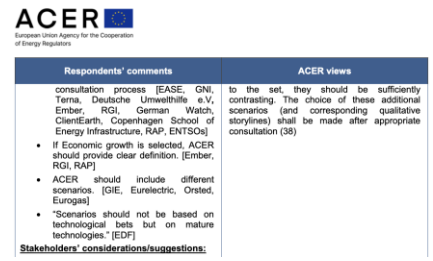
DRIVERS AND STORYLINES

Description of the theme/issue:
Respondents shared their views on the driver description in the Scenarios Guidelines.

Stakeholders' disagreement:
- Storylines should not be proposed in ACER's guidelines but should be left to the scenario development and

ACER does not limit the number of storylines/scenarios to be developed. The development of a 'national trends+' scenario and high/low economy variants (as stress tests) are required by the Guidelines for meeting the needs of decision makers, including regulatory authorities.

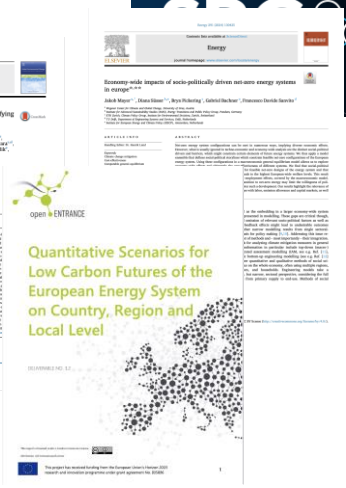
The Scenarios Guidelines welcome ENTSOs creating additional storylines/scenarios. When/if these additional storylines/scenarios are added



ACER
European Union Agency for the Cooperation of Energy Regulators

Respondents' comments	ACER views
consultation process [EASE, GNI, Terna, Deutsche Umwelthilfe e.V, Ember, RGI, German Watch, ClientEarth, Copenhagen School of Energy Infrastructure, RAP, ENTSOs] • If Economic growth is selected, ACER should provide clear definition. [Ember, RGI, RAP] • ACER should include different scenarios. [GIE, Eurelectric, Orsted, Eurogas] • "Scenarios should not be based on technological bets but on mature technologies." [EDF] **Stakeholders' considerations/suggestions:**	to the set, they should be sufficiently contrasting. The choice of these additional scenarios (and corresponding qualitative storylines) shall be made after appropriate consultation (38)

Work (in progress) of WG1



April 2024

First considerations regarding economic variants / consultations with **macroeconomic modellers**

mid-May 2024

ENTSOs present to the SRG different options on how to deal with economic variants, with request to provide feedback

May/ June 2024

Internal **discussions** and **considerations** at WG1 meetings

Options	Pros	Cons
1. (3-scenario) NT+ & (DE & GA re-structed as economic growth variants) First option is keeping the same structure as TYNDP 2024 scenarios (NT and DE/GA scenarios) and adding economic variant to the DE & GA scenarios storylines.	N/A	• Whole DE & GA scenarios storyline decoupled from economic growth as they both based on green economy. Therefore, it is not possible to keep the similar storylines to address both high and low economy variants.
2. (4-scenario) NT + & (DE & GA high) + low economic variant The second options strikes after the analysis of the first option and investigates possibility of keeping DE/GA as high economic variant because they represent a rather fast transition of the energy world. An additional low economic variant needs to	• Pragmatic approach as it provides possibility to reuse the work from previous cycle • Capture a range of climate neutrality pathways reflecting the varying impacts of key infrastructure development drivers	• One more scenarios comparing to TYNDP 2024 cycle, putting the timeline under further risk
3. (1-scenario) NT+ & high/low economic variants The third option includes one central scenario and high/low economic variants. This option would require more detailed modelling of the National Trends scenario and leaving the DE/GA scenarios out of scope. Furthermore, completely new high/low economic variants must be developed	• The process is streamlined if the high/ low-economic variants are developed in more simplified way compared to DE/GA	• Challenging to obtain NECP based datasets for all countries and time horizons • Less differentiated scenarios

1st half of June 2024

ENTSOs decide to go for **option 3**

2nd half of June 2024

Collection of ideas within the SRG

4 July 2024

Closing 2024 TYNDP & **Kick-off of 2026 TYNDP**

Next months of 2024

The way forward…

	Innovations* relevant for the TYNDP process			
	Type	Description	Relevance (WG1-4)	Pointed out by…
1				
2				
3				
20				

(22) The Agency also recommends the ENTSOs to prepare **a living roadmap document** detailing **planned changes** and **larger innovations** to be implemented for future scenarios cycles, and that such changes take place, to the extent possible, outside of the scenario preparation process.
At the time of the TYNDP consultation, the ENTSOs **shall invite feedback from stakeholders on potential innovation** to be included in the roadmap. At the start of each scenario cycle, the ENTSOs shall clearly communicate on the innovations that will be implemented in that cycle.

*Innovation must be understood in a broad sense, it covers any change compared to the previous cycle. That means toolchain innovations and methodological innovations, which may include some related to stakeholder engagement.

Add more rows, if necessary

Innovations* relevant for the TYNDP process			
Type	Description	Relevance (WG1-4)	Pointed out by…
1 *Example: Methodolog*	*Example: New methodological experiment on...*	*Example: WG2*	*N.N.*

Summary of the results (so far):

- 38 Uncertainties and drivers of the energy transition and infrastructural development (social, economic, environmental, technological, political, methodological)

- 24 Uncertainties and drivers of high and low economic growth relevant for infrastructural development and scenario building (economic, political, social, technological)

- 20 Innovations relevant for the TYNDP process (methodology, sensitivity, process, incl. stakeholder engagement)

							Martin Roach
							Sebastian Porras
							Martha
19	Economic	Carbon price	Carbon price	14	Process	accepted or rejected specific recommendations)	WG1	Lucy
20	Economic	Climate risk valuation	risk rating; risk v	15	Methodology	Different assets providing flexibility should be accounted for as fully as possible, both in terms of their capability and availability, and in relation to 'implicit' and 'explicit' flexibility. Flexibility from vehicles should be expanded to include smart and bidirectional EVs, and electric trucks. Smart devices and Energy Management Systems (EMS) in buildings should be included.	WG1/WG2	Lucy
				16	Methodology	Modelling for flexibility should include not just load reduction but also load displacement.	WG3	Lucy
21	Economic	Manufacturing capacity/loading for infrastructure equipment	Component dep	17	Methodology	There is a strong capex bias in the solutions put forward which should be supported by a cost benefit analysis in relation to costs and benefits of meeting system needs.	WG3	Lucy
				18	Methodology	Spatial resolution remains a hot debate, if possible resolution for Europe should have a spatial resolution of at least 100 regions.	WG1	Martha
				19	Methodology	Include additional hydrogen production pathways in addition to water electrolysis and SMR + CCS - i.e. methane pyrolysis and waste-to-hyrogen	WG3	Grzegorz
						Price setting methodology for hydrogen should be revised to make sure the price variability accurately reflects the expected contractual arrangements and that prices for imports of hydrogen via derivatives include dehydrogenation costs. As a first step a sensitivity analysis should be		

Next steps

- Careful **analysis** of collected input
- Discussion with **ENTSOs: combining input** collected at the workshop & from the **Innovation Roadmap Document**
- Reaching out to **external experts**
- Decision about the **selection of parameters** for different economic variants
- Continuation of work related to **uncertainties of infrastructural development**, contributing to the **storylines workstream** (an internal workshop?)

Building SRG's position on economic variants

Key takeaways

Jointly defined goal of delivering good quality information that will feed the TYNDP process (in the 2026 cycle, but with the perspective for the 2028 cycle).

Observations: collective exercise allowing to remain independent, build group knowledge and agree on the input.

Challenges: aligning timelines with ENTSOs, while considering time pressures and internal SRG procedures.

Outlook: busy summer months.

Thank you! Any questions?

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FISHBOWL

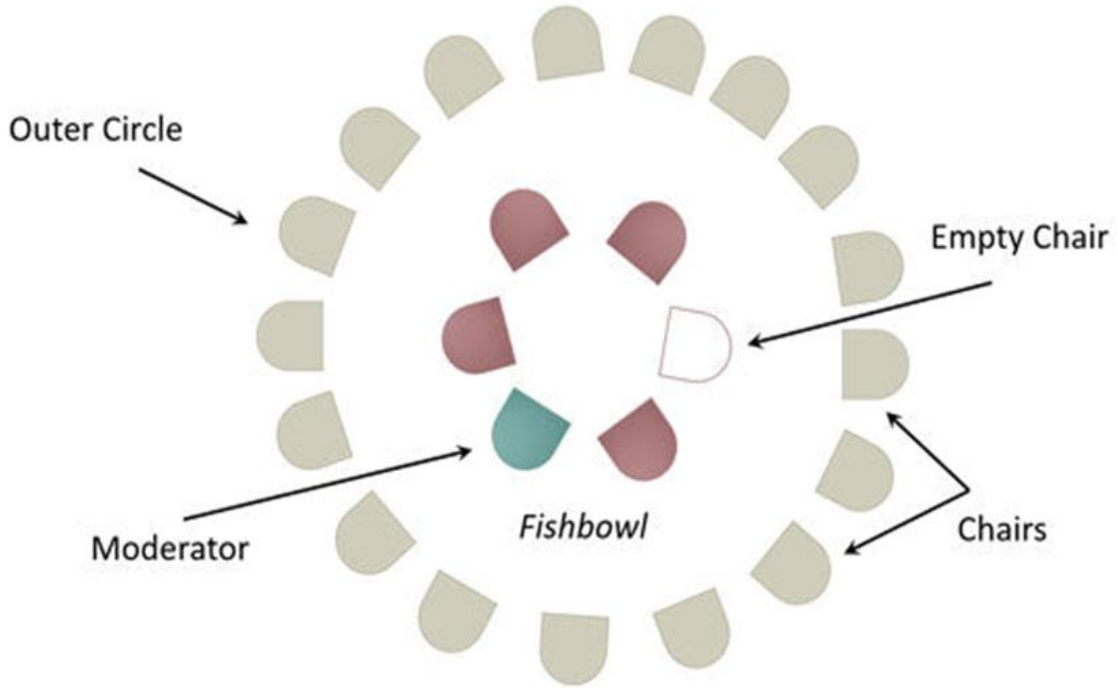
50 minutes

About the 'Fishbowl' discussion concept

The discussion begins with a few participants seated in an inner circle of chairs, with some empty chairs available. All participants are welcome to join the circle at any time to participate in the discussion.

Rules:

- Please introduce yourself before speaking
- Please use the microphone
- Please make your statement in max 2 Minutes



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Concluding remarks

Thilo von der Grün, Scenario Steering Group Convenor, ENTSOG
15 minutes

Thank you for your attention

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