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Scenarios Innovation Roadmap

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TYNDP // 2028

Scenarios Innovation Roadmap



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EXECUTIVE SUMMARY

The Ten-Year Network Development Plan (TYNDP) Scenarios Innovation Roadmap sets the direction for a transparent and adaptable Scenario Building process. It positions innovation as a driver for continuously improving energy system scenario methodologies and establishes a structured pathway for assessing and integrating technological and socio-economic innovations without compromising methodological consistency. By translating stakeholder priorities into feasible improvements, the Roadmap strengthens the responsiveness of energy system models to uncertainties, while ensuring that TYNDP Scenarios remain a credible and robust foundation for European energy infrastructure planning.

The TYNDP 2028 Scenarios Innovation Roadmap establishes a transparent framework for identifying, assessing and prioritising improvements to the joint electricity, gas and hydrogen Scenario Building process. Building on the 2026 Innovation Roadmap, it broadens innovation beyond modelling changes to include framework, data management, visualisation, quality assurance and toolchain improvements. Its development combines lessons from the previous cycle, expert interviews, Working Group Scenario Building and TSO assessments, SRG feedback, ACER's Opinion (13/2026) and dedicated innovation streams.

Innovations are assessed against regulatory relevance, expected contribution to scenario robustness, feasibility, dependencies, resources and stakeholder priorities, and classified as those *to be implemented*, *nice-to-have*, *to be assessed* or *out of scope*. The Roadmap is explicitly designed as a living document, allowing priorities and statuses to be reviewed as evidence, constraints and expectations evolve on a rolling basis.

This Roadmap will subsequently be subject to public consultation and is intended to move from prioritisation to delivery through a dedicated implementation plan that translates innovation-stream outcomes into Working Group Scenario Building work packages. The Roadmap is expected to be further updated in 2027.

Periodic updates should communicate progress, changing feasibility, dependencies and reprioritisation, while continued stakeholder engagement provides a cross-checking mechanism throughout the 2028 cycle.

The proposed portfolio concentrates on strengthening the full TYNDP Scenario Building chain.

- **Framework innovations** include improved target-alignment methodology, stronger economic variants, stakeholder-supported benchmarking, representative climate-year selection and an embedded stakeholder engagement framework.
- **Data priorities** focus on quality gates, clearer ownership, automated checks, improved interfaces and more accessible internal and external visualisations.
- **Toolchain development** includes testing and documenting PLEXOS® functionalities as well as exploring an alternative open-source market modelling framework.
- **Modelling innovations** cover hydrogen market representation, EV and heat pump flexibility, improved prosumer modelling, engagement with *non-EU* countries, selected CO_2-related modelling improvements and a more consistent electricity and hydrogen Scenario Grid.
- Topics with insufficient data, unclear scope or disproportionate complexity are retained for further assessment or documented as **out of scope** for this cycle.

1 INTRODUCTION

TYNDP 2028 Scenarios underpinning ENTSO-E's, ENTSOG's and ENNOH's 2028 Ten-Year Network Development Plans (TYNDP) introduce a joint electricity, gas, and hydrogen scenario, with economic variants. They aim at a consistent and forward-looking foundation for planning Europe's future energy infrastructure in support of the energy transition. The scenario development process is guided by Article 12 of Regulation 2022/869 (TEN-E Regulation) dated 30 May 2022 and ACER Framework Guidelines for the joint TYNDP scenarios (January 2023).

In 2025, the European Commission (EC) presented its proposal on the European Grids Package, which sees energy grids as central to strengthening the EU's energy infrastructure for energy to flow efficiently across EU countries.

To enable a transparent and robust Scenario Building process, a first Innovation Roadmap was established during the TYNDP 2026 cycle as a tool to document continuous improvements of the process or measure new ideas that could become a useful product, service, or method to energy scenarios. It enabled system identification, prioritisation and implementation of innovations, ensuring that lessons learned, stakeholder feedback and emerging regulatory and modelling requirements are effectively translated.

Building on the foundations laid in the previous cycle, this second edition of the Innovation Roadmap further refines and prioritises the identified innovations, with a particular focus on transparency, implementation readiness and value for the TYNDP 2028 Scenario Building process.

The Roadmap is developed by ENTSO-E, ENTSOG and ENNOH experts within their Working Group Scenario Building (WGSB) and reviewed by transmission system operators (TSOs) and the Stakeholder Reference Group (SRG). It will be subject to public consultation later in the Scenario Building process, allowing stakeholder feedback to further inform the final prioritisation of innovations for the TYNDP 2028 cycle.

The Innovation Roadmap is conceived as an open and evolving document that will be regularly reviewed and updated throughout the scenario development cycle. Its purpose is to provide a flexible framework for identifying and considering potential innovations and does not imply that all innovations included in the Innovation Roadmap will necessarily be implemented. The findings and feedback gathered through the consultation process could be taken into consideration during the periodic review and subsequent updates of the Innovation Roadmap, ensuring that it remains relevant and responsive to emerging needs, priorities, and developments throughout the scenario development process.

1.1 Purpose of an Innovation Roadmap

The general framework of each TYNDP Scenario Building cycle aims at specific issues pertaining to building robust, climate target-compliant and accountable long-term scenarios on energy supply and demand for the European energy system. Each cycle also may identify individual areas of improvement in the logic of applied methods, data, assumptions, parameters of Scenario Building. As a formal document, the Innovation Roadmap was introduced in the TYNDP 2026 cycle, to comply with the ACER Framework Guidelines, to coordinate this work, and to confirm identified topics (Figure 1). The purpose of the TYNDP Scenarios Innovation Roadmap is to provide a transparent and structured overview of the most relevant improvements proposed for the Scenario Building cycle. The Roadmap is not intended to function as a comprehensive catalogue of all potential modelling enhancements. Rather, it explains the key challenges identified during previous cycles, the innovations prioritised for TYNDP Scenarios, the expected benefits of their implementation for the Scenario Building process and resulting scenarios, and the rationale for deferring or excluding other proposed innovations. Out-of-scope innovations are outlined in the Innovation Roadmap to transparently document which innovations might become relevant for current or future scenario exercises (see section 1.3). In doing so, the Roadmap supports informed decision-making and provides stakeholders with a clear understanding of the direction and priorities of future scenario development activities.

Stakeholder feedback on TYNDP Scenario innovations reflect external requests and help to shape the selection, prioritisation, assessment, implementation and status of an innovation. Stakeholder proposals are, however, not reflective of the ENTSOs' commitments.

*(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.*

Figure 1: Article 22 in ACER Framework Guidelines

1.2 Scope of the Innovation Roadmap 2028

The main aims of the paper and its updates are

1. Re-assessment and re-prioritisation of the 2026 innovations
2. Consolidate information for the choice of 2028 innovation priorities
3. Contribute to improved transparency, documentation and tracking of the proposed innovations, also to facilitate stakeholder engagement

Innovations should be understood broadly within this Roadmap and not only refer to changes in modelling methodologies, but also encompass improvements to data management and visualisation, quality assurance and toolchain processes.

For the purpose of this Roadmap, an innovation is defined as:

A change in approach, methodology, data, modelling, toolchain or quality assurance process that has the potential to improve the accuracy, robustness, transparency, usability or efficiency of the TYNDP Scenario Building process and its results.

To ensure a structured assessment, innovations are grouped into thematic categories. These categories build upon the innovation areas identified during the TYNDP 2026 cycle.

The 2028 Innovation Roadmap is intended to function as a living document that evolves across Scenario Building cycles. As a living document, a consistent updating and re-publishing of the Innovation Roadmap throughout the scenario-building exercise ensures that developments, in particular changes to the application or prioritisation of innovations to achieve more robust and accountable solutions, are responsive to stakeholder's expectations on traceability and staying informed. A change in application or prioritisation of an innovation can be expected if time, resources or interdependent issues affect the feasibility of an innovation. The Innovation Roadmap should not be interpreted as a comprehensive catalogue of all possible improvements. Rather, it provides a structured assessment of the innovations considered most relevant for the TYNDP 2028 Scenarios cycle.

In this way, the Roadmap of the 2028 cycle helps ensure that innovation activities remain focused on delivering



the greatest value to the dedicated TYNDP Scenarios while maintaining transparency, consistency and accountability.

Data collection and analysis methods

The development of the TYNDP Scenarios 2028 Innovation Roadmap was informed by a combination of qualitative and quantitative data collection methods, drawing on the experiences of TYNDP 2026 scenario-building participants and the feedback received from external stakeholders.

The development of the TYNDP Scenarios 2028 Innovation Roadmap builds further upon the outputs and lessons learned from the TYNDP 2026 cycle. In particular, the first edition of the Innovation Roadmap served as an important starting point for identifying ongoing improvement needs and tracking the evolution of previously prioritised innovations. The assessment further considered the evaluation of roadmap implementation presented in Annex II (pg. 131) of the TYNDP 2026 Scenario Report, which provided insights into the progress achieved, remaining challenges, and areas requiring further development.

On top of that, a series of semi-structured interviews was conducted with the Working Group Scenario Building members to identify key challenges encountered throughout the process and gather recommendations for future improvements. In them, they responded to questions about innovations as well as shared related ideas and viewpoints. In total, 28 experts participated in the interviews, representing a broad range of perspectives across the Scenario Building process, including Supply, Demand, Toolchain, Innovation and Market Modelling sub-team members. The interviewees included representatives from both the electricity and gas sectors, with 14 e-TSO and 14 g-TSO participants, ensuring a balanced assessment of priorities and challenges.

In addition to the consultation of the Working Group Scenario Building, the analysis considered the SRG Opinion on the TYNDP 2026 Scenarios,responses collected through an SRG survey conducted in June-July 2026 as well as ACER's Opinion (13 /2026) on the draft TYNDP 2026 Scenarios Report, which was released in July 2026. This provided valuable external perspectives on the strengths of the current Scenario Building framework, areas requiring further development, and expectations for future scenario cycles.

After this, in order to complement the interview and stakeholder feedback, topic-specific innovation streams, consisting of experts from TSOs and ENTSOs, were established to further develop and assess potential innovations. These streams brought together relevant expertise to evaluate identified improvement areas, assess implementation feasibility, and define an implementation plan. This approach ensured that innovations were reviewed from both a detailed technical perspective and an overarching process perspective, enabling a consistent and coordinated prioritisation across the entire Scenario Building framework.

How should the nature of innovations into scenarios be understood?

After preparation, immersion, research, synthesis, exploration and prioritisation, an implementation of an innovation may advance through a concept and assessment, followed by design and testing. Because the nature and feasibility of innovations may be uncertain, any new innovations should first be tested. Any proposed innovations will require capabilities from the key actors involved. There also may be innovations that cannot be immediately implemented.

1.3 Prioritisation of innovations

The prioritisation of innovations is based on input collected from both subject matter experts in the Working Group Scenario Building, TSOs and the SRG as well as informed by feedback from other stakeholders, including ACER's Opinion (13/2026). To support a structured and transparent assessment, a survey was conducted within this working group to evaluate the perceived relevance and value of the identified innovations. In parallel, feasibility assessments were carried out within the innovation streams to evaluate implementation complexity, resource requirements, dependencies, and expected delivery timelines.

The decision-support diagram in Figure 2 illustrates a structured framework for prioritising innovations against multiple criteria, including regulatory relevance, impact on scenario robustness, feasibility, and stakeholder feedback, that helped innovation experts to preliminarily prioritise each innovation where feasibility assessments turned out more complex. While the diagram serves as a primary basis for consistent and transparent prioritisation, WGSB, SRG and feasibility assessments justify deviations where an alternative prioritisation is considered more appropriate in light of its specific context, dependencies, or implementation considerations.

Additionally, in the assessment, certain suggestions to the Roadmap were classified as tasks or fixes (rather than innovations). Such issues have also been noted, and will be integrated in forthcoming reporting (especially TYNDP Scenarios Methodology report and TYNDP Scenarios report).

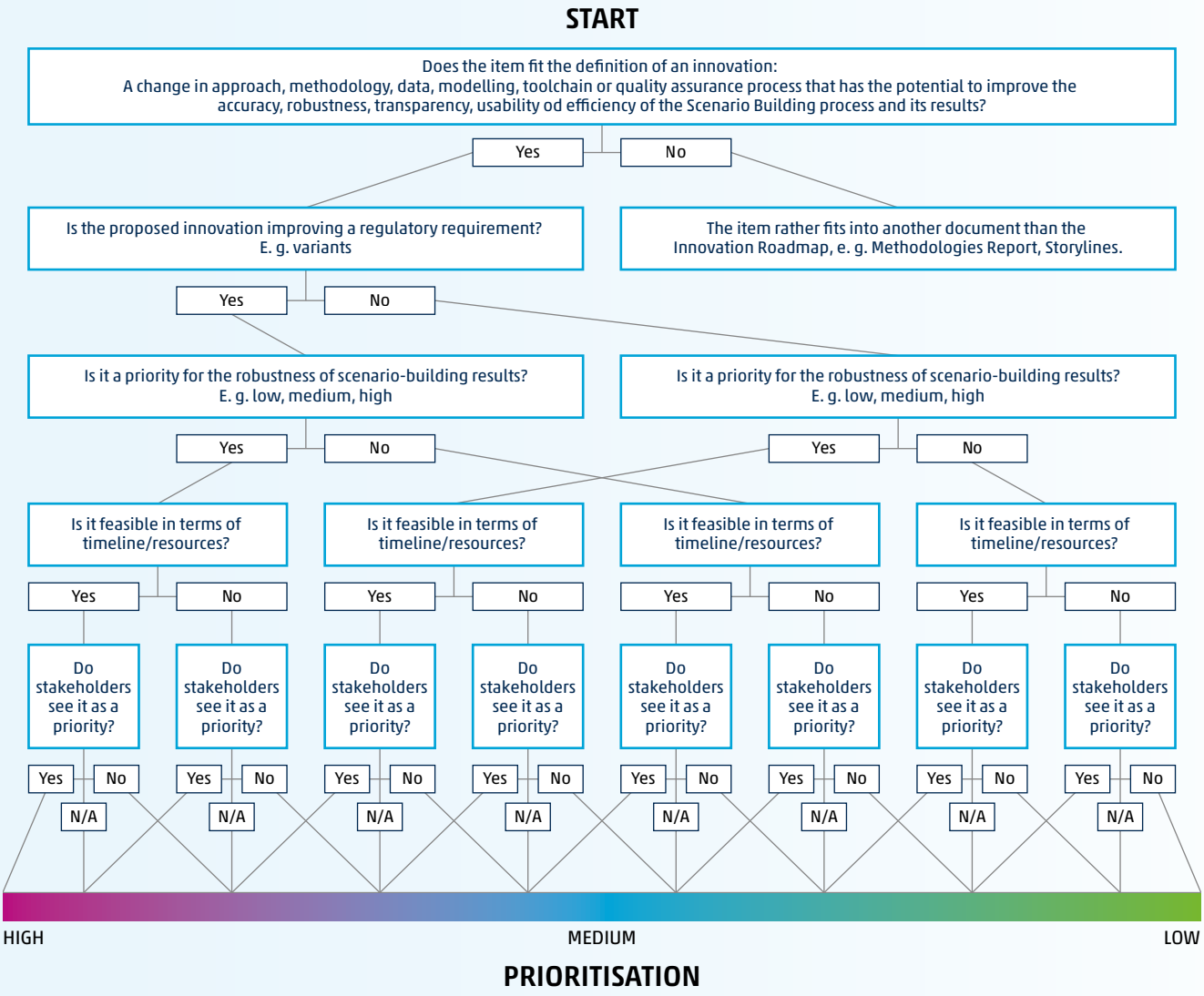


Figure 2: Decision support diagram for innovation prioritisation

The results of the prioritisation assessments were used to balance the expected impact of each innovation against the effort required for implementation. Consequently, innovations are classified into four categories:

Innovations to be implemented

innovations are considered essential for achieving the objectives of the TYNDP 2028 Scenario Building cycle. They are expected to provide significant benefits in terms of model robustness, methodological quality, transparency, efficiency, or stakeholder value. High-priority innovations are translated into dedicated subteam work packages and are planned for implementation during the TYNDP 2028 scenario cycle.

Nice-to-have innovations

These innovations are recognised as beneficial improvements that could further enhance the Scenario Building process or modelling framework. However, their implementation is not considered critical for the successful delivery of the TYNDP 2028 scenario cycle. They are translated into subteam work packages and may be implemented if sufficient time, resources, and expertise are available after the delivery of higher-priority activities.

Innovations requiring further assessment

These innovations have been identified as potentially relevant for the Scenario Building process, but currently lack sufficient information to allow a robust prioritisation or feasibility assessment. Further analysis is required to better understand their potential benefits, implementation effort, data requirements, methodological implications, or stakeholder value. Following this assessment, they will be categorised as either *to be implemented, nice-to-have* or *out of scope*, which will be updated in the upcoming versions of the Innovation Roadmap.

Out of scope innovations

These innovations will not be pursued within the TYNDP 2028 cycle. This may be due to a relatively limited expected impact on scenario results, significant implementation effort, insufficient maturity, data limitations, or resource constraints. While not prioritised for the current cycle, these innovations will be documented and may be reconsidered in future TYNDP scenario cycles.

When an innovation depends on or affects other innovations, assessing it on its own may not give a holistic prioritisation result. The feasibility, prioritisation and implementation of one innovation may depend on related innovations. Where this is the case, innovations should be reviewed in conjunction with the related innovations throughout the 2028 Scenario Building.

1.4 Stakeholder involvement

The Innovation Roadmap is strongly shaped by stakeholders and can further guide expectations concerning TYNDP Scenario development. The role of the SRG to the TYNDP Scenarios, with the ENTSOs, ACER, EC, JRC and ESABCC[1] as key observers, is advising the Scenario Building. Stakeholder views, priorities and expectations are also collected in workshops and exchanges.

As an expectation, improvements in each cycle should be guided by prior evaluations and stakeholder feedback, and the eventual Roadmap will be released for consultation to re-assess the prioritisation of the innovations.

Concerning the incorporation of stakeholder views to the Innovation Roadmap 2028, the process was as follows. As the first step, the SRG Opinion on the 2026 Scenarios, and in parallel, the ACER Opinion 13/2026, were reviewed as part of the preparatory stage i.e. data collection and analysis.

As a second step, the Stakeholder Reference Group (SRG) members were sent a survey in June-July 2026, which enquired about Roadmap satisfaction as well as asked for suggestions for innovations to the TYNDP 2028 scenario cycle. The survey to the SRG generated 11 individual responses.

As a third step, these responses were added into the documentation, which then informed experts in the innovation streams who reviewed proposals thematically as part of updating of the Roadmap and scrutinised them by selected criteria mentioned in subchapter 1.3. (expected impact, implementation effort, maturity, data availability, resource constraints). All innovation proposals from the SRG have been incorporated in the list of innovations, either as a separate innovation or merged with other innovations in a broader topic cluster.

1 European Scientific Advisory Board on Climate Change.

Across the stakeholder responses, four cross-cutting priorities emerge:

1. Establish a more operational and participatory innovation governance process, with the help of the Roadmap, supported by clear prioritisation, status and timeline tracking, and stakeholder involvement.
2. Increase transparency, traceability and data quality throughout the modelling chain that underpins the scenarios.
3. Further improve hydrogen and sector-coupling representation in the energy system.
4. Strengthen and elaborate flexibility and energy storage modelling.

In addition, more detailed mentions from the abovementioned SRG survey across framework, data and modelling aspects are shown in Table 1.

AN OVERVIEW OF THE SRG SURVEY RESPONSES AND INNOVATION SUGGESTIONS ORGANISED INTO THREE MAIN THEMES

SCENARIO FRAMEWORK PROCESSES

Align better inputs/results between countries and improve gap filling methodology	Make further advances in methodological transparency	Develop climate variability analysis further Incorporate extreme weather events into TYNDP scenarios	Reintroduce expansion modelling

DATA PROCESSES

Update reference year in ETM	Ensure better documentation and transparency on demand assumptions	Provide more detailed data on hydropower and pumped hydropower storage, with PHS to be reported in flexibility and long-duration energy storage	Improve data dashboards, data granularity and transparency

MODELLING METHODOLOGIES (INCL. ADVANCES IN CROSS-VECTOR OPTIMISATION)

Increasing the amount of flexibility	**Reviewing hydrogen modelling**	**Adding energy carriers**	**Other improvements**
> Include load shifting in flexibility modelling (incl. role of data centres) > More detailed modelling of electric heat pumps > Include heavy duty vehicles in fleet modelling and model temperature-sensitive efficiencies and heating/cooling needs	> Improve dynamics between domestic hydrogen production and hydrogen imports > Revise hydrogen storage methodology > An alternative justification for hydrogen import quota (instead of RePOWER EU target)	> Improve representation of biogas, biomethane and biofuels (incl. bio-LNG) > Industrial applications; convert large industrial gas offtakers to other energy carriers > Model synthetic fuels explicitly, incl. methanol > Include methane network	> Improve modelling of heating and energy storage > Modelling of transmission losses > Advance modelling of carbon capture, utilisation and storage (CCUS) potential, including non-energetic CCU (e.g. CO_2 to ethanol)

Table 1: Summarised Survey responses and innovation suggestions from SRG members in June–July 2026.

Stakeholder feedback will be integrated in the Innovation Roadmap progressively based on continuous assessment by ENTSO-E, ENTSOG and ENNOH in order to improve the Scenarios in a consistent and managed way.

As the fourth step, a draft Roadmap that includes a prioritisation was presented to the SRG on September 9, 2026, also providing the stakeholders with a 2-week review period before final publication. The dedicated feedback session with the SRG members also enabled the SRG observers to attend. The responses from the SRG review were treated alongside comments from the Working Group Scenario Building. They have been acknowledged and used to provide further clarity on the use of the Roadmap. Feedback on specific innovations assisted in finalising the prioritisation. More detailed suggestions were forwarded to respective innovation streams.

Taken together, they are expected to further guide the TYNDP 2028 Scenarios. The SRG received a detailed summary of how their feedback was accepted or partially accepted, acknowledged where no action was deemed required, or rejected via a feedback implementation tracker for the Innovation Roadmap.

Public consultation about the Roadmap is foreseen to take place later in the Scenario Building 2028 process (in Q1 2027).

The TYNDP 2028 Scenarios Engagement Plan provides the overarching framework for stakeholder participation throughout the TYNDP 2028 Scenario Building process, setting out

- the principles of transparency, inclusiveness and efficiency,
- the methods and timing of stakeholder engagement, and
- the respective roles of the SRG, other stakeholders and the ENTSOs.

It defines how stakeholders contribute to and scrutinise key Scenario Building deliverables, including the Innovation Roadmap, storylines, assumptions, methodologies, input data and draft scenarios, through consultations, workshops, public events and dedicated SRG review activities. The Plan further establishes mechanisms such as the stakeholder engagement timeline, feedback implementation tracker and regular SRG exchanges to ensure that stakeholder input is systematically captured, assessed and reflected in the Scenario Building process. As such, it provides the engagement structure through which innovations identified in the Innovation Roadmap can be prioritised, reviewed, implemented and monitored throughout the TYNDP 2028 Scenarios cycle.

Stakeholder and public engagement in the TYNDP Scenarios 2026

In the TYNDP 2026 scenario cycle, stakeholder engagement played a key role. ENTSOs engaged with the SRG in the preparatory stage of the 2026 Innovation Roadmap. Their role was not only in commenting the Innovation Roadmap, but also in guiding its implementation. SRG also has independently provided ENTSOs with other recommendations. For example, during the 2026 scenario cycle, the data source to assess commodity prices was changed to use European Commission scenarios, after stakeholder analysis, dialogue and associated recommendations. SRG also worked on the carbon budget methodology and provided related recommendations.

The public consultations of TYNDP scenarios conducted between June and July 2025 covered the Innovation Roadmap alongside key elements of the scenario framework, including energy demand and supply data, infrastructure and capacity, market and commodity assumptions, modelling methodologies and compliance aspects related to both the Central Scenario and the Economic Variants.

These consultations enabled stakeholders to gain deeper insight into the scenario development process and to actively influence both methodological choices and modelling outcomes.

In addition to the formal question-and-answer process, the Public Consultation Summary Report includes written responses from the ENTSOs to stakeholder comments, including those raised during the complementary public workshop held in July 2025.

Early stakeholder involvement proved particularly valuable, allowing engagement to focus on the definition of inputs and methodologies rather than on final outputs. The use of written responses and structured feedback loops through consultations and workshops further increased transparency and accountability in the implementation process.

The TYNDP 2026 Scenarios Consultations Summary Report (January 2026) summarises current advances and where more work is required.

1.5 Limitations of the assessment

The innovation assessment provides a structured basis for identifying and prioritising improvements to the Scenario Building Process. Nevertheless, several limitations should be considered when interpreting the results.

First, the assessment is based on the information, project constraints and priorities known at the time it is carried out. Given the long duration of the Scenario Building cycle and the evolving nature of regulatory requirements, stakeholder expectations, modelling developments and continued timeline advancement, innovation priorities may change over time. For this reason, the initial version of the Innovation Roadmap 2028 should be regarded as a starting point rather than a final prioritisation. The Roadmap is intended to function as a living document that is reviewed and updated throughout the project[2]. Reprioritisation may be required as new information becomes available, implementation constraints emerge, or the testing and evaluation of specific innovations provide additional insights.

Second, efficient resource management must be taken into account. While the Roadmap identifies innovations that are expected to improve the Scenario Building Process, inclusion in the Roadmap does not guarantee implementation. The successful delivery of innovations depends on the availability of time, expertise and project resources, as well as on their compatibility with project timelines and dependencies.

Third, the status "to be further assessed" indicates that an innovation requires additional analysis before its scope, impacts, dependencies, or implementation approach can be sufficiently evaluated. As such, this status should be understood as a temporary stage in the assessment process rather than a final conclusion. Any resulting limitations in the assessment of related innovations will be addressed as the innovation is further developed and implemented. Given that the Innovation Roadmap is maintained as a living document, progress on innovations marked "to be further assessed", together with any implications for other Roadmap elements, will be reflected and transparently communicated through Roadmap updates. Thus, a change in the status from *to be further assessed* to *to be implemented*, *nice-to-have* or *out of scope* for each affected innovation is anticipated.

Consequently, the Roadmap should be viewed as a tool for informed decision-making and continuous improvement rather than as a fixed or exhaustive list of innovations. Its value lies not only in defining priorities, but also in providing a transparent framework through which priorities can be reviewed, challenged, and adapted as the Scenario Building process evolves.

2 In summer 2025, the ENTSOs and Stakeholder Reference Group exchanged on how to make the Innovation Roadmap a "living roadmap document" as outlined in the TYNDP Scenarios Guidelines. During this time, the organisations weighed possible options of a living document against each other: They acknowledged that creating an open digital document to update the Innovation Roadmap on a regular basis posed too many risks to cyber security. Another option of creating an online fill-in feedback form on the TYNDP Scenarios website was discussed, however, deemed too unwieldy to be integrated into the work process. Instead, the possibility of arranging a bi-annual review of the TYNDP Scenarios Innovation Roadmap and an update of such when needed was agreed upon.



2 RECAP: INNOVATION ROADMAP OF TYNDP SCENARIOS 2026

The Innovation Roadmap from February 2025 included a review of the innovations that were not implemented during the 2026 cycle, essential model fixes for improving the TYNDP 2024 model, and new innovations proposed for the TYNDP 2026 scenario cycle, and prioritised for implementation.

The initial version of the Innovation Roadmap was prepared by ENTSO-E and ENTSOG experts from the Working Group Scenario Building, reviewed by TSOs and SRG. The TYNDP 2026 Scenarios were the first full cycle in which the recently established TYNDP Scenarios Guidelines were applied. Consequently, toolchain enhancements were prioritised, and this meant a limited introduction of new innovations.

A second, public review of the Innovation Roadmap 2026 via the consultation package in June/July 2025 concluded on additional feedback on the structure, listing and prioritisation of innovations in the 2026 Scenarios cycle. The Innovation Roadmap listed further requirements from the Stakeholders Reference Group, TSOs, and other stakeholders, as suggestions for future cycles (TYNDP 2028 and beyond). A detailed elaboration of whether and how innovations were implemented in the 2026 cycle was outlined in the TYNDP Scenarios 2026 Report.

2.1 Main implemented innovations

The implementation of the Innovation Roadmap 2026 focused on a set of priority areas, where innovations were either fully implemented or significantly advanced.

Most of the listed innovations were implemented either fully or in a materially enhanced form across the modelling toolchain, the quality control framework, system modelling (including hydrogen, EVs, storage and grid behaviour), and climate-aware assumptions (see Figure 3).

Notable advancements include the upgraded visualisation platform and dashboard, the transition to an improved database enabling a better representation of future climatic variability, the establishment of a Quality Control Task Force, improvements to hydrogen system representation (including imports, storage, pricing and topology), and a significantly refined EV and prosumer modelling approach.

In total, around two-thirds of the innovations identified in the Roadmap were delivered within the cycle, with several others partially implemented or addressed through alternative methodologies.

The current status of innovations is provided in the TYNDP 2026 Scenarios Report in chapter 8 *(see pages 26–28)* and its *Annex II: Innovation Roadmap Implementation in 2026 cycle (see pages 131–136).*

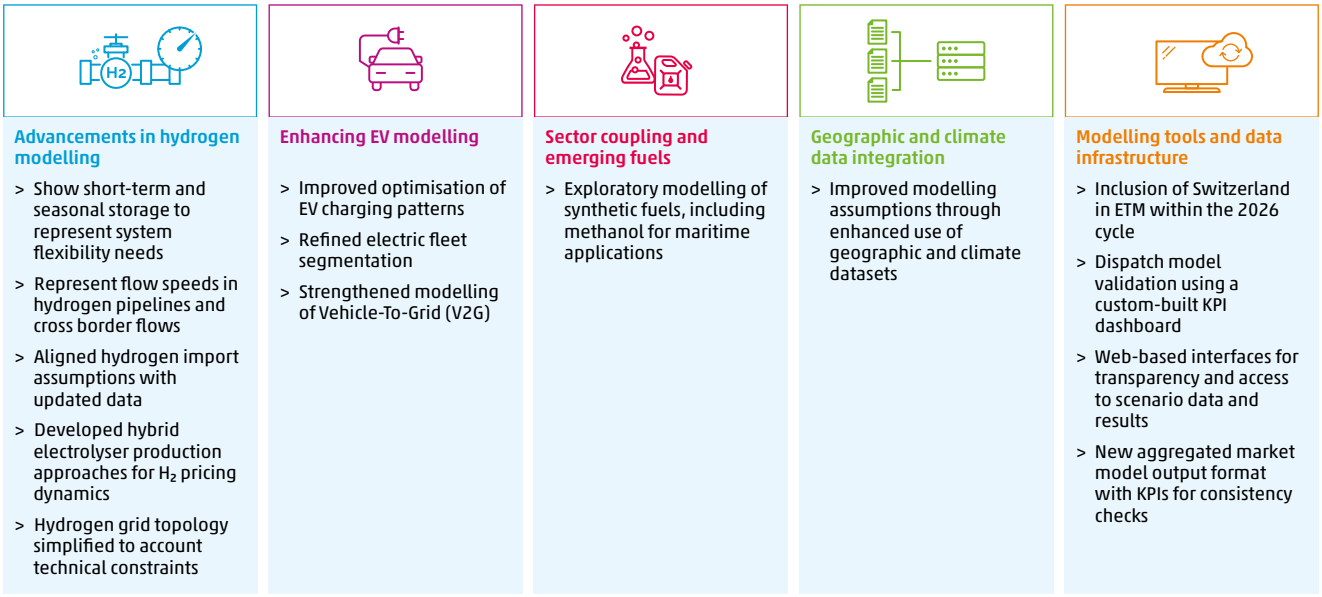


Figure 3: Priority areas in the Innovation Roadmap 2026.

2.2 Remaining gaps

A set of proposed innovations in the 2026 scenario cycle were not implemented, primarily due to methodological, data availability, feasibility or timeline constraints (see Scenario report chapter 8.6). While these innovations could not be incorporated into the 2026 scenarios, they remain relevant for the continued evolution of the TYNDP scenarios.

To ensure continuity and retain valuable stakeholder input, the non-implemented proposals have been reassessed for the 2028 cycle. Based on this reassessment and prioritisation process, the innovations have been assigned updated statuses reflecting their current level of feasibility and strategic relevance.

Some proposals have been prioritised for implementation within the 2028 cycle, while others remain under evaluation or have been deferred pending further methodological development and data availability.

This approach ensures that innovations are not discarded when immediate implementation is not possible, but are instead systematically tracked, reassessed, and integrated into future development cycles where appropriate. In this way, the Innovation Roadmap provides a transparent mechanism for addressing identified gaps and supporting the continuous improvement of the TYNDP Scenario Building process.



3 KEY INNOVATIONS FOR TYNDP SCENARIOS 2028 BY THEME

This chapter provides an overview of the innovations reviewed for the TYNDP 2028 Scenarios cycle. The reviewed topics cover innovations that are classified as *to be implemented*, *to be further assessed*, *nice-to-have* or *out of scope*, reflecting their assessed relevance, feasibility and expected contribution to the Scenario Building process.

The innovations are grouped into thematic areas covering the full Scenario Building chain, ranging from the overall scenario framework and data processes to modelling methodologies. Together, they aim to improve the robustness, transparency and usability of the TYNDP Scenarios.

As a summary of the prioritisation process, also acknowledging ACER's Opinion (13/2026), the following topics have been identified as the highest-priority innovation areas for the TYNDP 2028 cycle:

1. **Improving the methodology** for target alignment, including improved treatment of national inputs, and a more consistent assessment of pathways towards European climate and energy targets.
2. **Strengthening the economic variants** to ensure sufficiently differentiated and internally consistent pathways that provide meaningful scenarios.
3. **Improving climate-year methodology** and the representation of climate variability, including the selection of representative climate years.
4. **Exploring further the use of an additional open-source modelling framework**, alongside the existing modelling environment to improve transparency, reproducibility and long-term resilience of the modelling toolchain.
5. **Enhancing transparency and stakeholder involvement** through improved data support, more transparent toolchains, strengthened quality assurance, and improved data visualisation and stakeholder engagement processes.
6. **Advancing hydrogen market modelling and price formation**, including improved representation of domestic production, imports, price signals and market interactions.
7. **Improving flexibility methodologies**, with a particular focus on EV flexibility and heat pump flexibility as well as exploring other demand-side flexibility options.
8. **Enhancing the scenario grid representation** for electricity and hydrogen across planning horizons for a more consistent and transparent methodology.
9. **Developing the data alignment** and related processes of non-EU country inputs.

The associated table shows the selected key innovations to be implemented, followed by those identified as *nice-to-haves* or *to be further assessed* (*in italics*) based on assessed priority and thematic category.

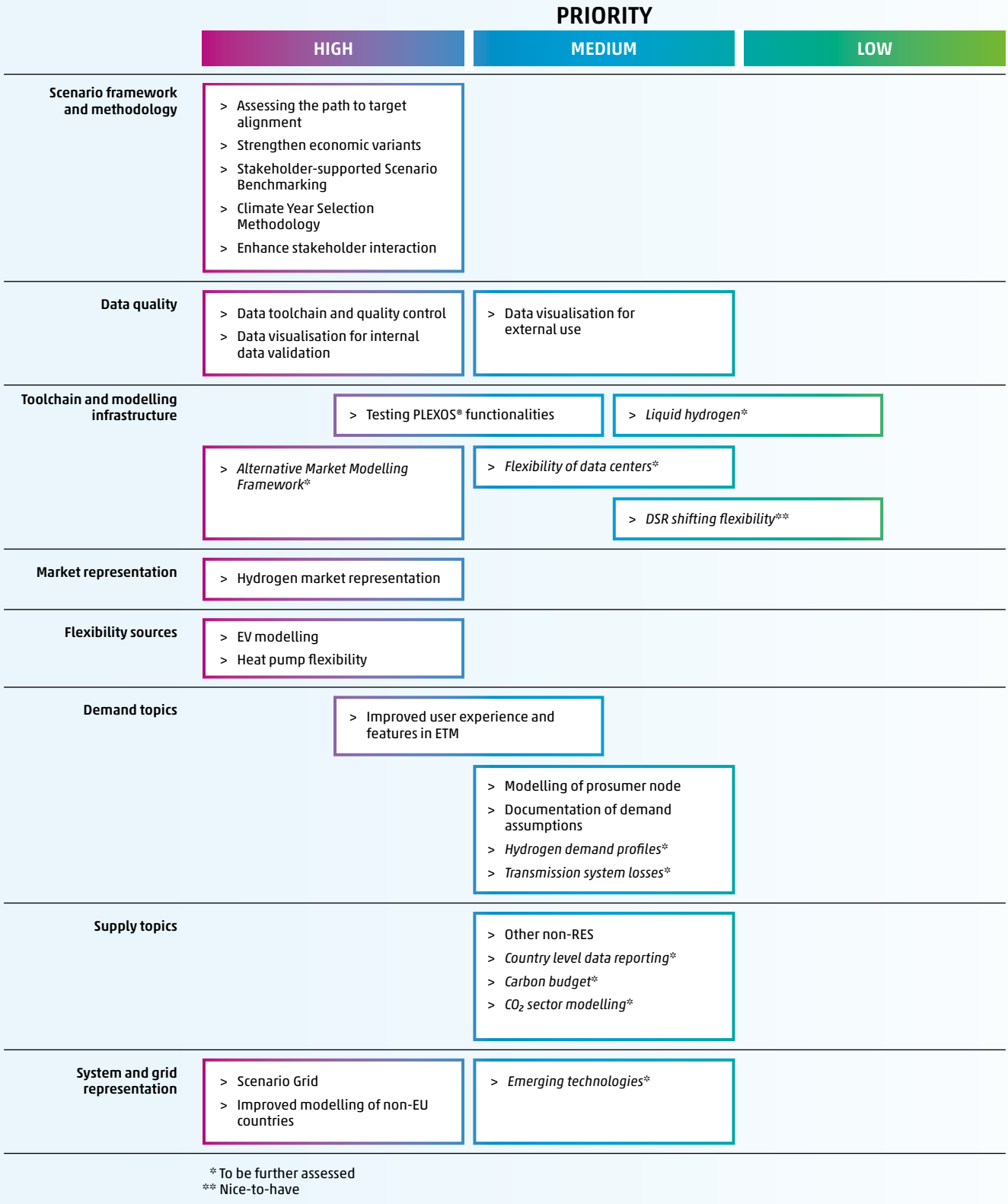


Figure 4: Key innovations of the Innovation Roadmap for TYNDP Scenarios 2028 by theme and priority.

3.1 Scenario Framework and Methodology

This chapter focuses on methodological developments that define how the scenarios are constructed and governed by policy design. The objective is to ensure that TYNDP scenarios remain aligned with European policy objectives, provide meaningful scenarios, and offer a robust framework for infrastructure planning. With the introduction of the central scenario and economic variants in the 2026 cycle, a profound innovation in the TYNDP Scenario framework and methodology was achieved by aligning it with the EU's climate objectives towards net-zero emissions by 2050 and the assessment of NECPs in achieving these. Recent developments related to the role of variants as meaningful stress tests and applying the gap-filling methodology to align national with EU energy and climate targets opened a re-assessment of existing methodologies outlining the overall Scenario framework. This innovation theme outlines 2028 cycle innovations to ensure stronger alignment between European policy objectives and robust infrastructure-relevant projections.

Framework and governance methodologies are classified as process innovations or organisational innovations rather than purely technological innovations, although their development strongly relies on technical calculation and feasibility studies. The scenario framework and methodology become innovative when they advance transparency, introduce a new or significantly improved way of developing scenarios, making informed decisions, ensuring system clarity, or involving stakeholders.

Regulatory requirements: target compliance, policy developments, storylines, central scenario, variants, stakeholder involvement, transparency, benchmark, TYNDP-ERAA consistency, sector integration, energy efficiency, cut-off date, other.

3.1.1 Assessing the path to target alignment

Develop a framework to assess, represent and communicate the transition from National Trends (NT) to a target-aligned pathway (NT+), making explicit the changes required to achieve European climate and energy objectives.

Motivation: Recent scenario cycles have revealed significant differences between national energy and climate plans (NECPs), associated sectoral strategies and implementation plans, and European climate and energy objectives. The gap-filling methodology applied in recent TYNDP cycles provided a structured approach to address these discrepancies and ensure consistency with policy targets. The experience gained during its implementation, together with stakeholder feedback, highlighted opportunities to further develop how the gap between national trajectories and target-aligned pathways is assessed, represented and communicated within the scenario framework. This includes improving the understanding of the transition from National Trends (NT) to National Trends+ (NT+), as well as the implications to achieve European climate and energy objectives.

Priority: High; Strategic relevance for the scenario framework and alignment with stakeholder and regulatory expectations regarding the assessment of pathways towards European climate and energy objectives.

Actions required: Develop and assess a methodology for deriving NT+ from NT, including the identification of the additional assumptions and adjustments required to achieve European climate and energy objectives, while ensuring consistency with the Energy Efficiency First Principle.

Status: To be implemented

3.1.2 Strengthen Economic variants

Review the design of High and Low Economic Variants to ensure they represent sufficiently differentiated and internally consistent future pathways, thereby defining a robust scenario envelope that captures a broad range of plausible economic developments.

Motivation: TYNDP 2026 introduced economic variants, but stakeholder feedback suggests that the current level of divergence from the central scenario may not fully capture alternative development pathways. ACER highlighted the importance of meaningful scenario variations and robust sensitivity analyses. A review of variant assumptions could improve their ability to test the resilience of planning decisions under different macroeconomic conditions.

Priority: High

Actions required: Assess the methodology for economic variants to ensure sufficiently differentiated and internally consistent pathways, considering both demand- and supply-side developments and the implications of the Energy Efficiency First principle.

Status: To be implemented

3.1.3 Stakeholder-supported Scenario Benchmarking

Incorporation of the SRG in the benchmarking process from the early stages of the scenario development process, including (i) ENTSOs/SRG cooperation on the shortlisting/selecting of external scenarios considered for benchmarking (ii) using capacities of SRG to analyse/describe the methodologies, inputs used by selected external scenarios and results. This approach showcases stronger stakeholder involvement than the Framework Guidelines request.

Motivation: To address the comments of ACER and SRG to the benchmark implementation in the 2026 scenario cycle.

Priority: High. Requirement of scenario benchmarking is included in the ACER framework guidelines.

Actions required: ENTSOs to prepare methodology for SRG to deliver the analysis of the shortlisted external scenario studies for benchmarking. Discussions with SRG on selection and analysis of benchmarks.

Status: To be implemented

3.1.4 Climate Year Selection Methodology

Develop a climate-year selection methodology that captures variability across climate variables, climate zones and seasons, enabling cross-study comparison by using a common subset of representative climate years

Motivation: Assumptions on future climate and its variability have a significant influence on TYNDP scenario results. In the 2026 scenario cycle future climate projections of three different climate models have already been used instead of historical climate and weather reanalysis data. However, the number of global climate models with an equilibrium climate sensitivity within the range that the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) considers to be of "high confidence" increased in the PECDv4.2 from three to six models. Including all six models in this scenario cycle addresses one key feedback from the SRG to use a larger number of climate models. This methodological transition expands the number of available climate years to even a few hundred years within a 10-year period. Within this context, a "climate year" refers to possible weather conditions provided by

- one specific climate model out of the six available climate models in PECDv4.2
- under one specific pathway of the Shared Socioeconomic Pathways (SSPs)
- for one specific projection year.

This potentially large pool of climate years creates a fundamental mismatch to the limited number of years that can practically be processed by power-system models. Therefore, a selection methodology is required to reduce the large number of available climate years to a representative subset of climate years. In this methodology, rare events such as potentially extreme weather years are not separately modelled.

Priority: High

Actions required: Develop a climate year selection toolset to identify a representative subset of climate years projected by all six PECDv4.2 climate models under the "middle of the road" SSP2-4.5 pathway; a subset is considered representative if

- it accurately reflects both the mean and the variability per variable,
- it accurately reflects the correlation between all variables, and
- these conditions are met on a seasonal basis to avoid cross-seasonal compensation.
- The method needs to combine variables of climate-year specific production (resulting from onshore wind, offshore wind, solar PV and hydropower), the population-weighted temperature-dependent demand and the resulting residual demand in order to feed the new climate year selection tool.

Status: To be implemented

3.1.5 Enhance stakeholder interaction

Establish a structured stakeholder engagement framework throughout the Scenario Building process, including SRG reviews, public consultations and other stakeholder interactions, to improve transparency, traceability and methodological feedback.

Motivation: Transparency, traceability and stakeholder scrutiny are increasingly important elements of the Scenario Building process, including continued engagement with the EC and ACER on scenario development. A more structured engagement framework would improve the traceability of feedback, strengthen confidence in scenario assumptions and methodologies, and support more robust and transparent scenario development.

Priority: High; Stakeholder engagement is a key expectation from the SRG, ACER, EC and other stakeholders.

Actions required: Develop and maintain a structured Stakeholder Engagement Plan that coordinates stakeholder interactions, consultation activities and transparency deliverables across the Scenario Building process. The framework should strengthen the role of the SRG as a permanent methodological review mechanism and ensure that key assumptions, datasets, validation exercises and methodological changes are made available at a sufficiently early stage to enable meaningful stakeholder scrutiny.

Particular attention should be given to improving the transparency, traceability and accessibility of scenario assumptions, including the documentation and justification of deviations from policy reference values and the publication of stakeholder-oriented datasets and consultation materials. This work should contribute to a more robust transparency and validation framework, taking into account the recommendations expressed by ACER in its Opinion on the TYNDP 2026 Scenarios Report regarding stakeholder scrutiny, public validation and transparency of assumptions.

Status: To be implemented

3.2 Data quality and visualisation

High-quality scenarios depend on reliable input data, transparent assumptions and robust validation procedures, and their comprehension. This chapter focuses on improving data quality controls, strengthening transparency of assumptions and results, and introducing processes and tools that enable earlier detection of inconsistencies, also aided by visualisation.

3.2.1 Data toolchain and quality control

Improve data toolchain by simplification and automatisation of data interfaces. Establish formal data review steps with dedicated quality gates after data collection, ETM (Energy Transition Model) and DFT (Demand Forecasting Tool) processing. Introduce clear ownership, automated quality checks, and milestone-based validation procedures to ensure that only verified data enters subsequent modelling stages and is shared with stakeholders.

Motivation: Experience from previous cycles showed that a significant share of unexpected results in our modelling preliminary tests originated not from deficiencies in the models themselves, but from inconsistencies, errors or limited visibility of input data and assumptions. Improving data toolchain, validation and transparency will improve the quality and consistency of the model input data, increase process efficiency and strengthen stakeholder confidence throughout the scenario-building.

Priority: High

Actions required: Centralised coordination to manage data quality, enhanced data quality management strategy, coupled with specific and dedicated actions and tasks, to be established for the 2028 scenario cycle.

Status: To be implemented

3.2.2 Data visualisation to support data validation

Provide increased support for data releases through new, understandable, and user-friendly dashboards and visualisations for modelling results to support data validation early in the process as well as learning from trends.

Motivation: The credibility and usefulness of TYNDP scenarios depend fundamentally on the quality, consistency and transparency of the underlying data. Establishing the tools to review results is a priority and will enable the conditions for all other innovations.

Priority: High

Actions required: Investigate the potential use of new tools aside from PowerBI to improve the visualisation of flows/transit (for example: HTML maps), implement these new tools as needed post investigation.

Status: To be implemented

3.2.3 Data visualisation for external use

Improve the presentation of results for external stakeholders, including through an assessment of existing PowerBI visualisation platform, and through the creation of new, understandable, and user-friendly visualisations of results. Inclusion in the reported data a clear overview for each country.

Motivation: The credibility and usefulness of TYNDP scenarios depend fundamentally on the accessibility, understandability, and transparency of the underlying data. Reviewing current tool usage and establishing new tools to improve result presentation can provide a better comprehensive view of the output data. ACER's latest Opinion pointed out missing data presentation on country level.

Priority: Medium

Actions required: Investigate potential use of new tools aside from PowerBI to improve the visualisation of flows/transit (for example: HTML maps), implement these new tools as needed post investigation. Improve the PowerBI visualisation platform, including by providing more comprehensive infoboxes with detailed methodological notes.

Include key figures (electricity demand, total gas demand including biomethane, hydrogen demand, electricity production by type) and assess which data shall be presented at country level. Develop charts on cross-border flows of electricity, methane and hydrogen across EU Member States.

Status: To be implemented

3.3 Toolchain and modelling infrastructure

This chapter addresses improvements to the technical infrastructure and modelling environment supporting the Scenario Building process. The objective is to increase robustness, efficiency, transparency and accessibility of the modelling toolchain and the market modelling framework. Improvements range from standardisation, automation and documentation of the toolchain to enhancing understanding, validation and long-term resilience of the market modelling approach.

3.3.1 Testing PLEXOS® Functionalities

Improve understanding, documentation and validation of key PLEXOS® modelling functionalities and implementations used in TYNDP scenarios, including RES curtailment accounting, custom constraints, linear programming limitations, must-run representations and shadow price interpretation.

Motivation: Several PLEXOS® implementations have a material impact on TYNDP scenarios results but are not always fully documented or consistently understood across modelling teams. Improved understanding and documentation would increase transparency, facilitate troubleshooting, support model validation and reduce the risk of misinterpreting model outputs.

Priority: Medium-to-High

Actions required: Document and assess key modelling functionalities currently used in TYNDP scenarios market model, with a particular focus on:

- RES curtailment accounting and allocation methodologies
- Custom constraint implementations, including the modelling of hydrogen-fired CCGTs
- Limitations of the linear programming formulation, particularly regarding ramping behaviour and unit commitment approximations (e.g. nuclear fleet representation)
- Must-run modelling approaches, including minimum energy requirements, minimum online units and penalty-based formulations
- Interpretation of shadow prices and drivers of negative price formation

Status: To be implemented

3.3.2 Alternative Market Modelling Framework

Explore the alternative open-source market modelling framework alongside the Reference Tool to improve efficiency, transparency, accessibility, reproducibility and long-term modelling resilience. Additionally another approach might open up new modelling opportunities and add more flexibility in the modelling scope.

Motivation: Developing the model using a parallel modelling framework could reduce dependence on a single modelling platform, increase transparency and facilitate broader stakeholder participation. Given the expected continuity between the TYNDP 2026 and TYNDP 2028 market modelling frameworks, developing an alternative implementation of an already available and validated model could provide practical experience and allow direct benchmarking against existing results. PyPSA with an active user and developer community is considered with its variety of different applications, alongside other suitable alternatives, depending on resource availability and project requirements. In addition, an alternative modelling framework could enable the development of enhanced gas and hydrogen modelling capabilities beyond those currently available in the Reference Tool, providing greater flexibility to explore innovative methodologies and future modelling requirements.

Priority: High

Actions required: Assess available open-source options for an alternative market modelling framework, define the required resources, governance and implementation roadmap, and potentially develop a parallel modelling stream capable of benchmarking selected use cases against the Reference Tool without affecting existing workflows, input data preparation processes or delivery timelines.

Status: To be further assessed

3.4 Market Representation

This chapter focuses on improvements of market representation in the sector-coupled modelling of electricity, hydrogen and other energy carriers. The objective is to strengthen the realism of price formation, investment signals, infrastructure utilisation and cross-sector competition within an increasingly integrated European energy system.

3.4.1 Hydrogen market representation

Robust hydrogen market representation methodology to balance domestic production, imports and exports, which implies the review of the Long-Term-Contract (LTC) band methodology and the hydrogen price assumptions

Motivation: A revised methodology must better represent the competition between domestic production and imports, solve price formation issues and supports more realistic market coupling between electricity and hydrogen market. This implies reviewing the hydrogen cost assumptions, the resulting merit order and the LTC band methodology.

In the TYNDP 2026, to model Long Term Contracts for importing hydrogen from outside the EU, a low and a high price band was introduced to enforce a reasonable amount of imports into a supersaturated hydrogen market. The low priced imports affected the hydrogen price formation and as a result the electricity price formation. Consequently, infrastructure needs are also impacted.

Priority: High

Actions required:

- Assess alternative approaches to model hydrogen imports
- Assess alternative approaches to set prices in hydrogen market
- Assess alternative approaches to balance domestic production and hydrogen non-EU imports, including reviewing supply potentials
- Evaluate the impact of reviewed technical and economic parameters for sector coupling elements
- Improve hydrogen market representation with a revised methodology

Status: To be implemented

3.4.2 Liquified hydrogen

Modelling "shipped hydrogen carrier" as a proxy for all shipped hydrogen imports for network infeed, replacing ammonia as the single shipped import source

Motivation: Today it is not clear in what form hydrogen will be shipped, main candidates are Ammonia, Liquid Hydrogen (LH_2) or liquid organic hydrogen carrier (LOHC). Modelling only Ammonia, even as a proxy for all liquified hydrogen imports, leads to the assumption, that other energy carriers are not considered. To cope with that, all possible energy carriers are modelled as "shipped hydrogen carrier" for H_2-network feed-in. The associated import costs will be based on an economic analysis.

Priority: Medium-to-Low

Actions required: Economic analysis about different hydrogen based import energy carriers

Status: To be further assessed

3.4.3 Modelling of E-fuels

Implementing more detailed modelling of e-fuels, as the model currently assumes they can be transported freely across the European market.

Motivation: E-fuel modelling concerns synthetic fuels such as SNG and e-Liquids produced from hydrogen and captured carbon. More detailed e-fuel modelling will thus also positively impact the hydrogen market functioning.

Priority: Medium

Actions required: To be further assessed, check with Market Modelling Team (MMT) possible solutions which could be implemented vs. Data availability. Based on outcomes from MMT – re-assessment by supply innovation stream of the innovation for 2028 scenario cycle.

Status: Out of scope

3.4.4 Methanol

Explicitly showing e-methanol's contribution to FuelEU Maritime targets instead of grouping it with other synfuels in target attainment calculations and in demand profiles.

Motivation: The SRG identified methanol as a crucial low-carbon fuel for the decarbonisation of maritime transport and recommended its explicit inclusion in the 2028 cycle.

Green methanol is gaining attention as a promising low-carbon fuel for shipping and is expected to play a role in meeting FuelEU Maritime targets. Explicitly representing methanol in the scenarios could provide a more detailed breakdown of synfuel utilisation and improve the realism of lowcarbon fuel pathways in maritime transport, instead of relying solely on ammonia as a proxy.

In TYNDP 2026, e-methanol is already considered separately when determining the hydrogen and CO_2 requirements of synthetic fuel production, but is subsequently aggregated with other synthetic liquids into a common e-liquid demand profile for market modelling. Similarly, while synthetic liquids are explicitly accounted for when replacing conventional oil in shipping, their contribution is not broken down by individual fuel type.

Priority: Low. Despite its potential relevance for maritime decarbonisation, the explicit representation of methanol is assigned a low priority due to uncertainties in future deployment pathways and the need to prioritise innovations with wider cross-sectoral modelling benefits.

Actions required: Implementation would require collecting robust data on expected methanol demand and supply from member states and relevant stakeholders. Given the high uncertainty around future methanol uptake, there is a risk of limited or inconsistent responses.

Status: Out of scope. Methanol explicit modelling can be disregarded for this cycle as share of methanol on energy supply is currently negligible and expected benefits are marginal compared to the workload invested.

3.5 Flexibility Sources

This chapter explains proposed improvements in the modelling of different sources of flexibility and investigates even further possibilities in flexibility modelling.

3.5.1 EV modelling

Continue improving EV flexibility modelling through (1) enhanced passenger EV fleet segmentation supported by literature review and updated behavioural assumptions; and (2) introduction of dedicated heavy-duty vehicle charging and flexibility modelling.

Motivation: EVs are expected to become one of the main sources of demand-side flexibility. Improving the representation of charging behaviour, fleet composition and flexibility potential increases the realism of electricity demand profiles and flexibility provision. In addition, the SRG has repeatedly highlighted the need for more detailed EV modelling, including both passenger EV behaviour and the growing role of electrified heavy-duty transport.

Priority: High

Actions required: Implement the enhanced passenger EV segmentation methodology and dedicated heavy-duty vehicle flexibility modelling, while assessing their relevance, feasibility and expected impact on TYNDP scenarios.

Status: To be implemented

3.5.2 Heat pump flexibility

Introduce explicit heat pump flexibility modelling to capture demand-shifting behaviour and the interaction between heat demand, electricity prices and system conditions.

Motivation: Heat pumps are expected to become an increasingly important source of demand-side flexibility in future energy systems. Explicitly modelling their flexible operation would improve the representation of electricity demand and its interaction with variable renewable generation. In addition, the SRG has repeatedly highlighted the importance of better representing Heat Pump flexibility in future TYNDP cycles.

Priority: High

Actions required: Evaluate the use of an implicit DSR representation for Heat Pump flexibility, mirroring approaches already adopted in ERAA and CBA studies, as a pragmatic alternative to a dedicated Heat Pump flexibility module.

Status: To be implemented

3.5.3 Potential flexibility of data centres

Assess whether data centres can provide meaningful demand-side flexibility and identify which flexibility mechanisms, if any, should be represented within the TYNDP modelling framework.

Motivation: Data centres are expected to become a significant source of electricity demand in several European countries. Understanding whether part of this demand can provide flexibility may improve the representation of future power systems. However, the flexibility potential remains highly uncertain and appears to depend on workload type, operational constraints and technical design. External stakeholders increasingly raise this topic, but there is currently limited evidence supporting large-scale flexible behaviour as a generic assumption.

Priority: Medium

Actions required: Review available literature and industry experience to assess the realistic flexibility potential of data centres. Define whether a flexible share should be represented and, if so, identify appropriate assumptions differentiated by workload type and operational characteristics.

Status: To be further assessed

3.5.4 DSR shifting flexibility

Adding load displacement (shifting DSR – Demand-side-response) on top of the already implemented load reduction (shedding DSR), as the model does not include sufficient flexibility.

Motivation: Flexibility is essential in a system dominated by variable renewables. Adding shifting DSR would allow demand to move from peak or high-price hours to periods of lower demand or higher renewable availability. This would improve the modelling of flexibility, reduce unrealistic price spikes and provide better insights into the value of demand-side resources.

Priority: Medium-to-Low

Actions required: Further feasibility and impact assessment is needed before proceeding, including an evaluation of the added modelling complexity versus the expected benefits on system results.

Status: Nice-to-have

3.5.5 H_2 storage

Better represent operational constraints for H_2 storages and different storage time scales. Current storage may be too variable (acting as batteries) and/or too seasonal – depending on the storage type.

Motivation: There might be limitations in the current hydrogen storage modelling that need to be addressed. If storage is not used realistically, the model may underestimate short-term flexibility needs or overstate the flexibility provided by imports, SMRs or electrolysers.

Priority: Medium

Actions required:

- Review operational assumptions for existing hydrogen storage representations.
- Differentiate between storage technologies and storage durations.

Status: Out of Scope; Instead of additional constraints on hydrogen storage operation, the main objective is to ensure through results quality checks that H_2 storage flexibility is behaving as expected.

3.5.6 Industrial applications

Improve the representation of industrial demand-side flexibility, particularly load shifting, by differentiating the flexibility potential across industrial sectors and technologies. Next to that, specific flexibility assumptions for each industrial sector and technical and economic potential of the respective load-shifting processes would be defined. This would allow flexibility contributions to be traced back to individual industrial sectors.

Motivation: The SRG recommendation highlights including industrial applications as a potential source of system flexibility and adding sectoral and technological disaggregation of industrial flexibility. SRG would like the modelling framework to recognise that different industrial processes have different technical and economic capabilities to shift electricity consumption in time.

Priority: Low. While flexibility provision from industrial applications may be relevant, the topic overlaps existing flexibility and DSR-related innovations and does not currently constitute a distinct innovation area.

Actions required: Assess linkages to modelling industrial demand; Assess overlap with DSR and cross-vector flexibility innovations; where relevant, incorporate applicable elements into existing flexibility-related workstreams.

Status: Out of scope. The proposal is insufficiently defined as a standalone innovation and, if related to industrial flexibility, is better addressed under existing DSR and flexibility innovation topics.



3.6 Demand topics

This chapter provides an overview of innovations and enhancements across a range of demand topics as well as their associated modelling for the scenarios.

3.6.1 Improved user experience and features in the Energy Transition Model (ETM)

Support Quintel in the development of ETM web interface to improve user experience. The project aims to enhance real-time data validation and to simplify model complexity. Also explore extended scope/use of ETM for TYNDP scenario building to simplify the overall process.

Motivation: Some TSOs experienced difficulties in building their demand scenarios on ETM because collecting and comparing the most relevant input and output variables was not straightforward. In addition, there were some redundant input variables. As a software, ETM also provides more comprehensive features to build energy system scenarios, not limited to energy demand modelling only.

Priority: Medium-to-High

Actions required: Upgrade the web interface to let users view input and output variables next to each other in their scenario collection. Evaluate extended use of ETM where it can simplify and increase transparency the overall process.

Status: To be implemented. However, updating the reference year within the ETM itself will be out of scope due to resource and timeline implications. Instead, in reporting, Eurostat data sources will be included.



3.6.2 Modelling of prosumer node

This node will be redefined as a Residential + Tertiary (RETE) node (replacing the loosely defined "prosumer" node) and consolidate within it the full residential and tertiary load, including heat pump consumption, as a further, non-mandatory refinement with respect to previous cycle. Discontinue the behind-the-meter (BTM) pre-optimisation approach and attach all BTM capacities (solar PV and batteries) directly to a dedicated demand node.

Motivation: Defining this node as a "prosumer" node has proven difficult, as the concept is hard to delineate consistently across countries. Framing it instead as a Residential + Tertiary (RETE) node provides a clearer and a more reproducible definition. Consolidating the full residential and tertiary load in the RETE node means that the batteries attached to it see the totality of the residential and tertiary demand as their nearest load and the BTM solar as their nearest generation, improving the physical realism of self-consumption. It also makes the treatment and the accounting of BTM capacities more homogeneous across all countries. In the TYNDP 2026 approach, BTM solar PV and batteries were represented through pre-optimised timeseries for few countries. This makes the flexibility they provide independent of the model outcome, and the solar PV embedded in those timeseries is not reflected in the total solar PV capacity. Attaching all BTM capacities (solar and batteries) to a dedicated demand node instead allows the model to represent distributed flexibility and self-consumption endogenously to ensure a complete and transparent accounting of installed PV.

Priority: Medium

Actions required:

- Discontinue the BTM pre-optimisation; behind-the-meter flexibility will no longer rely on pre-optimised timeseries.
- Attach all behind-the-meter capacities (solar PV and batteries) to the node, and describe this treatment clearly to the LACs.
- Define the corresponding PEMMDB categories clearly, so that BTM capacities are consistently classified and accounted for across countries.
- Improve ETM/DFT data flow
- Inform during data collection what is included in the model and what is not.
- Replace loosely defined "prosumer" node with a Residential + Tertiary (RETE) node. The RETE load would comprise the residential and tertiary load from ETM; in practice, it should be sufficient to use the (Residential + Tertiary)/total load split already available in DFT inputs.
- Include all heat pump consumption (hybrid and non-hybrid) in the RETE node. Whereas TYNDP 2026 considered only the additional heat pumps relative to the reference year, for TYNDP 2028 it is proposed that: (a) the additional heat pumps (compared to the reference year) are profiled according to the DFT, as in TYNDP 2026; and (b) the existing heat pumps are absorbed into the remaining RETE load, following its baseline profile.
- Keep the same profiling as the baseload for the RETE load.

Status: To be implemented

3.6.3 Documentation of demand assumptions

Establish a process for a better transparency on applied demand assumptions, instruct TSOs how this is conducted.

Motivation: In the 2026 cycle, TSOs completed ETM based on demand levels foreseen in national policies. They had to interpret national policy documents and create scenarios in ETM with corresponding demand levels. They did not document the assumptions used when constructing demands out of technology shares. As there is a public interest in these assumptions, we now aim to provide them.

Priority: Medium

Actions required: Guidelines are to be developed.

Status: To be implemented



3.6.4 Hydrogen demand profiles

Reviewing hydrogen demand profiles, with particular attention to sector-specific characteristics, demand flexibility, and the representation of industrial hydrogen consumption.

Motivation: Hydrogen demand profiles influence hydrogen infrastructure utilisation, storage requirements and network flows. The review will assess whether sector-specific demand characteristics are appropriately represented, including continuous industrial demand, temperature-dependent heating demand, transport applications and potential flexibility in selected end-use sectors. The objective is to ensure that hydrogen demand assumptions are consistent with the operational characteristics of the respective sectors and with the overall energy system modelling framework.

Priority: Medium

Actions required:

- Review hydrogen demand hourly profiles by sector
- Assess the representation of industrial, transport and heating-related hydrogen demand. Evaluate the degree of operational flexibility that can realistically be assumed for major hydrogen consumers, including steel, chemical and refining sectors. Define any required methodological improvements.

Status: To be further assessed

3.6.5 Transmission system losses

Reassessing transmission system losses in the electricity grid. They are currently calculated ex ante according to TSOs overall absolute losses in a market area. and potentially underestimated.

Motivation: Losses matter because they affect the amount of generation required to meet demand. If losses are underestimated or inconsistently applied, the model may misstate demand, generation needs and costs.

Priority: Medium

Actions required: Losses are currently not treated consistently between market nodes and prosumer nodes. Improved instructions in the data collection process is necessary to secure comprehension from the LACs and consistency in the data filled in the templates. Modelling assumptions should be clarified beforehand as well to optimise data collection guidelines and methodology.

Status: To be further assessed

3.7 Supply topics

This chapter provides an overview of innovations across a range of supply topics, and their associated modelling for the scenario-building.

3.7.1 Other non-RES

Improve the definition and fuel allocation of "Other non-RES". Improvement in the report showing a clear breakdown of each fuel that is encompassed in the Other Non-RES category.

Motivation: They are currently not always clearly defined or consistently labelled and no fuel is assigned to them. Currently, fuel use can be gas, coal, lignite, and oil. If "Other non-RES" is not well defined, results become difficult to interpret and compare across countries.

Priority: Medium

Actions required:

- Implement, in the report, better definition for the "Other non-RES"
- Implement ancillary figures or graphs that allow more transparency on the fuel allocation of this technology

Status: To be implemented

3.7.2 Country-Level data reporting

Include in the reported data a clear overview for each country.

Motivation: ACER Opinion 13 2026: With few exceptions (e.g. hydrogen imports per corridor), data remains presented only at EU-wide level.

Priority: Medium

Actions required:

- Provide key figures (electricity demand, total gas demand, biomethane production, hydrogen demand, electricity production by type) at country level
- Charts on cross-border flows of electricity, methane and hydrogen across EU Member States.

Status: To be further assessed

3.7.3 Carbon budget

Move from a purely expost carbon accounting exercise to a carbon budgeting setup where emissions from the modelled energy system are subject to an explicit carbon cap within the optimisation.

Motivation: The current carbon budget, used to report the trajectory of emissions along the scenario horizons, is calculated expost. To more robustly ensure consistency with the netzero target, emissions stemming from within the modelled energy system should be constrained by a carbon cap expressed as a global constraint in the optimisation. This would enhance the realism of the dispatch of fossil technologies and ensure that their operation is aligned with the overall emissions trajectory rather than only being evaluated afterwards.

Priority: Medium

Actions required:

- Implementing such a cap requires a consistent methodology to derive the carbon limit associated with the modelled technologies, in a way that is compatible with emissions from sectors currently outside the scope of the model.
- This needs to be assessed and tested by MMT, both for the default dispatch setup and for any capacity expansion runs, if applicable, including specific sensitivities to understand the impact on results and transparency.
- It also requires assessing how the introduction of a carbon budget constraint affects the transparency and interpretation of model results.

Status: To be further assessed

3.7.4 CO_2 Sector modelling improvements

The proposed improvement aims to incorporate the modelling of different energy carriers and CO_2 sources, including CCS (Carbon Capture and Storage), CCU (Carbon Capture and Utilisation), and CDR (Carbon Dioxide Removal) to better capture these processes implicitly. This includes an improved distinction among CO_2 sources and between the reuse of emissions and permanent removals, while reviewing relevant CCS pricing and utilisation assumptions.

Motivation: The proposed improvements aim to better reflect the CCU/CCS/CDR potential and enable a more accurate calculation of the carbon budget. This should include non-energetic CCU applications, particularly the use of hydrogen and CO_2 as feedstocks for chemical production, as well as a clear distinction between the reuse of CO_2 and permanent carbon removals. At the same time, potential interactions between the use of biogenic CO_2 for synthetic fuels or other CCU applications and its use for BECCS should be appropriately reflected.

The interaction between CCS costs, infrastructure availability, full-load hours, fuel prices and the merit order should be assessed to ensure economically plausible technology deployment and a consistent representation of the relative role of different decarbonisation options. This is important to account for potential deviations between modelled CCS deployment and its technically and economically achievable deployment, which could otherwise lead to an underestimation of the emissions gap and distort the energy system trajectory.

Priority: Medium

Actions required:

- Update Supply Tool to improve the carbon budget representation
- Preparation for the new IPCC Methodology Report on CDR, CCS and CCU expected in 2027
- Improvement communication with stakeholders on how CCS is modelled
- Review of CCS literature and underlying assumptions, including infrastructure requirements, utilisation levels, and full-load hours.
- Assess the implementation of CCS prices reflecting the full costs of CCS in the modelling tool, while reviewing the interaction between CCS assumptions, fuel prices, and the merit order of power generation technologies.

Status: To be further assessed; An enhanced CCS treatment and improved representation of CCS costs are to be implemented within the MMT. However, explicit modelling of a CO_2 system is out of scope for this cycle.

3.7.5 Peaking units utilisation

Further analysis of gas turbine operations and peaking unit utilisation could help improve the understanding and interpretation of model results, particularly regarding their role under different system conditions and market situations.

Motivation: Peaking unit utilisation is an endogenous outcome of market modelling, resulting from the interaction between generation costs, demand, renewable generation, available flexibility and other modelling assumptions. Further analysis could provide additional insight into the conditions driving the utilisation of OCGTs, CCGTs and, in the future, hydrogen-capable or hydrogen-retrofitted thermal power plants. The purpose of this work would not be to reproduce in detail operational constraints, reserve requirements or adequacy needs, which are addressed through dedicated processes and studies, but rather to better understand the behaviour observed in scenario modelling results and assess the sensitivity of peaking unit utilisation to relevant modelling assumptions.

Priority: Medium-to-Low

Actions required:

- Analyse the main drivers influencing gas turbine and peaking unit utilisation in model results.
- Review the sensitivity of peaking unit utilisation to relevant assumptions, including fuel costs, carbon prices, renewable penetration and thermal generation availability.
- Assess the behaviour of peaking units during periods of high residual load and selected weather conditions.
- Review utilisation of hydrogen-capable and hydrogen-retrofitted power plants under different fuel price assumptions.
- Compare modelled OCGT and CCGT utilisation with historical operational data, where relevant and comparable, to support the interpretation of model results.
- Assess whether additional analysis of gas price seasonality could provide useful insights into peaking unit utilisation.

Status: Out of scope. Peaking unit utilisation is an endogenous model result and is closely linked to the broader modelling assumptions and framework. While further analysis could support the understanding and interpretation of these results, a more detailed representation of operational constraints, reserve requirements and adequacy needs falls outside the scope of scenario market modelling and is addressed through dedicated studies.



3.8 System and Grid Representation

This chapter provides an overview of the energy system and grid related innovations that concern the TYNDP scenario-building.

3.8.1 Scenario Grid

Develop a more consistent and transparent methodology for defining the Scenario Grid for electricity and hydrogen across planning horizons. The objective is to improve the alignment of project categorisation, maturity and grid assumptions.

Motivation: Recent TYNDP cycles and stakeholder feedback highlighted differences in the methodologies used to define electricity and hydrogen grids. In particular, project categorisation and maturity requirements are not always applied consistently across infrastructures and planning horizons.

Priority: High

Actions required: Review and align project categorisation, maturity requirements and grid assumptions for electricity and hydrogen infrastructures, while improving transparency and stakeholder consultation processes.

Status: To be implemented

3.8.2 Improved modelling of Non-EU countries

Implement a structured process for early engagement, validation and review of modelling inputs from non-EU countries, like the UK and NO.

Motivation: Missing, incomplete or unrealistic assumptions for non-EU countries can significantly distort prices, cross-border flows, market-prices and congestion patterns, security-of-supply assessments, infrastructure utilisation rates, hydrogen import availability and routing, storage requirements, flexibility needs, balances and infrastructure needs across Europe.

Priority: High

Actions required:

- Earlier consultation with non-EU TSOs during the data collection phase to validate key assumptions before model building begins.
- Establish dedicated review milestones for non-EU country inputs as part of the scenario development timeline.
- Assign country-specific ownership and responsibility, ensuring that a designated expert maintains regular contact with key non-EU TSOs throughout the cycle.
- Develop a standardised data validation process for non-EU country submissions, including consistency checks against publicly available national plans and projections.
- Improve transparency regarding assumptions adopted for non-EU countries and document any deviations from national submissions.
- Establish an escalation process for unresolved data gaps or conflicting assumptions.
- Assess geopolitical and regulatory developments that may materially affect long-term infrastructure and market developments in neighbouring countries.

Status: To be implemented

3.8.3 Emerging technologies

Develop a transparent process for including emerging technologies and new model features in TYNDP Scenario modelling. The innovation aims to create a structured and consistent approach through which new technologies can be evaluated, tested and, where appropriate, integrated into the modelling framework during Scenario Building.

Motivation: The SRG identified the need to ensure that emerging technologies are assessed fairly and consistently rather than on an ad hoc basis. A transparent inclusion process would allow models to remain up to date with technological developments and provide a clear pathway for incorporating innovations as they emerge. Benefits include increased transparency, consistency and the ability of the modelling framework to reflect technological progress. A deferred innovation from the 2026 Roadmap.

Priority: Medium. Important for maintaining the long-term relevance and credibility of TYNDP Scenarios, although not essential for immediate model delivery.

Actions required: Establish a transparent evaluation process; define assessment criteria; identify candidate technologies; test and assess applicability; document decisions on inclusion or exclusion.

Status: To be further assessed. The inclusion of emerging technologies in the Scenario modelling must be assessed on an individual basis as the feasibility is strongly dependent on the data clarity and methodological meshing.

3.8.4 Granularity of electricity and hydrogen grid topology

Improved i.e. more granular and detailed topology of the electricity and hydrogen grid, and their interactions, in the future European energy system.

Motivation: A more detailed representation of the electricity and hydrogen grid would assist in creating a more detailed overview and representation of the energy system, when multiple countries, and their exchanges, are being modelled.

- **Higher electricity grid granularity:** Higher granularity of the electricity grid is currently captured in the Identification of System Needs (IoSN) assessment, part of the TYNDP. Deferred already in the TYNDP 2026 scenarios.
- **Higher hydrogen (H_2) grid topology:** The hydrogen grid topology has been improved in some aspects but the system wide granularity of the hydrogen system in TYNDP scenarios has not been revised.

Priority: Medium to High

Status: Out of scope. The key objective of the modelling for TYNDP scenarios is to assess the supply-demand balance. Grid-related assessments are captured at a later stage of the TYNDP process. Higher granularity of the electricity grid is captured in the Identification of System Needs (IoSN) assessment. Higher topology in hydrogen grid modelling is captured in the Cost-Benefit Analysis (CBA) for hydrogen infrastructure, and Hydrogen Infrastructure Gaps Identification (H_2 IGI), which also are a part of the TYNDP. This also helps avoid overly complex and computationally intensive modelling.

3.8.5 Granularity of the model topology across sectors

Improvements that increase the granularity of the model topology e.g. by adding or better representing additional sectors and energy carriers (like CO_2, heat, e-fuels, etc.) and their flows to more realistically capture cross-sector interactions.

Motivation: Higher granularity would improve the realism of scenarios by more accurately reflecting regional demand, renewable potential and crosssector flows. It would enhance the ability to make estimates concerning supply chains and production infrastructure for carriers like synfuels, and support better localisation of production assets and hubs. This in turn would help identify network constraints more precisely and enable more targeted investments in renewables, hydrogen and synfuel production, and grid enhancements in the future.

Priority: Medium to Low

Actions required: This would require robust, harmonised data on CO_2, heat and synfuel flows and infrastructures, consistent technoeconomic assumptions. Additionally, it introduces an increase in computational complexity of the model that needs to be assessed.

Status: Out of scope

3.8.6 Innovative grid technologies

Model advanced grid technologies, such as Dynamic Line Rating and Modular Power Flow Control, to improve the accuracy, responsiveness and operational realism of grid modelling within TYNDP Scenarios. The aim is to better reflect the potential contribution of innovative grid solutions to system performance.

Motivation: The innovation seeks to improve the representation of advanced grid technologies in scenario modelling, enabling a more accurate assessment of their impact on network utilisation and system operation. Potential benefits include improved modelling accuracy and a better understanding of how innovative grid solutions may support future energy systems.

Priority: Low. Although strategically relevant, survey prioritisation and resource constraints indicate that other innovations provide greater immediate value already in the 2026 cycle as well as for the 2028 cycle.

Actions required: Identify relevant grid technologies; assess modelling requirements and data availability; evaluate potential impacts on scenario outcomes; determine whether a robust and harmonised modelling approach can be established.

Status: Out of Scope. In addition, the innovation faces challenges similar to other efficiency-gain innovations, where quantifying and consistently representing operational benefits within long-term scenario development frameworks remains methodologically complex. This is particularly true to the limited usage of innovative grid technologies today.

4 IMPLEMENTATION PLAN: MAINTAINING THE INNOVATION ROADMAP AS A LIVING DOCUMENT

As a living document, the **Innovation Roadmap** will be updated and refined through several iterations. These updates will reflect changes in the status of innovations and provide revised implementation timelines. Particular attention will be given to innovations requiring further assessment, as they will finally be classified into the categories **To be implemented** or **Out of scope**.

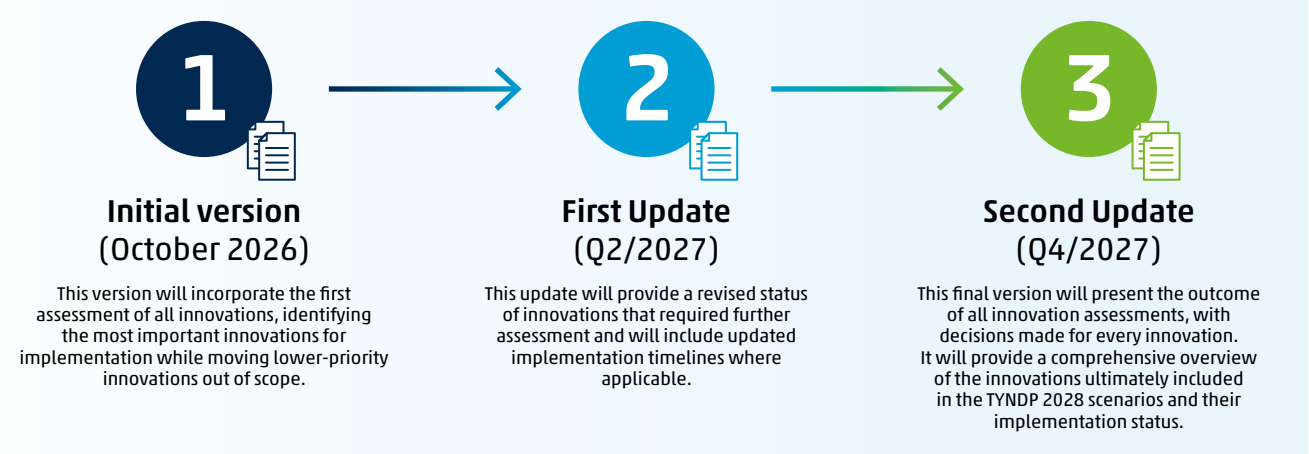


Figure 5: Innovation Roadmap and its Implementation Plan as a Living Document.

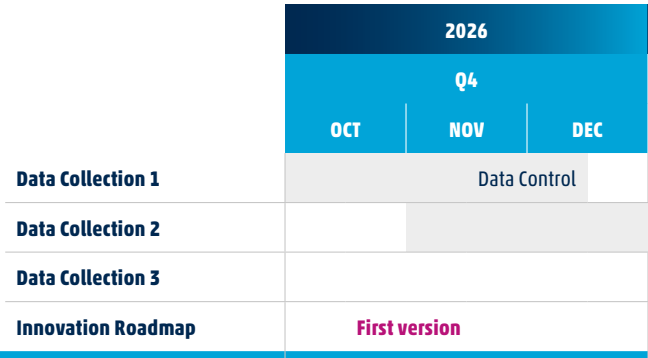
In total, three versions of the Innovation Roadmap will be published (Figure 5):

- **Initial Version (October 2026):** This version will incorporate the first assessment of all innovations, identifying the most important innovations for implementation while moving lower-priority innovations out of scope.
- **First Update (Q2 2027):** This update will be based on feedback received in the anticipated public consultation in Q1 2027 as well as provide a revised status of innovations that required further assessment and will include updated implementation timelines where applicable.
- **Second Update (Q4 2027):** This final version will present the outcome of all innovation assessments, with decisions made for every innovation. It will provide a comprehensive overview of the innovations ultimately included in the **TYNDP 2028 scenarios** and their implementation status.
- The Implementation Plan to the Innovation Roadmap translates the work in the innovation streams further into sub-team work packages in the TYNDP Scenario-Building 2028. Dedicated workshops with the Stakeholder Reference Group are foreseen to take place related to identified key topics, which range from proposed changes in key methodologies to individual themes in the Roadmap, taking place throughout the scenario-building cycle. The first version of the Implementation Plan can be found in the next figure and showcases the time plan for each individual innovation that is *to be implemented*, *nice-to-have* or *to be further assessed*. The implementation phase of the latter is preliminary, depending on the assessment. Note that the exact dates for SRG workshops are still to be defined and thus subject to change (Figure 6).

Stakeholders are welcome to contact ENNOH, ENTSO-E and ENTSOG directly at scenarios@entsos-tyndp-scenarios.eu in the meantime.

Legend

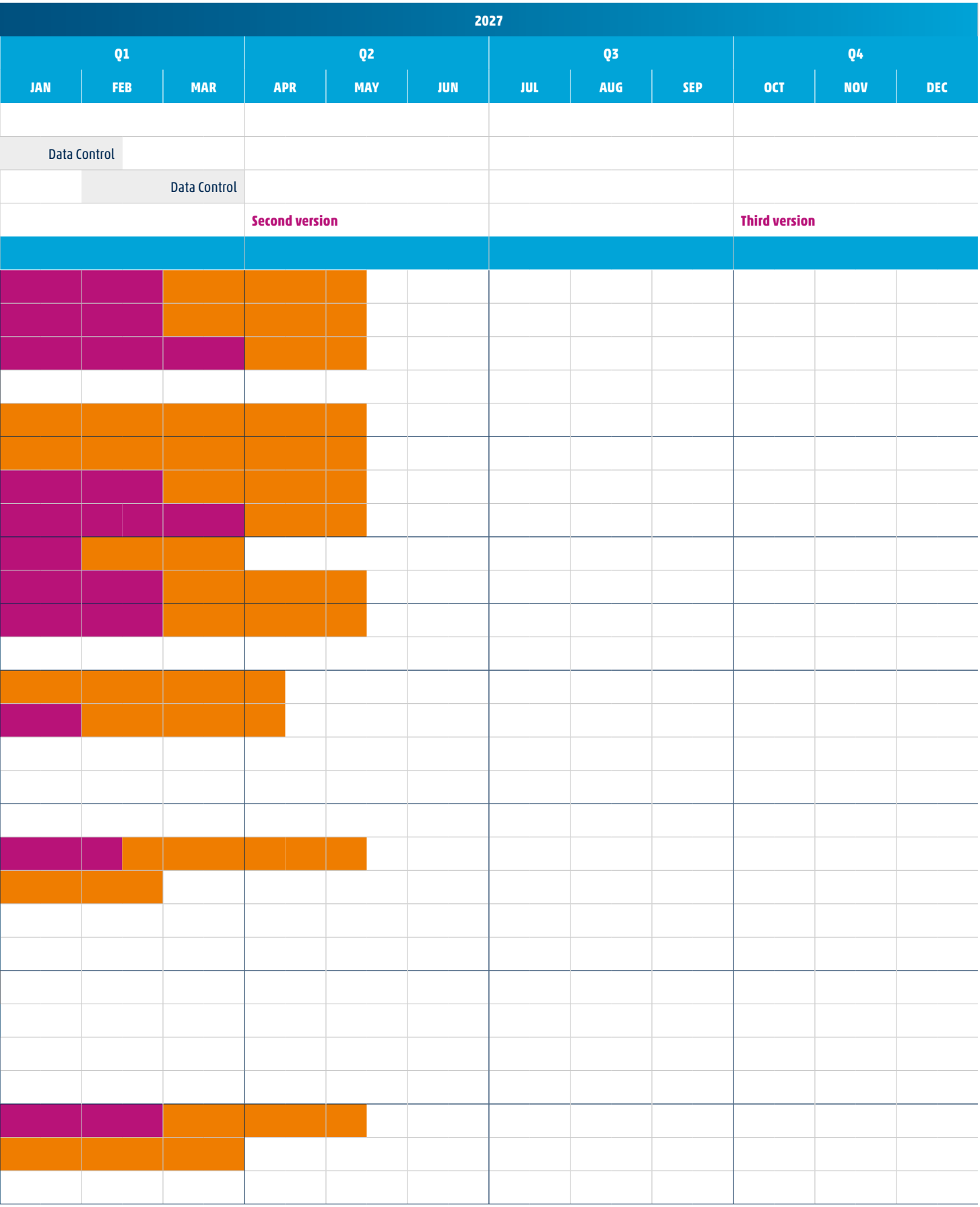
- Preparing Methodology
- Testing
- Implementing
- Assessment



	INNOVATIONS		SRG INVOLVEMENT*
Scenario Framework and Methodology	3.1.1	Assessing the path to target alignment	Q4 2026 & Q1 2027
	3.1.2	Strenghten economic variants	Q4 2026 & Q1 2027
	3.1.3	Stakeholder-supported Scenario Benchmarking	Q4 2026
	3.1.4	Climate Year Selection Methodology	No
	3.1.5	Enhance stakeholder interaction	Ongoing
Data Quality and Visualisation	3.2.1	Data toolchain and quality control	Q4 2026 & Q1 2027
	3.2.2	Data visualisation to support data validation	Q4 2026 & Q1 2027
	3.2.3	Data visualisation for external use	Q4 2026 & Q1 2027
Toolchain and Modelling	3.3.1	Testing PLEXOS® functionalities	No
	3.3.2	Alternative market modelling framework	No
Market Representation	3.4.1	Hydrogen market representation	Q1 2026
	3.4.2	Liquified hydrogen	No
Flexibility sources	3.5.1	EV modelling	Q1 2027
	3.5.2	Heat pump flexibility	Q1 2027
	3.5.3	Potential flexibility of data centers	Q1 2027
	3.5.4	DSR shifting flexibility	Q1 2027
Demand topics	3.6.1	Improved user experience and features in ETM	Q4 2026
	3.6.2	Modelling of prosumer node	Q4 2026
	3.6.3	Documentation of demand assumptions	Q4 2026
	3.6.4	Hydrogen demand profiles	Q4 2026 & Q1 2027
	3.6.5	Transmission system losses	Q4 2026
Supply topics	3.7.1	Other non-RES	No
	3.7.2	Country level data reporting	No
	3.7.3	Carbon budget	Q4 2026
	3.7.4	CO_2 sector modelling improvements	Q4 2026
System and Grid Representation	3.8.1	Scenario Grid	No
	3.8.2	Improved modelling of non-EU countries	No
	3.8.3	Emerging Technologies	Q1 2027

*Dates are subject to change

Figure 6: Implementation plan for the innovations


2027
Q1
Q2
Q3
Q4
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Data Control
Data Control
Second version
Third version

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ENTSOs (2026a) TYNDP 2026 // Scenarios Consultations Summary Report, January 2026:
Summarises stakeholders' feedback on the first publication of the Innovation Roadmap.

ENTSOs (2026b) TYNDP 2026 Draft Scenarios Report.

ENTSOs (2026c) TYNDP 2026 Annexes to the Draft Scenarios Report.

SRG (2025) Stakeholder Reference Group for the TYNDP scenarios:
Summarises the SRG's detailed advice on the Innovation Roadmap 2026.

SRG (2026) Stakeholder Reference Group's Opinion on the TYNDP 2026 Scenarios, April 2026.

ACRONYMS

ACER	European Union Agency for the Cooperation of Energy Regulators
AR6	Sixth Assessment Report (of the Intergovernmental Panel on Climate Change)
BTM	Behind The Meter
CBA	Cost Benefit Analysis
CCGT	Combined Cycle Gas Turbine
CDR	Carbon Dioxide Removal
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilisation
DFT	Demand Forecasting Tool
DSR	Demand-Side-Response
ENNOH	European Network of Network Operators for Hydrogen
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
ENTSOs	ENTSO-E, ENTSOG and ENNOH
ESABCC	European Scientific Advisory Board on Climate Change
ERAA	European Resource Adequacy Assessment
ETM	Energy Transition Model (primarily used for yearly demand quantification)
EV	Electric Vehicle
HDV	Heavy Duty Vehicle
IoSN	Identification of System Needs
IPCC	Intergovernmental Panel on Climate Change
LOHC	Liquid Organic Hydrogen Carrier
LTC	Long-Term-Contract
MMT	Market Modelling Team
NECPs	National Energy and Climate Plans
OCGT	Open-cycle Gas Turbines
PECD	Pan-European Climate Database
PEMMDB	Pan-European Market Modelling Data Base
PLEXOS®	The PLEXOS® Energy Market Simulation Software
PV	Solar photovoltaics
RETE	Residential + Tertiary node
SNG	Synthetic Natural Gas
SRG	Stakeholder Reference Group
TSO	Transmission System Operator
WGSB	Working Group Scenario Building

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