

ENNOH

CONSULTATION REPORT

RESPONSES TO CONSULTATION FEEDBACK
ON ITS FIRST SINGLE-SECTOR DRAFT METHODOLOGY

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ENNOH'S RESPONSES TO CONSULTATION FEEDBACK ON ITS FIRST SINGLE-SECTOR DRAFT METHODOLOGY

The first ENNOH draft of the Cost-Benefit Analysis (CBA) Single-Sector Methodology was subject to public consultation from 15 September to 15 December 2025.

In total, nine stakeholders provided feedback during the consultation period. Seven stakeholders submitted their comments exclusively through the consultation questionnaire, one stakeholder provided a separate position paper, and one stakeholder submitted both a completed questionnaire and an additional written statement.

All non-confidential feedback received, together with ENNOH's responses, is presented below.

1. Does the new way of presenting general approach, including the modelling, enhance transparency and comprehension in your view?

— Stakeholder feedback

A majority of stakeholders, including Italgas, GD4S, Proxigas and EirGrid, welcomed the revised presentation of the general approach and modelling framework, noting that it represents a clear improvement in transparency and overall comprehension. These stakeholders highlighted in particular the clearer structure of the document, the more explicit description of the scenario development process and optimisation principles, and the introduction of a multi-energy system (MES) perspective. According to this feedback, these elements support a more objective and consistent comparison between projects and help explain the underlying assessment logic, including to non-technical audiences.

Several stakeholders, including Hydrogen Europe and H2eart for Europe, acknowledged the improved clarity of the methodology but called for further clarification on the scope of application and on how ENNOH's modelling framework relates to, and is coordinated with, the modelling approaches applied by ENTSG and ENTSO-E. In particular, they requested more information on the types of models envisaged, the alignment of assumptions across sectors, and the risk of oversimplification when translating methodological principles into practical evaluation rules.

EWE Gasspeicher generally supported the revised approach but raised concerns that certain modelling choices may risk understating the systemic value of underground hydrogen storage. In particular, they pointed to potential limitations in capturing flexibility, resilience and cost-efficiency benefits associated with storage assets within the current modelling set-up.

EirGrid emphasised the importance of transparency in modelling assumptions from the perspective of cross-border system impacts and sector coupling, noting that clear explanations of modelling principles are essential for assessing the interaction between hydrogen infrastructure development, renewable integration and electricity system operation.

Overall, while stakeholders broadly supported the revised presentation of the general approach and modelling framework, several respondents requested additional clarity on modelling architecture, assumptions, and cross-sector alignment to further enhance transparency and facilitate practical application.

— ENNOH Response

ENNOH welcomes the broadly positive feedback on the improved transparency, structure and comprehensibility of the general approach and modelling framework. In response to the consultation, several clarifications and refinements have been introduced in the revised methodology to address the points raised.

First, the scope, positioning and intended use of the methodology have been clarified in Chapter 1, including its role as a stable CBA framework applicable across planning cycles and its relationship with other TYNDP deliverables. This clarification responds to stakeholder requests for greater certainty regarding the document's scope and its interaction with other regulatory and planning processes.

Second, Chapter 2.2 has been restructured to clearly distinguish between general modelling principles and CBA-specific modelling requirements. This restructuring aims to improve readability and address requests for a clearer explanation of the modelling logic underpinning the assessment, while avoiding unnecessary technical detail at the methodology level.

Third, a new subsection (Chapter 2.2.3) has been introduced to explicitly define key modelling requirements relevant for CBA assessments, including spatial and temporal resolution, sector coupling and regional interlinkages. This addition increases transparency regarding the minimum modelling features expected for CBA applications, while remaining technology- and tool-neutral.

ENNOH also acknowledges stakeholder comments regarding the representation of flexibility and storage assets. In response, the methodology further clarifies the role of multi-energy system (MES) modelling in capturing cross-sector interactions and system-level effects. In particular, the introduction of explicit modelling requirements in Chapter 2.2.3 strengthens the ability of the CBA framework to consistently assess the system-wide contribution of flexibility and storage-related assets.

Overall, the CBA Methodology is designed to provide a robust and durable framework rather than a fully specified implementation manual. Detailed modelling assumptions, parameter values and the operational alignment with ENTSG and ENTSO-E models will therefore be further addressed in cycle-specific and implementation-related documents, ensuring transparency while preserving flexibility for future developments.

2. Do you need further explanation about the general approach?

In which part/regard?

— Stakeholder feedback

Several stakeholders, including Italgas, GD4S and Proxigas, indicated that the general approach is overall well structured and understandable, but would benefit from further clarification of specific assumptions underpinning the assessment, in particular regarding the calculation of environmental benefits. These stakeholders requested additional transparency on how baselines for GHG emission reductions are defined, which assumptions are used for different scenarios, and how differences between sectors such as industry, transport and residential demand are reflected in the analysis.

Hydrogen Europe requested further clarification on how ENNOH's approach is coordinated with existing ENTSG and ENTSG-E rules and practices. In particular, questions were raised regarding the conditions under which the ENNOH CBA methodology could be applied earlier than 2028, the definition and alignment of common model inputs across organisations, and the treatment of parameters such as the social discount rate.

Several stakeholders, including EWE Gasspeicher and EirGrid, asked for clearer explanations of how cross-sector integration between electricity, natural gas and hydrogen is modelled in practice. This includes requests for more detail on how flexibility, adequacy and resilience aspects are captured, how curtailed versus disrupted hydrogen demand is defined and quantified, and how these concepts interact with cross-sector planning and electricity-hydrogen integration.

Additional comments were raised regarding data granularity, the calculation of socio-economic welfare impacts, the treatment of competing projects and clustering rules, and the calibration of model constraints. Edison highlighted the importance of adequately reflecting regional cost differences for hydrogen production and imports, as well as the distinction between renewable and low-carbon hydrogen.

Overall, while stakeholders recognised the coherence of the general approach, many requested further explanation on modelling assumptions, parameter choices and cross-sector consistency to facilitate understanding and practical application.

— ENNOH Response

ENNOH acknowledges the requests for further explanation of specific elements of the general approach and modelling framework. In response to the consultation, the revised interim methodology provides additional clarifications while maintaining a clear distinction between methodological principles and cycle-specific implementation choices.

First, the revised interim methodology clarifies in Chapter 1 and Chapter 2 the role of scenarios, reference infrastructure levels and weather years in defining baselines for the assessment of costs and benefits, including GHG emissions. This clarification addresses requests for greater transparency on how baseline assumptions are constructed and how project impacts are derived through with- and without-project comparisons.

Second, the restructuring of Chapter 2.2 and the introduction of the new Chapter 2.2.3 respond directly to stakeholder requests for a clearer explanation of cross-sector modelling. The revised interim methodology explicitly sets out the minimum modelling requirements relevant for CBA assessments, including spatial and temporal resolution and the representation of sector coupling, thereby improving transparency on how interactions between electricity, gas and hydrogen systems are captured at methodological level.

ENNOH also notes stakeholder requests for additional detail on parameters, sectoral differentiation, cost assumptions and operational rules. The revised interim methodology is intentionally designed as a stable framework applicable across planning cycles. Detailed assumptions, parameter values and specific modelling choices, including those related to sectoral differentiation, discount rates and price inputs, will therefore be defined in accompanying documents, allowing them to reflect the most up-to-date data and context.

Overall, the revised interim methodology seeks to strike a balance between providing sufficient methodological clarity and maintaining the flexibility required to adapt assumptions and parameters over time, while ensuring consistency and transparency in the assessment of hydrogen infrastructure projects.

3. Does the enlargement of the methodological scope of infrastructure levels support the assessment process in your view?

— Stakeholder feedback

Feedback received during the consultation indicates broad support for the extension of the methodological scope to include multiple infrastructure levels. Stakeholders such as Italgas, GD4S and Proxigas underlined that the consideration of different stages of infrastructure development contributes to a more systemic assessment, allowing interdependencies, bottlenecks and system-wide effects to be better identified. According to this feedback, the use of infrastructure levels supports a more robust evaluation of resilience and flexibility and improves the overall coherence of the assessment framework.

At the same time, some stakeholders raised questions regarding the practical application and characterisation of infrastructure levels. Hydrogen Europe considered the overall concept to be understandable, but expressed concerns about the relevance of certain levels in early market phases and suggested adjustments to their use as reference configurations. In particular, Hydrogen Europe recommended postponing the application of some infrastructure levels and broadening others to explicitly reflect the role of strategically relevant projects, such as IPCEI initiatives.

Further comments were provided by EWE Gasspeicher and EirGrid, who emphasised the importance of ensuring that infrastructure levels appropriately reflect system maturity and are compatible with the underlying modelling framework. EWE Gasspeicher highlighted the need for sufficient spatial and temporal resolution to capture bottlenecks and flexibility needs, while EirGrid stressed the relevance of infrastructure levels for phased investment strategies, especially in regions where hydrogen infrastructure is still at an early stage of development.

Overall, while the concept of infrastructure levels was widely welcomed, stakeholders called for clearer rules on their construction, selection and use within the CBA, as well as for better alignment with system maturity and strategic infrastructure considerations.

— ENNOH Response

ENNOH welcomes the positive feedback on the enlargement of the methodological scope to include multiple infrastructure levels and acknowledges stakeholder requests for further clarification on their construction and use. In response to the consultation, the revised interim methodology introduces a more structured and transparent approach to infrastructure levels.

In particular, Chapter 2.3 has been substantially revised to clarify that infrastructure levels represent coherent system configurations reflecting different stages of development of the European hydrogen system. Rather than being predefined or static, infrastructure levels are constructed based on project maturity, ensuring that reference configurations used in the CBA reflect realistic and consistent system states.

To support this approach, the revised interim methodology introduces a maturity-tier framework, which classifies projects according to transparent and verifiable criteria such as permitting status, financial commitment and construction progress. In addition, the introduction of a dedicated Tier E allows the explicit consideration of strategically relevant EU-level projects, including PCI/PMI, IPCEI and other priority infrastructure, even in early market phases.

The revised interim methodology also clarifies the role of infrastructure levels as the common reference context for assessing individual projects, supporting incremental benefit assessment across different system maturity stages. As such, infrastructure levels are designed to enhance consistency and comparability across CBAs, while remaining sufficiently flexible to accommodate different development pathways of the hydrogen network.

Detailed choices regarding the application of infrastructure levels in specific assessments, including their interaction with modelling resolution and scenario assumptions, will be further specified in accompanying documents. This ensures that the revised interim methodology provides a robust and transparent framework, while allowing practical application to evolve in line with system development and future planning cycles.

4. Do you consider the concept of curtailed vs disrupted hydrogen demand understandable? Do you need further explanation? In which part/regard?

— Stakeholder feedback

Stakeholder feedback shows that the distinction between curtailed and disrupted hydrogen demand is generally understood and appreciated as a useful conceptual differentiation. Several stakeholders, including EWE Gasspeicher and H2eart for Europe, explicitly welcomed the introduction of this distinction and considered it helpful for improving consistency with security of supply and resilience considerations.

At the same time, a number of stakeholders, including Hydrogen Europe, EirGrid and Proxigas, questioned whether the economic relevance of disrupted hydrogen demand is sufficiently reflected in the current framework. In particular, concerns were raised that the value attributed to disrupted demand may be underestimated for certain end uses, especially where substitution options are limited or not readily available. Several respondents stressed the importance of an appropriate Cost of Disrupted Hydrogen (CODH) to reflect economic damages, security of supply impacts and, potentially, additional emissions effects.

Further requests for clarification related to the practical application of the concepts, including how curtailed and disrupted demand are quantified, how duration and volume of disruptions are reflected, and how these concepts interact with cross-sector planning and electricity-hydrogen integration. Some stakeholders also highlighted the importance of clearly explaining the treatment of substitution possibilities across different hydrogen types and other energy carriers.

Overall, while stakeholders broadly recognised the conceptual validity of the distinction, many called for further clarification on parameter choices and monetisation approaches to support consistent application.

— ENNOH Response

ENNOH notes that the consultation feedback broadly confirms the relevance and conceptual soundness of the distinction between curtailed and disrupted hydrogen demand. The revised interim methodology therefore maintains this conceptual framework and does not introduce fundamental changes to its underlying logic at this stage.

In response to stakeholder feedback, the revised interim methodology further clarifies the role of curtailed and disrupted demand within the overall assessment framework, including their conceptual linkage to substitution possibilities, security of supply and resilience considerations. The methodology emphasises that the distinction is intended to reflect fundamentally different system situations and should be applied consistently across relevant benefit indicators.

ENNOH also acknowledges stakeholder requests regarding the valuation and monetisation of curtailed and disrupted hydrogen demand, including the definition of parameters such as the Cost of Disrupted Hydrogen. The quantification of these values is inherently complex and subject to significant uncertainty, given the current stage of development of hydrogen markets and end uses. For this reason, no further parameterisation changes have been introduced at this stage, while discussions with stakeholders are ongoing.

It is foreseen that the treatment of curtailed and disrupted hydrogen demand will be further refined in the final version of the methodology. Quantitative assumptions and parameter values, including those related to monetisation, will be defined in accompanying documents, allowing them to reflect the most up-to-date information and to be adapted over time as market conditions and policy frameworks evolve.

5. The revised indicator framework includes now eight indicators:

In your view, are the indicators well described, in particular in terms of its relevance and methodology?

— Stakeholder feedback

A broad range of stakeholders, including Italgas, GD4S, Proxigas and EirGrid, considered the revised indicator framework to be generally well structured and relevant, covering key dimensions such as emissions, system adequacy, resilience, flexibility and socio-economic welfare. Several respondents noted that the indicators are clearly defined and address important aspects of hydrogen infrastructure assessment.

At the same time, many stakeholders explicitly requested the inclusion of practical examples to support interpretation and application of the indicators. In particular, stakeholders highlighted that some indicators are conceptually complex and that worked examples or illustrative cases would be helpful to better understand how the indicators operate in practice and how results should be interpreted, especially by non-technical audiences.

In addition, a number of stakeholders provided comments on specific indicators. Several respondents raised concerns regarding the formulation and relevance of indicator B3, including its potential implications for importing regions and low-carbon hydrogen pathways. Others questioned whether indicator B8 fully captures the value of cross-sector flexibility, in particular for storage-related assets, and whether cross-sector effects are sufficiently reflected in indicator B5.

Overall, while the indicator framework was broadly supported, stakeholders called for clearer explanations, illustrative examples and, in some cases, adjustments to individual indicators to ensure robust and consistent application.

— ENNOH Response

ENNOH welcomes the overall positive assessment of the revised indicator framework and acknowledges the strong and recurring request from stakeholders for additional examples to support interpretation and practical application. In response to this feedback, the revised interim methodology has been expanded by introducing a dedicated subsection for each indicator, including concrete examples illustrating its application and interpretation within the CBA framework.

In addition, several indicators have been refined in response to stakeholder feedback. In particular, indicator B3 has not only been further clarified but substantively adjusted compared to the previous draft, reflecting concerns raised during the consultation regarding its formulation and interpretation. These changes aim to better align the indicator with its intended analytical purpose and to address stakeholder concerns while preserving methodological consistency.

The revised interim methodology also clarifies the scope and role of the remaining indicators, including B5 and B8, to improve transparency and reduce the risk of misinterpretation. These adjustments focus on clarifying methodological boundaries and analytical intent rather than introducing new concepts at this stage.

Overall, the revised interim methodology confirms the indicator framework as a coherent and comprehensive basis for the assessment of hydrogen infrastructure projects, while the systematic inclusion of indicator-specific examples significantly strengthens transparency, usability and consistency of application.

6.a) The revised indicator framework includes the new indicator B3, B6 and B8.

Indicator B3:

i. In your view, is this benefit indicator well described?

— Stakeholder feedback

Stakeholder feedback on the description of indicator B3 was mixed. Several stakeholders, including Italgas, GD4S and EirGrid, considered the indicator to be clearly described and relevant for assessing the contribution of renewable hydrogen to decarbonisation objectives. These respondents acknowledged that the indicator provides a transparent and non-monetised measure aligned with broader EU policy goals.

At the same time, a significant number of stakeholders, including Hydrogen Europe, Proxigas and H2eart for Europe, raised concerns regarding the conceptual framing of the indicator. In particular, they questioned whether the indicator appropriately reflects infrastructure-related benefits, noting that it appears more closely linked to commodity flows than to capacity or network effects. Some stakeholders also cautioned that, in its initial formulation, the indicator could lead to unintended biases against certain project types or market configurations.

Overall, while the policy relevance of the indicator was recognised, several stakeholders considered that its description and framing required adjustment to avoid misinterpretation and unintended effects.

— ENNOH Response

ENNOH acknowledges the divergent views expressed on the description and framing of indicator B3. In response to the consultation, indicator B3 has been substantively revised in the revised interim methodology, going beyond purely editorial clarification.

The revised interim methodology refines the definition and explanatory text of indicator B3 to better clarify its analytical purpose and its role within the overall indicator framework. These changes aim to address stakeholder concerns regarding interpretation and relevance, while maintaining consistency with the broader objectives of the methodology.

Indicator B3:

ii. Do you find it more reasonable to assess the share of green H₂ supply in relation to H₂ supply or rather H₂ demand?

— Stakeholder feedback

On the appropriate reference basis for indicator B3, a majority of stakeholders, including Italgas, GD4S, EirGrid and EWE Gasspeicher, expressed a preference for assessing renewable hydrogen in relation to hydrogen demand rather than total supply. These stakeholders argued that a demand-based approach better reflects actual decarbonisation outcomes in end-use sectors and avoids distortions related to supply-side configurations.

Conversely, several stakeholders, including Hydrogen Europe, Proxigas and H2eart for Europe, raised concerns that certain formulations of the indicator could disadvantage hydrogen-importing regions or projects enabling cross-border supply, including low-carbon hydrogen pathways. They stressed the importance of ensuring that the denominator does not exclude curtailed or disrupted demand, as this could lead to misleading improvements in the indicator.

Overall, stakeholder feedback highlighted the sensitivity of the reference basis and the need for a formulation that avoids bias across regions, supply routes and stages of market development.

— ENNOH Response

ENNOH acknowledges the strong and consistent stakeholder feedback on the appropriate reference basis for indicator B3. In response to the consultation, the revised interim methodology has been adjusted to assess renewable hydrogen in relation to hydrogen demand rather than total hydrogen supply.

This change directly reflects stakeholder requests to better capture the effective penetration of renewable hydrogen in end-use sectors and to avoid distortions related to supply-side configurations. Using demand as the denominator also reduces the risk that curtailed or disrupted hydrogen demand would artificially impact the indicator value and ensures a more robust and meaningful interpretation across different market contexts.

By adopting a demand-based formulation, the revised interim methodology addresses concerns regarding potential biases against hydrogen-importing regions or specific supply pathways, while preserving the indicator's role as a structural measure supporting the assessment of renewable hydrogen integration.

6.b) Indicator B6: Which climate year/extreme weather year should be considered for this indicator?

— Stakeholder feedback

Stakeholders broadly supported the inclusion of extreme climate and stress situations in the assessment of hydrogen system adequacy and resilience. Several respondents, including Italgas and GD4S, suggested that the analysis should not rely on a single reference year, but rather consider both representative average conditions and adverse or extreme climate situations, such as periods of low renewable generation or high energy demand.

Hydrogen Europe highlighted that the choice of climate year should reflect the characteristics of different hydrogen production pathways. In particular, it was suggested that adverse weather conditions affecting renewable generation should be considered for renewable hydrogen, while stress situations comparable to gas supply disruptions could be relevant for blue or grey hydrogen pathways.

Other stakeholders, including EWE Gasspeicher and EirGrid, emphasised the importance of using plausible but sufficiently severe stress situations to test system robustness. They stressed that such assessments are particularly relevant for capturing the contribution of storage and flexibility assets and for identifying systemic vulnerabilities. Several respondents also underlined the need for consistency with approaches used in electricity and gas adequacy assessments.

Overall, stakeholders expressed broad agreement on the relevance of extreme climate and stress scenarios, while calling for clarity on how such years are selected and applied within the indicator.

— ENNOH Response

ENNOH acknowledges the broad stakeholder support for assessing hydrogen system adequacy and resilience under stressed conditions. The revised interim methodology therefore confirms the use of extreme or stress situations as a core element of indicator B6.

The revised interim methodology clarifies that indicator B6 is intended to assess the ability of the hydrogen system to meet demand under adverse conditions, reflecting resilience and adequacy considerations. While the relevance of extreme climate or stress situations is explicitly recognised, the methodology does not prescribe specific climate years or stress definitions.

Given the evolving nature of hydrogen markets and supply chains, the revised interim methodology deliberately refrains from fixing detailed assumptions at this stage. The specification of concrete stress situations and related assumptions will be addressed in accompanying documents, allowing for consistency with other sectoral assessments and for adaptation over time.

6.c) Indicator B8: What is your view on this indicator?

Do you need further explanation/example to examine the indicator?

— Stakeholder feedback

Stakeholders broadly recognised the relevance of introducing a dedicated indicator on hydrogen system flexibility, particularly in light of the increasing penetration of variable renewable energy sources. Several respondents, including Italgas, GD4S and Proxigas, considered indicator B8 to be timely and conceptually appropriate, highlighting the role of hydrogen production and use in supporting system flexibility and integrating renewable electricity.

At the same time, a number of stakeholders raised concerns regarding the current formulation of the indicator and its ability to fully capture flexibility contributions. Hydrogen Europe questioned whether the proposed correlation-based approach sufficiently reflects the complexity of system flexibility. EWE Gasspeicher and H2eart for Europe pointed out that, in its current form, the indicator may not adequately capture the role of hydrogen storage and other flexibility assets, as their contribution is not always directly reflected through renewable hydrogen production patterns.

Additional requests for clarification were made by EirGrid and others, who highlighted the need for clearer explanations of the calculation approach, underlying assumptions and interpretation of results. Several stakeholders suggested that worked examples or illustrative cases would support a more consistent understanding of the indicator and its practical application.

Overall, while stakeholders welcomed the inclusion of a flexibility indicator, many called for further clarification and refinement to ensure that the indicator adequately reflects system-wide flexibility effects and can be consistently interpreted.

— ENNOH Response

ENNOH acknowledges the broad stakeholder support for introducing a dedicated indicator on hydrogen system flexibility, as well as the requests for further clarification regarding its formulation and interpretation. The revised interim methodology therefore maintains indicator B8 as part of the indicator framework and clarifies its conceptual role.

In particular, the revised interim methodology clarifies that indicator B8 is intended to capture hydrogen system flexibility at system level, focusing on the interaction between hydrogen production and variable renewable electricity generation. The indicator is designed as a structural measure reflecting the ability of the hydrogen system to contribute to system flexibility, rather than as a comprehensive valuation of all individual flexibility assets.

ENNOH also acknowledges stakeholder comments regarding the representation of storage and other flexibility-related assets. The revised interim methodology does not introduce asset-specific formulations or parameters for indicator B8. Instead, the strengthened modelling requirements set out in Chapter 2.2.3 enhance the overall ability of the CBA framework to capture system-wide flexibility effects in a consistent and transparent manner.

Given the conceptual nature of indicator B8 and the evolving understanding of flexibility in hydrogen systems, the revised interim methodology does not further quantify or monetise this indicator.

Additional structured stakeholder statements

In addition to the feedback submitted through the structured consultation template, two stakeholders provided their input in alternative formats. INES submitted a consolidated position paper, while H2eart for Europe submitted both a completed questionnaire and an additional written statement.

Given the scope and structure of these submissions, their feedback is addressed separately below in consolidated blocks, summarising the key points raised and providing ENNOH's response accordingly.

— Stakeholder feedback INES

Initiative Energien Speichern e.V. (INES) raises a number of structural concerns regarding the modelling architecture underlying the CBA methodology and argues that the current modelling set-up risks systematically undervaluing hydrogen storage.

In particular, INES highlights the interaction between the electricity-hydrogen model and the hydrogen-gas model, noting differences in temporal resolution and model coupling. According to INES, hydrogen storage is only represented in the hydrogen-gas model and does not influence the electricity-hydrogen model, which may lead to an incomplete representation of cross-sector effects. INES further argues that the limited temporal granularity in the hydrogen-gas model may smooth scarcity situations and extreme events, potentially understating the seasonal and strategic value of storage. In this context, INES recommends moving towards higher temporal accuracy, ideally a full-year simulation.

Beyond modelling resolution, INES questions whether the methodology sufficiently assesses substitution effects between infrastructure types. It is argued that the incremental "with/without project" approach does not allow for identifying an economically optimal long-term infrastructure mix and may not fully capture competition between storage and import infrastructure. INES also raises concerns regarding the assumed flexibility of import infrastructure and constant import prices, which may structurally favour imports over storage in optimisation results.

Finally, INES questions whether certain indicators, in particular B4 and B8, are able to adequately reflect the contribution of storage projects under the current modelling architecture and calls for greater transparency regarding aggregation and final project evaluation.

— ENNOH Response

ENNOH acknowledges the detailed technical feedback provided by INES, in particular with regard to modelling architecture, temporal granularity and the representation of hydrogen storage in a multi-energy context.

At methodology level, the revised interim methodology strengthens and formalises the modelling requirements for CBA assessments in Chapter 2.2.3. This chapter sets out minimum requirements concerning spatial and temporal resolution and the representation of cross-sector interactions. It explicitly establishes hourly temporal resolution as the default approach, while allowing aggregation where this does not materially affect the robustness of results. In doing so, the revised interim methodology clarifies the expectations for modelling granularity in a way that addresses general concerns regarding the ability of the framework to capture flexibility and storage-related effects.

With regard to the overall modelling architecture, the revised interim methodology confirms that the CBA framework is designed as an incremental assessment based on predefined infrastructure levels and with/without project comparisons. It does not aim to determine an economically optimal system architecture across all infrastructure types. This design choice reflects the objective of ensuring comparability and neutrality across project categories within a harmonised assessment framework.

Concerning indicator B8, the revised interim methodology clarifies its scope and explicitly acknowledges that, while hydrogen storage can enable flexibility effects captured by the indicator, B8 does not measure storage operation directly and does not cover all flexibility dimensions. The strengthened modelling requirements in Chapter 2.2.3 further support a consistent system-level representation of flexibility effects.

ENNOH notes the broader points raised by INES regarding import assumptions, uncertainty and substitution effects. The revised interim methodology addresses these aspects at methodological level by clarifying modelling requirements and analytical boundaries. It does not prescribe specific implementation choices for operational assumptions within the methodology itself.

— Stakeholder feedback H2eart for Europe

H2eart for Europe provided feedback both through the structured consultation questionnaire and through an additional written submission. The feedback focuses primarily on modelling resolution, cross-sector integration, indicator design and the treatment of different hydrogen types.

H2eart emphasises the importance of a high level of spatial and temporal granularity in the modelling framework, explicitly supporting a NUTS-1 level representation and hourly temporal resolution in order to adequately capture congestion, bottlenecks and cross-sector dynamics. The organisation stresses that insufficient granularity may mask regional effects and limit the robustness of infrastructure assessment.

In addition, H2eart calls for stronger cross-sector integration in the modelling approach, including a more comprehensive representation of interactions between electricity, gas and hydrogen systems. It raises concerns that certain simplifications may understate flexibility and system integration effects, particularly where hydrogen infrastructure interacts with renewable electricity generation.

With regard to the indicator framework, H2eart provides detailed comments on several indicators. In particular, it questions whether indicator B8 sufficiently captures system flexibility and storage-related effects and suggests that additional metrics or refinements may be needed. H2eart also raises concerns regarding indicator B3 and the differentiation between renewable and low-carbon hydrogen, arguing that the indicator should avoid unintended bias and reflect the diversity of hydrogen supply pathways.

Furthermore, H2eart proposes the consideration of additional indicators, including measures linked to market stability, shadow prices or congestion signals, with the objective of strengthening the economic interpretation of results.

Overall, H2eart supports the objective of a harmonised CBA framework but calls for further clarification, higher modelling precision and a careful review of selected indicators to ensure that infrastructure benefits are fully and fairly captured.

— ENNOH Response

ENNOH acknowledges the detailed and constructive feedback provided by H2eart for Europe through both the questionnaire and the additional written submission.

With regard to modelling resolution, the revised interim methodology strengthens and formalises modelling requirements in Chapter 2.2.3. This chapter explicitly establishes hourly temporal resolution as the default and defines minimum spatial resolution requirements, thereby addressing stakeholder calls for sufficient granularity to capture regional and cross-sector effects. The methodology remains tool-neutral and does not prescribe a specific modelling architecture beyond these minimum requirements.

Concerning cross-sector integration, the revised interim methodology clarifies the requirement to represent interactions between electricity, gas and hydrogen systems in a consistent manner. The strengthened modelling requirements are intended to ensure that system-wide effects, including flexibility interactions, are reflected at methodological level without prescribing asset-specific modelling solutions.

With respect to indicator B3, the revised interim methodology introduces substantive adjustments to its formulation. The indicator has been revised to assess renewable hydrogen in relation to hydrogen demand, reflecting stakeholder feedback and aiming to avoid distortions related to supply-side configurations. The revised framing clarifies its analytical purpose and avoids implicit preferences between domestic production, imports or specific hydrogen pathways.

Regarding indicator B8, the revised interim methodology clarifies its scope as a system-level flexibility indicator. While it does not measure the operation of individual assets directly, it captures structural flexibility effects arising from the interaction between hydrogen production and renewable electricity generation. The methodology does not introduce additional or asset-specific indicators.

ENNOH takes note of H2eart's proposal to introduce further indicators related to shadow prices, congestion signals or market stability effects. In the revised interim methodology, the indicator framework has been streamlined from eight to seven indicators. Against this background, and to preserve consistency and comparability, the revised interim methodology does not introduce additional indicators at this stage.

The possible inclusion of additional indicators may be considered in the final version of the methodology, taking into account practical experience, further stakeholder input and overall methodological coherence.

Overall, the revised interim methodology reflects clarifications and targeted adjustments in response to stakeholder feedback while maintaining a coherent and stable framework for hydrogen infrastructure assessment.

IMPRINT

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