Part III.8 - Supplementary Information Sheet for the notification of an evaluation plan

Member States must use this sheet for the notification of an evaluation plan pursuant to Art. 1(2)(a) of Regulation (EU) No 651/2014[1] and in the case of a notified aid scheme subject to an evaluation as provided in the relevant Commission guidelines.

Please refer to the Commission Staff Working Document "Common methodology for State aid evaluation"[2] for guidance on the drafting of an evaluation plan.

1. Identification of the aid scheme to be evaluated

(1) Title of the aid scheme:

Financing model for Germany's hydrogen core network (HCN)

(2) Does the evaluation plan concern:

(a) ☒ a scheme subject to evaluation pursuant to Article 1(2)(a) of Regulation (EU) No 651/2014?

(b) ☐ a scheme notified to the Commission pursuant to Article 108(3) TFEU?

(3) Reference of the scheme (to be completed by the Commission):

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(4) Please list any existing *ex-ante* evaluations or impact assessments for the aid scheme and ex-post evaluations or studies conducted in the past on predecessors of the aid scheme or on similar schemes. For each of those studies, please provide the following information: (a) a brief description of the study's objectives, methodologies used, results and conclusions, and (b) specific challenges that the evaluations and studies might have faced from a methodological point of view, for example data availability that are relevant for the assessment of the current evaluation plan. If appropriate, please identify relevant areas or topics not covered by previous evaluation plans that should be the subject of the current evaluation. Please provide the summaries of such evaluations and studies in annex and, when available, the internet links to the documents concerned:

The financing model was newly developed and is notified for state aid approval for the first time. Hence, no previous ex ante evaluations or impact assessments for the aid scheme have been conducted.

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[1] Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (OJ L 187, 26.6.2014, p. 1).

[2] SWD(2014)179 final of 28.5.2014.

2. Objectives of the aid scheme to be evaluated[3]

2.1. Please provide a description of the aid scheme specifying the needs and problems the scheme intends to address and the intended categories of beneficiaries, for example size, sectors, location, indicative number:

Aid scheme: The financial model is based on the intertemporal smoothing of the network tariffs, through the creation of an 'amortisation account', backed by a State guarantee (the 'measure'). It aims to enable the construction and operation of the Hydrogen Core Network (HCN), which will be the nation-wide backbone of long-distance transport pipelines for hydrogen in Germany. The Project will also be part of the European hydrogen backbone and as such an infrastructure connecting several Member States and will contain, inter alia, Projects of Common Interest ('PCIs') such as those included in the 6th PCI list. However, not all transmission pipelines in the network will be PCIs. The HCN will not include distribution pipelines for the local distribution of hydrogen. Hence, connection lines to individual producers or end consumers are generally not part of the HCN. If future hydrogen transmission pipelines were added in the German system, those would also not form part of the HCN but instead be financed under the ordinary regulatory system.

The financial model is based on the following components:

(1) The construction and operation of the HCN will be financed privately by the future hydrogen TSOs. The HCN will be fully regulated under internal energy market legislation, it will therefore be subject to full Third Part Access and Tariff Regulation.

(2) The intertemporal smoothing of the network tariffs will work as follows:

i. Ramp-up phase: To prevent very high initial fees, which would be prohibitively high for initial users (which will already have to bear costs for switching to hydrogen usage), the cost-based network tariffs will not be fully charged to the limited initial users. The independent regulator BNetzA will approve a lower tariff up to the maximum willingness to pay of initial consumers instead, to ensure hydrogen uptake. Charging lower initial tariffs than needed to cover approvable costs is expected to result in initial deficits for the hydrogen TSOs, which will be spread over a multi-year period.

ii. Recovery phase: Once the user base of the HCN will be sufficiently broad, therefore at a more mature stage of the hydrogen market with higher utilisation of the network, BNetzA will set tariffs higher than needed to cover the approvable costs of a given year, which are expected to nonetheless be below or up to the maximum willingness to pay of the users

[3] Beyond providing a general description of the objectives and eligibility rules of the scheme, the aim of this section is to assess how the eligibility and exclusion rules of the scheme may be used to identify the effect of aid. In some cases, the precise eligibility rules may not be known in advance. In those cases the best available expectations should be provided.

as the user base will be broader. Such tariffs are expected to result in profits that will offset losses made during the initial ramp-up phase.

(5) A special purpose vehicle (the 'SPV') will be created by all HCN TSOs together to keep a dedicated account, called the amortisation account. During the ramp-up phase, when TSOs would otherwise be operating at a loss, the SPV will pay to the TSOs the amount required to offset the approvable costs net of the revenues received through user tariffs. The necessary liquidity will be provided by the Kreditanstalt für Wiederaufbau ('KfW')[4] on behalf of the Federal Government[5] through a loan priced at KfW's own refinancing cost, whose interest will be charged to the TSOs and initially financed by the amortisation account. The loan will be covered by a guarantee from the Federal Government.

(3) During the recovery phase, the additional revenues net of approvable cost coverage will be transferred by the TSOs to the SPV, which will in turn use them to repay the loan principal and interest to KfW.

(4) The amortisation account is required to be balanced by 2055. Once the amortisation account is balanced, the financing model comes to an end and the tariffs are formed solely in accordance with the then valid reference tariff methodology of the independent regulatory authority.

(5) The financing model includes a revision mechanism, through which the independent regulatory authority (BNetzA) determines every three years whether the amortisation account is on track to be balanced by 2055 at the latest. If the revision exercise projects a remaining balance of the amortisation account by 2055, the BNetzA adjusts the grid fees for future periods to a level that ensures a balanced account by 2055. Only if higher grid fees would have a dampening effect on demand such that that the expectation for the revenues of the HCN overall would be lower than when maintaining lower rates, BNetzA may refrain from adjusting grid fees.

(6) Overall, the measure is therefore designed in such a way that revenues will cover the costs in a long-term perspective, by 2055 at the latest. However, in case the hydrogen ramp-up remains below the anticipated path determined by the regulator based on scientific expert analysis (e.g. if radical innovation in battery technology greatly reduces the hydrogen demand projected today) and sufficient excess revenue to repay the loan and interests does not materialise, the Federal Government will have to balance the amortisation account by 2055 at the latest.

(7) The Federal Government may decide to cancel the amortisation account already at an earlier date than 2055 to prevent additional costs from accruing. The earliest possible date is 31 December 2038, taking effect on 31 December 2039. In this case, just as when a balance remains in the amortisation account by the end of 2055, the Federal State will cover the remaining amount through the general federal budget.

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4 KfW is a State-owned promotional bank, with the Federal Republic of Germany owning 80% and the German federal states owning the remaining 20%.

5 Pursuant to Article 2(4) of the Law Concerning Kreditanstalt für Wiederaufbau (available at: https://www.kfw.de/PDF/Download-Center/Law-Concerning-KfW/KfW-Gesetz-DE-EN.pdf).

(8) The financing model moreover foresees a burden-sharing mechanism between Federal State and TSOs in case the amortisation account is not fully balanced by 2055. In this case, the Federal State would be entitled to recover part of the costs for covering any remaining balance in the amortisation account in 2055 (or when the Federal Government decides to cancel the amortisation account at an earlier date after 2038) from the TSOs. By the end of 2055, this share would be 24% of the remaining balance. In the event of an early termination, the share is reduced by 0.5 percentage points for each calendar year, starting from the expiry of the term of the amortisation account in 2055. If one or several HCN-TSOs are unable to pay the deductible (in full) due to insolvency, and their share is not paid in cash by one or more of the other HCN-TSOs, all TSOs are obliged to transfer their assets to the Federal Government in return for payment of the imputed residual value (less the deductible). This ensures that the entire HCN is transferred to the Federal government if a pro rata deductible is not paid.

Needs and problems (market failure): In the absence of the proposed measure, we have experienced a "chicken-and-egg" problem that prevented the necessary investment in hydrogen production and infrastructure: due to the lack of hydrogen users, there was a lack of incentives for the expansion of a hydrogen infrastructure, which in turn was the prerequisite for new demand from hydrogen users. The financing model was hence designed to provide private actors with the financial and legal security needed to enable long-term planning: hydrogen producers will know that they will be able to supply their future customers efficiently and hydrogen customers will know that the infrastructure will be in place for them to access hydrogen, all at adequate user fees.

The early realisation of the HCN thus enables many players to invest in the climate-friendly transformation of their business models in a timely manner, considering the required lead-up times both for repurposing natural gas pipelines and building new hydrogen pipelines. Without the measure, our model calculations show that in the base case the initial (uncapped) network charges significantly exceed double-digit numbers (e.g. 2027: 1033 EUR/kWh/h/a). This is because in the first years of the hydrogen ramp-up, relatively few network users face high investment costs. If the full costs were levied via network tariffs upon few initial users, this would lead to the aforementioned high fees – that would exceed most users' willingness to pay – in particular in comparison to the current German-wide TSO network charge for natural gas which currently amounts to 5.10 EUR/kWh/h/a. Thus, on the one hand no potential customer was willing to sign offtake agreements (that could entail prohibitively high tariffs). On the other hand, potential network operators were not willing to invest into the new infrastructure without the certainty that the investment costs can be levied to customers.

Beneficiaries: The beneficiaries of the measure are all future operators of the hydrogen network (HCN-TSOs). Other stakeholders in the financing model are KfW and Trading Hub Europe GmbH (THE). The KfW provides liquidity to the amortization account based on a so-called "Zuweisungsgeschäft" on behalf of the Federal Government (no margin). THE manages the AMK and also only receives a reimbursement of costs (no margin). KfW and THE are not beneficiaries of the financing model.

2.2. Please indicate the objectives of the scheme and the expected impact, both at the level of the intended beneficiaries and as far as the objective of common interest is concerned:

Objective of the scheme: The HCN will be the basic framework for the development of the hydrogen infrastructure in Germany. The aim of the HCN is to connect key hydrogen locations throughout Germany, such as large industrial centres, storage facilities, power plants, production and import locations.

The objective of common interest of the HCN is therefore to support the decarbonisation of Germany's energy supply and overall economy. Green hydrogen will provide a decarbonised source of energy to energy-intensive sectors of the economy with the highest greenhouse gas emissions that need to rely on gaseous fuels, where no superior alternatives to hydrogen are available. Hydrogen will also enable the storage of electricity for periods in which little or no electricity can be generated with renewable wind and solar power and thereby facilitates the transition of the broader energy sector to renewable sources. This requires an efficient hydrogen transport infrastructure to be in place, otherwise supply and demand cannot be connected in an efficient and timely manner. The quick and efficient realisation of the HCN is also a basic prerequisite for security of supply with clean, affordable and safe energy. In particular, the timely completion of a robust hydrogen infrastructure reduces Germany's dependence on the supply of fossil energy by few importers of natural gas.

The intended objective at the level of the beneficiaries is to provide the HCN-TSOs with the necessary the financial and legal security to enable their financial investment decisions (FIDs).

Expected impact: The financial model for the HCN is based on three elements that together aim at overcoming the chicken-and-egg problem described above:

1. It enables positive investment decisions to be made at an early stage (before reliable demand forecasts are available) through subsidiary state protection,

2. The state-guaranteed interim financing via KfW reduces the AMK's financing costs and thus enables more favorable grid fees for end users in the long term,

3. The flexibility option offers the possibility of adapting to the actual development of demand over time, which potentially postpones the implementation of projects and prevents costly vacant (unused) pipelines.

The state guarantee therefore makes the early construction of the HCN possible in the first place, while the financing of the AMK and the flexibility option are intended to ensure that the grid fees are affordable for customers and that the private financing of the entire grid construction is successful. The latter is a prerequisite for ensuring that the original shortfall in revenue during the construction phase of the grid can be offset by additional revenue in the return phase (by 2055 at the latest).

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2.3. Please indicate possible negative effects, on the aid beneficiaries or on the wider economy, that might be directly or indirectly associated with the aid scheme[6]:

Once it is established, the hydrogen core network "HCN" will constitute a natural monopoly, i.e. no other company will be able to build a parallel infrastructure. Any financing model for the hydrogen infrastructure would have that limiting effect. The financing model enables the construction of the HCN and thereby also regulates the competition for the market and limits the competition between HCN TSOs. The HCN will therefore be fully regulated from the start (access and tariff regulation by the independent authority/BNetzA). For the TSOs that implies that future profits are limited to regulated costs – i.e. monopoly rents are excluded and gaining market shares is limited (loss of typical first mover advantages in new markets). Given that the planning of the network relied strongly on existing infrastructures for cost reasons, the future HCN-TSOs will probably be closely related to the current gas network operators.

Overall, the positive economic effects of the accelerated, reliable and non-discriminatory access of important industrial centers, producers and importers to hydrogen outweigh the potential negative effects.

2.4. Please indicate (a) the annual budget planned under the scheme, (b) the intended duration of the scheme[7], (c) the aid instrument or instruments and (d) the eligible costs:

a) Annual loan amount EUR 737,000,000

b) until 31.12.2055, termination of the financing model is possible for the first time on 31.12.2039

c) KUEBLL

d) Interest costs for the interim financing of the Amortisation Account

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2.5. Please provide a summary of the eligibility criteria and the methods for selecting the aid beneficiaries. In particular, please describe the following: (a) the methods used for selecting beneficiaries (e.g. such as scoring), (b) the indicative budget available for each group of beneficiaries, (c) the likelihood of the budget being exhausted for certain groups of beneficiaries, (d) the scoring rules, if they are used in the scheme, (e) the aid intensity thresholds and (f) the criteria the authority granting the aid will take into account when assessing applications:

a, d and f) The hydrogen network is intended to reach the locations of future large hydrogen consumption and production regions in Germany and thus connect central locations - such as large industrial centers, storage facilities, power plants and import

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6 Examples of negative effects are regional and sectorial biases or crowding out of private investments induced by the aid scheme.

7 Aid schemes defined in Article 1(2)(a) of Regulation (EU) No 651/2014 are excluded from the scope of the Regulation six months after their entry into force. After having assessed the evaluation plan, the Commission may decide to extend the application of the Regulation to such schemes for a longer period. Member States are invited to precisely indicate the intended duration of the scheme.

corridors. The core network is to include important hydrogen infrastructures that are to go into operation by 2032.

The beneficiaries of the measure are all future operators of the hydrogen network. In accordance with Section 28r (2) EnWG, they must submit a joint application for the hydrogen network to the BNetzA. The selection of the HCN-TSO's was based on a public call to ensure competition between the TSOs for the construction of the HCN. Any interested operator of distribution networks - potential and existing hydrogen network operators and operators of other pipeline infrastructures - were entitled to respond to the call until July 28, 2023, which was published on the website of the Association of Transmission System Operators ("FNB Gas") with a press release in both German and English. The FNB's informal draft application (November 15, 2023) was followed by a second public consultation on the draft application by the BNetzA until January 8, 2024, which resulted in a range of 12 - 34 future core network operators. The final application is expected immediately after publication of the European Commission's approval of the financing model under state aid law. The BNetzA will then review and approve this application.

However, the planning process emphasized the use of existing infrastructures, reflecting the considerably higher cost effectiveness of repurposing existing natural gas pipelines over building entirely new hydrogen pipelines. The majority of the existing infrastructure is currently operated by German Gas-TSOs which are partly German entities or German subsidiaries of TSOs located in other EU member states (e.g. Fluxys SA, Nederlandse Gasunie NV) and will probably be operated by hydrogen network operators related to the current owners. The overall effect on competition and trade will be positive. The aim of the HCN is to connect key hydrogen locations throughout Germany, such as large industrial centres, storage facilities, power plants, production and import locations. As such, the HCN is open to capacity booking by all producers and consumers of hydrogen, so-called connection lines to individual end consumers are not part of the HCN.

b) The average maximum amount of the KfW loan to finance the Amortisation Account is EUR 11,061,000,000. The liquidity of the loan is provided to all HCN-TSOs jointly and equally.

c) A revenue netting mechanism between the core network operators ensures that all core network operators always receive the liquidity necessary to cover their revenue shortfall in the first ramp-up phase of financing mechanism. It cannot be used by other individual beneficiaries at the expense of the rest.

e) The aid intensity of the financing model is limited. It merely provides interim financing of the revenue shortfall in the AMK due to the intertemporal smoothing and the subsidiary state guarantee. The probability of this subsidiary guarantee being utilized is also low.

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2.6. Please mention specific constraints or risks that might affect the implementation of the scheme, its expected impacts and the achievement of its objectives:

The desired effect of the financing model at the result/outcome level depends on a number of other factors (including the promotion of demand, CO_2 price, location

decisions by industrial companies, etc.) that remain outside the scope of the financing model evaluated here. Ultimately, the investment costs of the HCN can only be recovered if the demand for hydrogen will materialise roughly in line with available forecasts. Without sufficient demand for hydrogen as an energy source, it will not be possible to generate the necessary revenue from grid fees to offset the AMK. Yet, the grid fees are only one factor in the development of demand (and much less important than the development of the commodity costs, i.e. H2 production as well as of the costs of alternatives, in particular the development of the CO_2 price).

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3. Evaluation questions

3.1. Please indicate the specific questions that the evaluation should address by providing quantitative evidence of the impact of aid. Please distinguish between (a) questions related to the direct impact of the aid on the beneficiaries, (b) questions related to the indirect impacts and (c) questions related to the proportionality and appropriateness of the aid. Please explain how the evaluation questions relate to the objectives of the scheme:

Direct impact on aid recipients:

The first set of evaluation questions concerns the immediate output of the financial model: did it provide liquidity as planned and thus allow the HCN-TSOs to provide hydrogen transport capacity in a timely manner?

1. Has the financing model enabled the HCN-TSOs to obtain Final Investment Decisions (FIDs) earlier than without the financing model?

2. Has the financing model enabled the HCN-TSOs to gradually develop a new business area earlier than would have been the case without it?

3. Have the flexibility options (postponement of construction measures; adjustment of ramp-up fees) supported the financial sustainability of the HCN more than would have been the case with alternative financing approaches?

4. Has the financial model contributed to providing hydrogen transport capacity through the HCN more cost-effectively than without an amortization account?

5. To what extent are there differences between the core network operators in terms of the successful implementation of the construction measures and the development of the business model?

Indirect effects:

The indirect effects relate to the overarching objective of the measure: the HCN will be constructed to provide hydrogen transport capacity in a timely manner in order to support the decarbonisation of Germany's energy supply and overall economy. Specifically, it aims to offer a decarbonized source of energy to those industrial sectors whose production processes cannot be electrified (e.g. steel). If the measure succeeds, it should bring forward

investment in climate-friendly production processes by companies in such industrial sectors and thus contribute to green growth. The second set of questions thus focusses on the indirect effects on the hydrogen ramp-up:

6. Have end users made investments in converting their production processes earlier than they would have done without core network access?

7. Did producers invest in hydrogen production earlier than they would have done without the hydrogen network?

8. Did the early provision of the hydrogen core network contribute to the earlier installation of local infrastructure (distribution networks, connection lines of individual customers)?

9. Has the European backbone network been set up more quickly and thus facilitated EU-wide trade in hydrogen more than without the hydrogen core network?

Appropriateness and suitability:

10. .Is the financing model suitable for solving the chicken-and-egg problem or could a similar infrastructure have also been realized (in a timely manner) with alternative financing concept?

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4. Result indicators

4.1. Please use the following table to describe which indicators will be built to measure outcomes of the scheme, as well as the relevant control variables, including the sources of data, and how each result indicator corresponds to the evaluation questions. In particular, please mention (a) the relevant evaluation question, (b) the indicator, (c) the source of data, (d) the frequency of collection of data (for example, annual, monthly, etc.), (e) the level at which the data is collected (for example, firm level, establishment level, regional level, etc.), (f) the population covered in the data source (for example, aid beneficiaries, non-beneficiaries, all firms, etc.):

Evaluation question	Indicators	Source	Frequency	Level	Population
Has the financing model enabled the HCN-TSOs to obtain FIDs earlier than without the financing model?	Annual transport capacity available in the core network Proportion of pipeline projects with positive FID (of the pipeline projects submitted in the core grid application per core grid operator) per year (until 2037)	BNetzA / HCN-TSOs	Annually	National; sub-national	Beneficiaries

Has the financing model enabled the HCN-TSOs to gradually develop a new business area earlier than would have been the case without it?	Fee income from the entire HCN and the respective share of the revenue shortfall financed via the AMK Share of revenues from the HCN relative to total revenues of TSOs Development of the relevant capital market and sustainability indicators for each core network operator	BNetzA / HCN-TSOs	Annually	National; sub-national	Beneficiaries
Have the flexibility options supported the financial sustainability of the HCN more than would have been the case with alternative financing approaches?	Development of ramp-up tariff over time Share of conversion lines in the HCN Proportion of vacant pipelines in the HCN (utilization <2% of annual transport capacity) Proportion of pipeline projects in the HCN with adjustments over time	BNetzA	Annually	National; sub-national	Beneficiaries
Has the financial model contributed to providing hydrogen transport capacity more cost-effectively than without an amortization account?	Cumulative delta of costs in the financing model to the hypothetical counterfactual scenario with cost-covering grid charges Development of the share of transport costs in overall hydrogen costs for various user groups (e.g. industry; H2 power plants)	BNetzA / Customer-Survey	Annually Surveys at least with each evaluation	National; sub-national	Hydrogen customers
To what extent are there differences between the core network operators in terms of the successful implementation of the construction measures and the development of the business model?	Development of EBITDA (hydrogen infrastructure business area / overall) Development of share of hydrogen infrastructure in total company turnover	HCN-TSOs (annual reporting)	Annually	Firm-level	Beneficiaries
Have end users invested in transforming their business models earlier than they would have done	Hydrogen demand (kWh/h/a) For industrial companies: production volume of CO2 -neutral production (in € or industry-specific key	Customer-Survey (business reports)	Business reports annually	Firm-level	Hydrogen customers

without access to the HCN?	figures such as x tons of green steel) For power plant operators: volume of hydrogen-based electricity production Investment volume in climate-neutral production processes CO2 emissions # of respondents who say they have brought forward investments due to HCN access		Surveys at least with each evaluation		
Did producers invest in hydrogen production earlier than they would have done without the hydrogen network?	# of respondents (electrolysis players) who have brought forward production due to HCN access	Producer-Survey (electrolysis players)	Business reports annually Surveys at least with each evaluation	Firm-level	Hydrogen producers (electrolysis players)
Did the early provision of the HCN contribute to the earlier installation of local infrastructure (distribution networks, connection lines of individual customers)?	Kilometers of connecting lines that are connected to the core network	BNetzA	Annually	Regional	Beneficiaries / customers
Has the European backbone network been set up more quickly and thus facilitated EU-wide trade in hydrogen more than without the HCN?	Number of border crossing points connected to the core network (annually) Volume of annual trade at border crossing points (in GW / €)	BNetzA	Annually	Regional	Beneficiaries / customers
Is the financing model suitable for solving the chicken-and-egg problem or could a similar infrastructure have also been realized (in a timely manner) with alternative financing concept?	Quantitative assessment of the financial mechanism (esp. costs of the intertemporal shift) relative to (hypothetical) scenarios with uncapped charges (cf. answer to question 5.1) Qualitative evaluation of hypothetical counterfactual scenarios based on expert interviews.	BNetzA Expert-Survey for qualitative evaluation	Annually Surveys at least with each evaluation	National	Beneficiaries and hydrogen customers

5. Envisaged methods to conduct the evaluation

5.1. In light of the evaluation questions, please describe the envisaged methods to be used in the evaluation to identify the causal impact of the aid on the beneficiaries and to assess other indirect impacts. In particular, please explain the reasons for choosing those methods and for rejecting other methods (for example, reasons related to the design of the scheme)[8]:

Ideally, counterfactual methods should be used to measure the direct and indirect effects of the core network financing model in order to determine the causal effects of the measure. The evaluation should therefore be supplemented by counterfactual evaluations where possible.

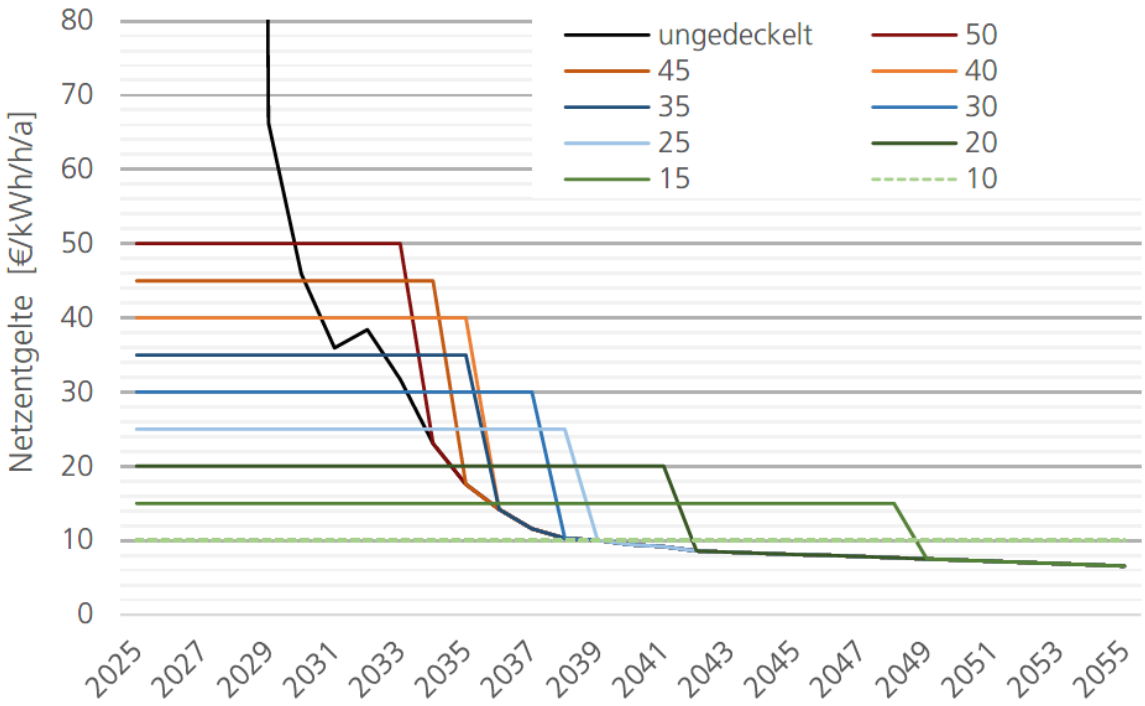
In the case of the HCN, however, limitations inherent to the logic of a chicken-and-egg problem must be taken into account. For example, there is a close interdependency between the provision of infrastructure and the creation of demand. In other words, the impact logic basically works in both directions. Therefore, the counterfactual analyses that can be used here are limited to purely hypothetical (qualitative) scenarios that can only be quantified on the basis of certain simplifying assumptions.

These include the following scenarios, for example:

1. Development of the hydrogen infrastructure analogous to the approach actually pursued; financing on the basis of uncapped (cost-covering) charges
2. Delayed development of the hydrogen infrastructure until after requirements have been clearly demonstrated as part of the network development plan
   a) Financing analogous to the approach pursued
   b) Financing on the basis of uncapped (cost-covering) fees

The (hypothetical) counterfactual scenario 1 can be used, for example, to estimate the additional costs incurred as a result of intertemporal fee financing (i.e. financing costs of the AMK). A calculation basis for this already exists thanks to the expert opinion on validating the sustainability of the financing model provided by Fraunhofer IEG (see Annex). Thus, hypothetical annual total revenues of a system without an amortization account can be modelled, assuming that hydrogen customers are willing and able to pay cost-covering (uncapped) grid fees from day one – even if these are initially prohibitively high (see black line in the figure below).

[8] Please make reference to SWD(2014)179 final of 28.5.2014.



As can be seen from the graph, the capped ramp-up tariff determined by the BNetzA falls to the uncapped tariff as soon as the AMK is balanced (the higher the tariff, the sooner the AMK is balanced). Following this logic, the cumulative delta of capped tariff revenues and (hypothetical) uncapped tariff revenues results in the "price tag" of the intertemporal smoothing of tariff revenue. Based on observed demand data (2024-2038/2055) and the level of charges determined by the BNetzA (2024-2038/2055), the evaluation can thus determine the additional costs implied by the selected financing model.

For the development of further hypothetical counterfactual scenarios (such as 2a or 2b), assumptions must be made regarding the feedback between demand assessment, planning and (expansion) construction of lines. Based on the data collected on demand development, a hypothetical scenario could be modeled ex post with the commissioning of lines in the core grid in line with demand.

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5.2. Please describe precisely the identification strategy for the evaluation of the causal impact of the aid and the assumptions on which the strategy relies. Please describe in detail the composition and the significance of the control group:

While there is therefore a lack of a practicable control group at the level of aid beneficiaries (see 5.3 below), the evaluation should be able to estimate the causal effects of the measure at the level of hydrogen customers. The evaluation could analyze whether the investment and emissions behavior of relevant groups of hydrogen customers can be causally linked to the timely provision of hydrogen transport capacity due to the financing model of the HCN.

Here, the evaluation can take advantage of the fact that the HCN will not be put into operation in its entirety at a single point in time, but rather will be created over the period from 2025 to 2032 (or even 2037 at the latest[9]). For example, current plans envisage that the core network

[9] Provided the flexibilization option described above is effectively utilised.

pipelines in north-western Germany will be put into operation particularly early.[10] If the provision of infrastructure has a causal effect on the investment behavior and production methods of local industrial companies and power plant operators, this effect should be felt first in the regions with early commissioning.

The central independent (explanatory) variable would therefore be the year in which the core grid line projects were commissioned.

Possible dependent variables include

- Investment volume of companies in CO_2 -neutral production processes;
- Annual CO2 emissions;
- Annual volume of hydrogen-based electricity generation (in
- Annual production volume of CO2 -neutral products (e.g. green steel)

To complement these variables, appropriate control variables could and should be used to estimate the causal effect of the hydrogen core network on the behavior of (potential) hydrogen customers in the econometric analysis, e.g.:

- Local GDP
- Commodity price for hydrogen (import / locally produced)
- Price of (renewable) electricity
- Amount of subsidies for operators of hydrogen power plants (H2-ready power plants)
- Amount of subsidies for the production of CO_2-neutral products (e.g. Carbon Contracts for Difference to produce green steel)

The dependent variables as outcomes of interest - investment volumes, emissions, sustainable electricity generation, production volume of CO2-neutral products - can all be operationalized as year-on-year changes, resulting in a panel dataset.

The central independent variable is the year the local pipeline projects of the HCN are commissioned. It could be operationalized either as annually available transport capacity or as dummy variable (full commissioning of local pipeline: yes/no). As data on all variables of interest are collected annually as part of the revision mechanism, this approach appears recommendable from today's perspective.

The level of measurement is decisive for the analysis. Options include 16 federal states, 44 administrative districts or statistical regions, or possibly even 489 districts and independent cities. The BNetzA will determine the level at which the relevant data can be collected in a practicable way. On this basis, the database can be stratified as part of the evaluation. For example, the classification of the 44 administrative districts and statistical regions could be divided into a treatment group (commissioning completed) and a control group (commissioning not yet completed) using the dummy indicator "commissioning yes/no".

Following the recommendations of the interim evaluation in 2038, further systematic data collection efforts may be carried out in the course of the regular revision mechanism. If required, a regular data collection at the level of hydrogen customers may also be carried out on this basis to improve the data situation until the final evaluation report is prepared in 2056.

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[10] The regional distribution of annual commissioning of pipeline projects between 2025 and 2032 (according to the current planning) can be visualized comparing the various annual maps on the FNB-Gas website: https://fnb-gas.de/pressematerialien/wasserstoffnetz_entwicklung-des-wasserstoff-kernnetzes/

5.3. Please explain how the envisaged methods address potential selection bias. Can it be claimed with sufficient certainty that observed differences in the outcomes for the aid beneficiaries are due to the aid?

At the level of the aid beneficiaries, there is no practical way to address selection bias. Outcomes for the HCN-TSOs cannot be compared with a control group (e.g. consisting of TSOs without access to the financing model for the HCN) since such a group does not exist.

In principle, comparative analyses could be carried out with regard to several financial key performance indicators (KPIs), comparing the HCN-TSOs to operators of comparable infrastructures in other EU countries (e.g. time series data covering the period from 2010 to 2037 (2055) for selected KPIs could be compared, with the financing model entering into force in 2024/25 providing the "treatment"). However, this does not allow for causal inference due to obvious problems of endogeneity and considering the high number of contextual variables varying across EU jurisdictions, the extremely long duration of the measure and, presumably, dynamic changes in the make-up of the TSO landscape in all EU member states over the course of the hydrogen ramp-up. Hence, such analysis requires careful contextualization.

We thus recommend to focus the analysis on the causal effect of the HCN on future hydrogen customers (see 5.2).

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5.4. If relevant, please explain how the envisaged methods intend to address specific challenges related to complex schemes, for example schemes that are implemented in a differentiated manner at regional level and schemes that use several aid instruments:

Not applicable

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6. Data collection

6.1. Please provide information on the mechanisms and sources for collecting and processing data about the aid beneficiaries and about the envisaged counterfactual.[11] Please provide a description of all the relevant information that relates to the selection phase: data collected on aid applicants, data submitted by applicants and selection outcomes. Please also explain any potential issue as regards data availability:

The evaluation will be able to draw on extensive existing data. These include (a) an external expert assessment of the financial viability of the financing model[12] (including the calculation basis for detailed scenarios of hydrogen demand and network costs) and b) the data collected throughout the duration of the measure as part of periodic revision mechanism carried out by the BNetzA.

[11] Please note that the evaluation might require sourcing of both historical data and data that will become progressively available during the deployment of the aid scheme. Please identify the sources for both types of information. Both types of data should preferably be collected from the same source as to guarantee consistency across time.

[12] https://www.bmwk.de/Redaktion/DE/Downloads/G/gutachterliche-validierung-des-finanzierungsmodells-zum-aufbau-eines-wasserstoff-kernnetzes-bei-subsidiarer-staatlicher-absicherung.pdf?__blob=publicationFile&v=6

Starting in 2028 and every three years thereafter, the BNetzA will review the sustainability of the financing model, as the parameters relevant to balance the account by 2055 (at the latest) will likely change considerably during the duration of the measure. § Section 28r (5) of the EnWG therefore introduces a periodic revision mechanism that analyses whether previous assumptions of costs and demand still hold or whether adjustments to the ramp-up fee are required in order to balance the AMK in 2055. The BNetzA can periodically adjust the ramp-up charge if these analyses determine that this is necessary.

As part of this regular review, BNetzA will therefore create a comprehensive dataset comprising all relevant parameters on the demand and cost side: does demand develop essentially as it was assumed when the financing model was developed? Should unanticipated cost increases (construction costs or operating costs) be taken into account? This dataset will be made available to the external organization carrying out the evaluation.

The dataset created through the revision mechanism will include the following variables:

- Applicable ramp-up fee
- Total amount of the annual investment volume of the HCN-TSOs
- Total annual marketed transport capacities of the HCN
- Liquidity made available annually via the amortization account
- Annual status of the intertemporal cost allocation account (regulatory equivalent of the AMK) and the deviation from the respective forecast value on which the respective ramp-up charge was based
- Pipeline length (km) that are put into operation annually (repurposed / newly built)
- Annual capacity bookings of HCN customers
- Number of border crossing points connected to the core network
- Volume traded annually at border crossing points (in GW / €)
- Length of connection lines at the distribution grid level that are connected to the HCN each year
- Projects whose commissioning is postponed by applying the flexibility option:
    - Number of projects
    - Length of pipelines
    - Investment amount of the projects
- Annual domestic hydrogen production volume

Further data for deriving important context variables that do not result directly from the revision mechanism are also made available to the evaluators by the Federal Network Agency, e.g.

- Ratio of grid costs to hydrogen costs
- Ratio of grid costs to commodity in comparable areas (gas, electricity)

In addition, the Federal Statistical Office (StBA) already collects and documents key figures that can be used to determine the CO2 emissions of production areas that are likely to become hydrogen customers in Germany.

In addition, a representative survey (if possible) of hydrogen users should be conducted as part of the evaluation. Here, the focus on specific user groups is appropriate, such as industrial sectors whose production processes cannot be electrified (e.g. steel, basic chemicals) or operators of hydrogen power plants. The survey is intended to collect company-specific quantitative and qualitative data that the BNetzA and the core grid operators cannot collect as part of the operation of the core grid, e.g. company-specific information on:

- Annual demand for hydrogen (kWh/h/a)

- For industrial companies: annual production volume of CO2 -neutral production (in € or industry-specific key figures such as x tons of green steel)
- For power plant operators: annual volume of hydrogen-based electricity production
- Annual investment volume in climate-neutral production processes
- Annual funding received in €
- Annual CO_2 emissions

Finally, qualitative assessments should be obtained as part of the data collection, e.g. on the following questions:

- Has your company brought forward planned investments in climate-friendly production processes due to the provision of hydrogen transport capacity by the hydrogen core network?
    - If yes, please indicate the type and scope of the investments and the timing of these before/after the hydrogen core network is made available.

As a further source of data for the qualitative assessment of the appropriateness and suitability of the measure, it is recommended that the evaluators conduct an additional 5-10 semi-structured interviews with hydrogen experts (academia, industry representatives etc.).

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6.2. Please provide information on the frequency of the data collection relevant for the evaluation. Are observations available on a sufficiently disaggregated level, that is to say at the level of individual undertakings?

The regular revision mechanism, which provides the data on the majority of the variables of interest, is carried out every three years. However, in this regular data collection exercise, the data will be collected individually for all three calendar years covered. The BNetzA will determine the sub-national level at which the relevant data can be collected in a practicable way: 16 federal states or 44 administrative districts / statistical regions.

The company-level survey data collected as part of the evaluation focuses on financial and other information that companies are reporting on an annual basis.

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6.3. Please indicate whether the access to the necessary data for conducting the evaluation might be hindered by laws and regulations governing confidentiality of data and how those issues would be addressed. Please mention other possible challenges related to data collection and how they would be overcome:

Any detailed information on cash-flows towards and from individual HCN-TSOs as well as information relating to the loan agreement with the KfW are confidential business secrets and would require prior consent of the parties. Hence we recommend to analyse the HCN-TSOs as a unit, using aggregate data.

6.4. Please indicate whether surveys of aid beneficiaries or of other undertakings are foreseen and whether complementary sources of information are intended to be used:

As part of the evaluation, a representative survey should be carried out among hydrogen customers. The focus here is on certain user groups, such as industrial sectors whose production processes cannot be electrified (e.g. steel, basic chemicals, or operators of hydrogen power plants). The Federal Statistical Office (StBA) collects and documents key figures that can be used, among other things, to determine the CO2 emissions of these sectors that are likely to become hydrogen users in Germany.

7. Proposed timeline of the evaluation

7.1. Please indicate the proposed timeline of the evaluation, including milestones for data collection, interim reports and involvement of stakeholders. If relevant, please provide an annex detailing the proposed timeline:

In light of the long duration of the measure (up to 2055), the interim evaluation is of particular importance. While the final evaluation report cannot reasonably be submitted until after the AMK is balanced (by December 31, 2055, at the latest), an interim report is to be submitted by December 31, 2038. At this point, the results of four of the ten scheduled rounds of the regular revision mechanism will be available (2028, 2031, 2034, 2037 - providing annual data for the period 2025-2037), and can be used as part of the interim evaluation.

In addition, Section 28r (7) of the Energy Industry Act provides that the earliest possibility for an early termination of the financing model by the federal government is by the end of 2038 (effective by the end of 2039). If at this point in time, it becomes evident that the hydrogen ramp-up is likely to fail, the federal government is entitled to terminate the AMK at this point. Hence, the interim evaluation could potentially provide valuable guidance and insight before such a decision might be taken by the government (in such an unlikely worst-case scenario).

The public tender inviting applications to carry out the evaluation (interim report) should thus be issued so that the contract can begin on 1 January 2038. By following the general rules for public tenders, the independence, experience and expertise of the organization carrying out the evaluation is secured. The project period should not exceed the calendar year 2038, making the interim evaluation report available by December 31, 2038 at the latest.

Similarly, the tender for the external evaluation for the final evaluation report should be issued in such a way that it is possible to start the contract directly after the end of the AMK, i.e. on January 1, 2056. The processing period should not exceed the calendar year 2056, so that the final evaluation report is available by December 31, 2056 at the latest.

7.2. Please indicate the date by which the final evaluation report will be submitted to the Commission:

The final evaluation report will be available by December 31, 2056 at the latest and will then be submitted to the Commission promptly.

7.3. Please mention factors that might affect the envisaged timeline:

At this point, no factors that might affect the envisaged timeline are anticipated.

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8. The body conducting the evaluation

8.1. Please provide specific information on the body conducting the evaluation or, if not yet selected, on the timeline, procedure and criteria for its selection:

The public call for the external evaluation by a specialized evaluation company will be issued timely – i.e. for the interim report the contract to begin on January 1, 2038. By applying the applicable regulations for contracts with external service providers, the independence, experience and expertise of the contractor is guaranteed. The processing period should not exceed the calendar year 2038, so that the interim evaluation report is available by December

31, 2038 at the latest. Similarly, the external evaluation for the final evaluation report should be advertised in such a way that the contract can begin immediately after the AMK has ended, i.e. on January 1, 2056.

8.2. Please provide information on the independence of the body conducting the evaluation and on how possible conflict of interest will be excluded during the selection process:

The expert shall be selected through a call for tenders. The internal regulations and procedures for such tenders of the German Government are designed to ensure independence and to prevent conflicts of interest (several divisions in the Federal Ministry have to cross-check the written assessment of the expert proposals).

8.3. Please indicate the relevant experience and skills of the body conducting the evaluation or how those skills will be ensured during the selection process:

A public call for tenders of a specialized evaluation company as well as the internal provisions weighing requirements for the selection (including weighting provisions) ensure professional competence during the selection process.

8.4. Please indicate which arrangements the granting authority will make to manage and monitor the conduct of the evaluation:

The evaluation will be closely monitored by a specialised division within the competent Federal Ministry (BMWK).

8.5. Please provide information, even if only of an indicative nature, on the necessary human and financial resources that will be made available for carrying out the evaluation:

The tender for the external evaluation will apply the usual requirements for expert reports from the BMWK. The selection will be based on expertise and costs. The evaluation will be closely monitored by a specialized division within the competent Federal Ministry (BMWK.

9. Publicity of the evaluation

9.1. Please provide information on the way the evaluation will be made public, that is to say, through the publication of the evaluation plan and the final evaluation report on a website:

The evaluation plan as well as the report on the interim evaluation (31.12.2041) and the final evaluation report (31.12.2056) will be published on the website of the competent Federal Ministry (BMWK).

9.2. Please indicate how the involvement of stakeholders will be ensured. Please indicate whether the organisation of public consultations or events related to the evaluation is envisaged:

The independent regulatory authority (BNetzA) involves the HCN TSOs in the data collection exercises and will provide the data of the regular tri-annual revision mechanism cited above (cf. 6.1). It is expected that the evaluation organisation will involve all relevant stakeholders, especially BNetzA, TSOs and relevant hydrogen customers when providing the evaluation report – giving all interested parties the opportunity to comment on its findings. A public consultation or evaluation event has not yet been planned.

9.3. Please specify how the evaluation results are intended to be used by the granting authority and other bodies, for example for the design of successors of the scheme or for similar schemes:

The financing model is designed to build the HCN with a view to facilitate the hydrogen market. When it comes to an end, the HCN is an ordinary energy infrastructure that has to finance itself – without the amortization account/state aid. A successor or similar scheme is not planned.

9.4. Please indicate whether and under which conditions data collected for the purpose or used for the evaluation will be made accessible for further studies and analysis:

The evaluation reports will be published on the BMWK website. The data is thus available for further use.

9.5. Please indicate whether the evaluation plan contains confidential information that should not be disclosed by the Commission:

The information in connection with the loan agreement with KfW under 2.4 and 2.5 b) are confidential business secrets and require the prior consent of KfW before they can be disclosed.

10. Other information

10.1. Please indicate here any other information you consider relevant for the assessment of the evaluation plan:

No further information relevant to the assessment of the evaluation plan is available.

10.2. Please list all documents attached to the notification and provide paper copies or direct internet links to the documents concerned:

ANNEX-01_Part.III.6_Notif_Form_CEEAG_Chapter_4.9.pdf
ANNEX-02_FNB-Gas-Entwurf-Antrag-Wasserstoff-Kernnetz_en.pdf
ANNEX-03-FNB_Massnahmenliste.xlsx
ANNEX-04-Leitungsmeldungen_weiterer_potenzieller_Wasserstoffnetzbetreiber.xlsx
ANNEX-05-Fraunhofer-report_validation_of_financial_model.pdf
ANNEX-06-Fraunhofer-calculation (Updated, pre-set for FIEG Base Case).xlsx
ANNEX-07-WACC_NPV (REVISED_2024_05_23).xlsx
ANNEX-08_FGA_-_Base Case vs Alternative Case(20240523).xlsx
ANNEX-09_Evaluation plan_AMK_sent.docx
ANNEX-10_2. ÄnderungsG EnWG_BGBl I Nr. 161.pdf