Methodology determination on efficiency benchmarking

January 2025

Current status of the Bundesnetzagentur's deliberations

1. Background

The Bundesnetzagentur's "Networks. Efficient. Secure. Transforming." key elements paper published in early 2024 presented the Bundesnetzagentur's initial deliberations on possible changes to the regulatory framework for costs and tariffs, including efficiency tools ("NEST" process: https://www.bundesnetzagentur.de/EN/RulingChambers/GBK/Key_ElementsPaper/start.html). The Bundesnetzagentur raised the question in thesis 5 of the paper as to whether efficiency benchmarking for electricity distribution system operators was a suitable tool and should be updated on the basis of the existing system for the electricity sector. It put the question in thesis 6 as to whether and how efficiency benchmarking for gas network operators could be developed to accommodate the changes in the gas supply landscape. The applicability of efficiency benchmarking should be assessed before the start of each regulatory period. If efficiency benchmarking could no longer be applied, other incentive elements should be used instead.

The Bundesnetzagentur evaluated the responses to these initial deliberations and also held discussions in particular with representatives from industry and academia. The Bundesnetzagentur commissioned a report to gain as full a picture as possible of the options for the future feasibility of efficiency benchmarking in the gas sector.

2. Objective of the paper

The objective of this paper is to present the Bundesnetzagentur's assessment of the key cornerstones of the future efficiency benchmarking method as at the end of 2024/beginning of 2025. This paper is not to be seen as a preliminary draft determination but as guidance on the contents of a future draft determination based on the current status of discussions. The actual draft determination would be subject to the usual consultation process.

Taking stock of the overall process and developments while discussions about the future regulatory framework are still ongoing will regularly lead to requirements and details being firmed up. This paper presents the current status of discussions that is constantly changing.

The topic of efficiency requirements for the above-mentioned network operators relates to three levels in the overall process:

- level 1: RAMEN framework determination

- level 2: methodology determination on efficiency benchmarking
- level 3: data collection relating to individual periods, cost driver analysis and definition of the model.

First of all, it is important to note that this paper and the proceedings for the methodology determination on efficiency benchmarking are essentially about a methodology for electricity distribution system operators and gas distribution and transmission system operators (level 2). More specifically, the requirements would not be for network operators in the simplified procedure or for electricity transmission system operators. This paper also touches on the subsequent stage comprising the period-related data collection, cost driver analysis and model determination.

Questions were sent out to industry representatives in advance of the sector dialogue (see section 3). The representatives presented their views on the individual points both at and after the dialogue, and the Bundesnetzagentur evaluated these views. This paper presents the Bundesnetzagentur's position on selected questions in light of the special dialogues held and the latest findings.

The paper is structured as follows. Section 3 summarises the dialogues held with industry representatives. Section 4 sets out the Bundesnetzagentur's views on a possible future framework for efficiency benchmarking based on the questions sent out in preparation for the sector dialogue. These statements are to be seen as a "work in progress" and not as a final position, and generally and primarily relate to the electricity sector. No detailed views on potentially different arrangements for the gas sector can be presented before the conclusions from the report are available (see section 5).

It is planned to publish a draft of the methodology determination on efficiency benchmarking for consultation in about mid-2025.

3. Industry dialogues

3.1. Dialogue on efficiency benchmarking on 24 September 2024

The Bundesnetzagentur held a special dialogue on efficiency benchmarking on 24 September 2024: "Efficiency benchmarking in the energy sector- Evaluation and challenges for German regulation".

The dialogue provided the opportunity for recognised scientific experts and consultants to share and discuss their experience and findings. The event addressed the following topics:

- review and experiences
- state of the art in efficiency measurement
- improvements for prospective application.

Speakers shared their experience of Germany's system of incentive-based regulation, presented alternative benchmarking methods and discussed specific aspects of efficiency benchmarking models.

The dialogue offered an opportunity to discuss possible ways for updating efficiency benchmarking methodologies. The aim of the event was to incorporate the latest scientific findings into the methodology determination on efficiency benchmarking.

The dialogue was an academic event primarily for nationally and internationally recognised scientific and academic experts with practical experience from industry as well, enabling a high-level specialist discussion.

3.2. Sector dialogue on 15 November 2024

The Bundesnetzagentur held an open expert dialogue on the methodology determination on efficiency benchmarking on 15 November 2024: Sector dialogue on efficiency benchmarking.

The first part of the event focused on the current status of discussions on the Bundesnetzagentur's future design of efficiency benchmarking and in particular the general rules to follow on from the current arrangements under the Incentive Regulation Ordinance (ARegV).

The second part served to outline the challenges for efficiency benchmarking in the gas sector in connection with the report commissioned on the future applicability and design of efficiency benchmarking for gas distribution system operators. Representatives from industry also presented their views on updating the efficiency benchmarking method based on the questions compiled and sent out in advance by the Bundesnetzagentur.

The dialogue provided the opportunity for a face-to-face discussion in Bonn between Bundesnetzagentur representatives and selected external experts. Other interested stakeholders and representatives of academia were able to join the meeting online.

4. Bundesnetzagentur's deliberations on a possible framework for future efficiency benchmarking and on selected questions

4.1 General

Which basic framework conditions should apply to efficiency benchmarking in future?

The industry considers efficiency benchmarking to be a core element of incentive regulation that has a direct influence on distribution system operators' financial resources. In the industry's opinion, redefining the requirements for efficiency benchmarking must not lead to an increase in the regulatory risk. Rather, individual aspects of the existing system should be updated.

The Bundesnetzagentur still intends to carry out efficiency benchmarking on a national basis, which means that it will also cover those network operators who are under the responsibility of the federal state regulatory authorities.

The efficiency score would correspond to the total costs minus the costs not subject to efficiency benchmarking (KA_{nEu}), expressed as a percentage. Account would also be taken of input and output parameters. The costs would essentially be determined on the basis of the current requirements in section 14 of the Incentive Regulation Ordinance, adjusted in line with the requirements of the RAMEN framework determination. As at present, the Bundesnetzagentur would obtain the structural data for the national efficiency benchmarking, as the basis for the output parameters, directly from all the network operators concerned. Deadlines would be set in particular to safeguard and speed up procedures.

Which requirements would a future efficiency benchmarking method need to meet?

Industry representatives presented their views on the requirements for a future efficiency benchmarking method at the sector dialogue. The main demand was that the future method had to produce undistorted efficiency scores together with cost reduction requirements that could be achieved and also exceeded. Overall, representatives were in favour of keeping the current method of efficiency benchmarking.

In the Bundesnetzagentur's view, the future efficiency benchmarking method must be flexible enough to accommodate new developments. This can be achieved, for example, by having new efficiency benchmarking models for each regulatory period, collecting new data formats (such as GIS data), adjusting the methodology to take account of new findings, and analysing any increase in the degree of heterogeneity among network operators.

At the same time, efficiency benchmarking should be as simple as possible and focus on the fundamental aspects. This means efficiency benchmarking cannot take account of every single particular characteristic.

Above all, however, efficiency benchmarking must not only reflect differences among network operators but also allow any inefficiencies that result in unnecessary costs and therefore a burden on network customers to be identified.

When regulating natural monopolies, efficiency benchmarking must create the necessary economic incentives to awaken and revisit efficiency potential. Efficiency is not a static or fixed factor even in a competitive economic sector: it is constantly changing. The regulatory framework must therefore ensure that companies' progress in efficiency is regularly reassessed and compared through efficiency benchmarking.

Does the current method need to be updated to be able to take adequate account of objective and structural differences?

The current view is that adequate account is already taken of objective and structural differences through the choice of the parameters. The possible need to update the method is examined before each regulatory period.

The Bundesnetzagentur is willing to discuss with representatives from industry or, for practical reasons, individual companies who have dealt intensively with the subject whether it is possible to pre-classify network operators and their supply tasks according to objective criteria. A call for a more in-depth discussion was made at the sector dialogue on 15 November 2024 and generally supported by the Bundesnetzagentur (see section 4.3.2).

4.2. Methodology

Which efficiency benchmarking method(s) is/are suitable as a basis for measuring efficiency? Are changes to the methods and/or is a new method needed? Is any method needed at all?

The majority of the industry representatives were in favour of keeping the current data envelopment analysis (DEA) and stochastic frontier analysis (SFA) methods. In their view, these methods were tried and tested and would guarantee continuity and legal certainty. Alternative methods should only be used to validate results in plausibility and robustness analyses.

In accordance with section 21a(1) sentence 7 of the Energy Industry Act (EnWG) the methodology for determining efficiency requirements must be designed so that small changes to individual parameters in the underlying method do not lead to disproportionate changes to the requirements, in particular compared with their significance. New methods and their potential applicability in the German regulatory system are also examined.

Objective criteria are needed to compare and weigh up the characteristics of different methods. These criteria may comprise the following aspects:

- transparency (clarity, replicability)
- robustness (as regards moderate changes to data and model assumptions)
- practicability (as regards required and available data and work involved in data processing)
- suitability (as regards statistical characteristics)
- methods in line with the latest scientific findings.

Continuity and legal certainty are arguments in favour of keeping the DEA and SFA methods. These methods were said at the industry dialogues to still be in line with the latest scientific findings. The companies are familiar with the methods. This gives them planning certainty and therefore investment certainty. In addition, the majority of the industry representatives supported keeping the DEA and SFA methods. The following criteria speak in favour of this:

- The methods are transparent: as companies are familiar with and already use the methods, there is clarity as to how to apply the methods. Past practice has shown that the results can also be replicated by companies.
- The methods have proven to be robust, for example in outlier analyses.
- The methods are practicable.
- The widespread use of the methods (in other countries as well) also shows that they are suitable.
- The methods are in line with the latest scientific findings.

How should outlier analyses be designed in future?

The industry's view is that variations in implementation, such as alternatives to the use of Cook's distance and additions in the DEA method to identify "masked outliers", should be looked at when developing the future outlier analyses.

The Bundesnetzagentur will evaluate the industry's arguments.

Which type of returns to scale should be used?

The type of returns to scale has been the subject of discussion among network operators and regulators for a long time. Opinions differ depending on which interests are being represented.

The basic aim of using non-decreasing returns to scale is to protect relatively small network operators that are included in efficiency benchmarking. This means that inefficiencies resulting from a too small company size are not taken into account in the efficiency assessment. If, by contrast, large network operators were to be protected, non-increasing returns to scale would have to be used. If inefficiencies resulting from different company sizes were to be removed from the efficiency assessment, variable returns to scale would need to be used. If inefficiencies resulting from company size were to be reflected in the efficiency score, constant returns to scale would have to be used.

The Bundesnetzagentur does not currently believe that its task is to protect certain company sizes. At the same time, it must be possible to eliminate inefficiencies that result from company size and result in a burden on network customers. A method with constant returns to scale would therefore be more appropriate.

Should the results from the SFA method still be scaled?

The Bundesnetzagentur is looking at whether it is still necessary to scale the results from the SFA method. The German Federal Court of Justice (BGH) concluded from the wording of Annex 3 to the Incentive Regulation Ordinance that it had to be possible to achieve an efficiency score of 100% in both methods. On account of the methodology, it is only possible to achieve 100% in the SFA method if the results are subsequently adjusted.

Industry representatives emphasised that when calculating efficiency scores, network operators that are classified as efficient had to achieve a score of 100% regardless of the method.

As Annex 3 will no longer apply when the Incentive Regulation Ordinance expires, it is necessary to look at whether there are reasons for keeping this requirement, apart from the wording of the current legislation. The Bundesnetzagentur is bound to the Energy Industry Act and in particular to European law when designing the new regulatory framework and will analyse the legislation in this respect. Of course, other statistical factors or incentive effects may also play a role in whether a requirement corresponding to the current one in Annex 3 should be included in the methodology determination. However, one possibility is to design the new regulatory framework so that the results from the SFA method are not artificially scaled up but the results actually calculated are used.

Which criteria should be taken into account when selecting a model?

The industry's view is that more weighting should be given to engineering/scientific factors than to statistical criteria when choosing a model. Statistical criteria such as the significance of the inefficiency or multicollinearity should not be used as "hard criteria" when selecting a model.

The Bundesnetzagentur believes that the current method for selecting models, which is characterised by an interplay between engineering/scientific and statistical analyses, is still appropriate. The engineering/scientific assessment plays an important role here. The minimum statistical requirements (see the last reports on efficiency benchmarking) should be met. Building on the current method, the future method must also ensure that groups of network operators that can be defined according to objective criteria do not have a distortive effect on other network operators.

Which distribution assumption should be used for the inefficiency?

In the case of the SFA model, assumptions are needed about the statistical distribution of the stochastic error term and the inefficiency in order to differentiate between the two. In the SFA model, as in most regression models, normal distribution is assumed for the error term, while a half-normal, exponential, truncated or gamma distribution can be assumed for the inefficiency. Since the second regulatory period, exponential distribution has been taken for the inefficiency in the SFA model.

In the Bundesnetzagentur's view, the first question to be looked at is whether the distribution assumptions should be addressed early on in the methodology determination or later at the efficiency benchmarking stage. One argument in favour of the latter is that it would then be possible to test out the effects of changes.

The responses at least have not yet provided a clear picture of any concrete change to the current method.

4.3 Efficiency benchmarking parameters

4.3.1 Cost basis/input parameters

Which cost basis should be used for efficiency benchmarking in future? To which cost items should the calculated efficiency score be applied?

As in the previous four regulatory periods, efficiency benchmarking for electricity and gas distribution system operators will be based on total costs (totex). This means that capital costs as well as operating costs will be included in the benchmarking.

The industry supports using a total costs basis at least for calculating efficiency. The total costs must not be distorted by regulatory requirements such as in the KANU 2.0 determination, as this could lead to distorted efficiency scores.

In the Bundesnetzagentur's view, using total costs has the economic advantage that no false incentives for suboptimal capital intensity are created, as substituting operating costs with capital costs does not generally result in a change in the efficiency scores. The Bundesnetzagentur believes that establishing efficiency must not be restricted to a certain type of costs.

However, industry representatives have suggested rediscussing to which cost items the calculated efficiency score should be applied. In their view, it would only be appropriate to apply the efficiency score to controllable operating costs.

The Bundesnetzagentur's view is that the efficiency requirements would still apply to controllable total costs minus the costs not subject to efficiency benchmarking (KA_{nEu}). Restricting the efficiency requirements to operating costs does not seem appropriate. Capital costs (capex) can also include controllable costs and inefficient costs. Excluding these costs from the pressure of

efficiency would perpetuate inefficiently high capital costs and conflict with the principle that only costs corresponding to those of an efficient and structurally comparable network operator are eligible for recognition under the regulatory framework.

In addition, the argument that capital costs are not generally controllable once investments have been made, resulting in an excessive burden on operating costs, is not valid. Firstly, the introduction of a weighted average cost of capital (WACC) method and the industry's support for this step show that there is at least potential to optimise capital cost financing structures. In this respect, efficiency requirements can also be achieved. Secondly, the logical consequence of the argument would be to carry out efficiency benchmarking before investments are actually made, which would obviously not be appropriate.

One decisive factor in favour of applying the efficiency requirements to total costs is – besides the possible existence of inefficient capital costs as mentioned above – the varying degree of capital intensity among network operators. Applying the efficiency requirements to just operating costs would disadvantage network operators with a relatively large proportion of operating costs. This would not be appropriate, as it would create a regulatory incentive for network operators towards capital-intensive strategies.

The Bundesnetzagentur is convinced that basing benchmarking on total costs is the only way to create a general incentive to increase efficiency and avoid inappropriate incentives and allocations.

Should a standardised calculation continue to be used?

Industry representatives believe that efficiency benchmarking should be based not only on total costs but also on standardised costs.

The use of capital costs can lead to distortions due, for example, to networks' different lifetimes or network operators' different depreciation methods.

Current and future dynamic developments in the gas and electricity markets will increase the diversity of investment and depreciation models. The Bundesnetzagentur therefore believes that it is still essential to harmonise capital costs for efficiency benchmarking using a standardisation calculation and annuities. It can even be expected that the more varied the network operators' depreciation and investment models, the more important the use of standardised capital costs will become. This view is shared by industry representatives. It might therefore be appropriate to give more weighting to standardised capital costs in a modified "best of" approach.

If there was a switch to general price level accounting, the price indices used to calculate the replacement costs for the standardisation calculation would only need to be set for efficiency benchmarking purposes. The Bundesnetzagentur therefore intends to keep the current rules under the electricity and gas network tariffs ordinances for setting price indices.

Should redispatching costs be taken into account in efficiency benchmarking in future?

Some industry representatives stated they were in favour of classifying the costs of redispatching as permanently non-controllable costs and therefore against including the costs in efficiency benchmarking for electricity distribution system operators. The main reason was that there would otherwise be a risk of the efficiency benchmarking results being distorted, as only a few network operators particularly affected by the energy transition were affected by redispatching. In most cases, redispatching costs would be incorrectly classed as inefficient costs for these network operators. The fact that some operators had a particularly high need for redispatching was because

in some places network expansion could not keep pace with renewable energy expansion due to external factors.

In accordance with the draft operative part of the RAMEN framework determination, electricity distribution system operators' costs for redispatching will generally be classed as **volatile costs**. This means that network operators will be able to make annual adjustments to their revenue caps to take account of their current costs but also that the costs for redispatching will be included in the cost basis for efficiency benchmarking.

The relationship between network expansion and redispatching is substitutional, which is why redispatching costs need to be taken into account in efficiency benchmarking. In return, an adequate output parameter must be selected. Network operators affected by redispatching will not be disadvantaged as long as the installed renewable energy capacity is still taken into account as an output parameter. The costs and output parameter(s) must relate to the base year; this could make certain adjustments necessary because of the current delay in billing for redispatching measures. Technology neutrality with respect to integrating new loads is ensured. What is important is that costs and structural parameters must match each other, that is they must correspond to the same year (= costs induced in the base year).

4.3.2 Output parameters

Should output parameters be set as mandatory? If so, which parameters?

Industry representatives were against setting mandatory parameters but in favour of defining common supply tasks instead.

New legal or practical requirements may emerge that could necessitate changes or prevent appropriate efficiency benchmarking if mandatory parameters were set.

"Mandatory parameters" set in a methodology determination would be legally binding for network operators. However, unlike an ordinance having the force of law, a methodology determination is only binding for the regulatory authority to the extent that the administration imposes an obligation on itself. A determination issued by the Bundesnetzagentur can also be amended more quickly than the current regulatory framework of ordinances if necessary.

Mandatory parameters can therefore firstly contribute to transparency and continuity in regulation and secondly act as an incentive for network operators for optimisation in line with the parameters.

Should output parameter variants be used in the different efficiency benchmarking methods?

Overall, industry representatives were in favour of making the output parameters more flexible by, for example, using variants in different efficiency benchmarking methods.

The Bundesnetzagentur's current view is to generally continue using the same parameters in all the efficiency benchmarking methods. The output parameters serve to describe a network operator's supply tasks, which do not depend on which efficiency benchmarking method is used. Differences between network operators, consideration for which is one of the industry's main concerns, can only consist of differences in supply tasks and not differences in operators' own chosen structures or in the results of efficiency benchmarking.

However, the Bundesnetzagentur will consider using output parameter variants to take account of the special characteristics of the benchmarking methodologies when it defines the models for the

different efficiency benchmarking methods. This means that the efficiency benchmarking methods to be used will have the same parameters. However, these parameters may be combined into density parameters, growth rates, ratios, etc to take better account of structural differences in supply tasks in the individual efficiency benchmarking methods.

Should completely new efficiency benchmarking be carried out in each period or are there ways to, for example, fix the output parameters and just update the data and re-estimate the efficiency threshold?

Industry representatives were against fixing data and models so as to provide better scope for adjustments.

The Bundesnetzagentur is considering defining a certain set of output parameters as candidates for the efficiency benchmarking model to be used. These candidate parameters would be subject to an engineering/scientific (re-)assessment and, if found to be statistically suitable, would be taken into account in the process of designing the model. In the past this set has comprised several hundred parameters with different levels of aggregation. This number can be reduced considerably by preselecting suitable data, which would firstly reduce the amount of work for all involved and secondly provide a certain degree of predictability. This data preselection could be based more on experience from previous efficiency benchmarking, accompanied by processes similar to previous pre-test processes and developed in consultation with the industry.

However, some industry representatives stated that a list of parameters that would no longer be needed in the future was not practicable at present. Parts of the industry are therefore against reducing the volume of data or defining a set of output parameters.

The possibility of fixing an efficiency benchmarking model for several regulatory periods will be discussed in the further course of the proceedings.

To what extent is there increased (or even new) heterogeneity that should be taken into account in efficiency benchmarking?

The industry was asked how increased heterogeneity affected the output parameters and how the term could be operationalised and made manageable.

Various ways in which heterogeneity could be dealt with in efficiency benchmarking were presented at the sector dialogue. These approaches were divided into three stages. At the first stage, data sets should be checked before carrying out efficiency calculations to remove data for network operators with different supply tasks. A separate efficiency benchmarking process could be carried out for these network operators. A joint efficiency benchmarking process should be carried out for network operators with the same supply tasks but with different structural factors or at different stages of transformation. However, the differences among the network operators should be reflected as at present through the choice of the output parameters used in the model.

At the sector dialogue held on 15 November 2024 the industry's response to the question about "new" heterogeneity for the electricity sector was limited to "different stages of transformation", while its response for the gas sector was more specific and included the challenges associated with the KANU 2.0 determination. The industry submitted more concrete examples for the electricity sector in mid-December 2024: renewable energy (differences between north and south, for instance in growth in wind and solar capacity), heat pumps (large increase in some regions, small increase in others where municipal heat plans may include district heating), large differences between federal states and towns within the same groups (town A with a large number of heat pumps and town B with district heating, state A with a focus on wind and state B with a focus on

solar, etc). A range of factors affecting the gas sector were also listed (including KANU 2.0 and the hydrogen strategy).

It is natural for there to be differences between network operators in terms of fulfilling their supply tasks (operators do not, for instance, have the same demand structure). Heterogeneity is taken into account very well through the choice of the output parameters. As long as it is not clear where there are deficits and whether alternative or additional methods really produce better results in taking heterogeneity into account, there is much to be said for retaining the current method. Better efficiency scores are not a sign that heterogeneity is better taken into account.

Rather, alongside the mere call for "adequate consideration", the term "increased" or "new" heterogeneity needs to be operationalised. If this is not possible, increased or new heterogeneity cannot be assumed. In this context, the following questions need to be answered:

- How should increased or new heterogeneity be measured?
- Which limits or values can be used to define increased or new heterogeneity in any case?
- Can increased or new heterogeneity be taken into account through the output parameters?

As stated at the sector dialogue, these questions will be addressed in an in-depth discussion with individual representatives from industry.

Are there concrete, identifiable deficits in taking account of forward-looking network expansion? If so, how could they be eliminated appropriately with the choice of output parameters?

It is a fact that energy supply networks need to be expanded to cope with current and future changes resulting from the transition in the energy, transport and heating sectors. Network operators are required by section 11(1) sentence 1 of the Energy Industry Act to take appropriate forward-looking network expansion measures. Planning undersized networks is only permissible in the case of "peak shaving" (section 11(2) sentence 1 of the Act). Network operators with more than 100,000 connected customers are also subject to formal planning obligations under section 14d of the Act.

In accordance with section 21a(3) sentence 2 of the Energy Industry Act, the Bundesnetzagentur's determinations should take account of forward-looking network expansion to achieve the objectives set out in section 1 of the Act. European legislation also requires incentives to be provided to electricity distribution system operators to operate and develop their networks cost effectively. For that purpose, regulatory authorities must recognise relevant costs as eligible, including costs related to anticipatory investment, and include those costs in transmission and distribution tariffs (see Article 18(8) of Regulation (EU) 2019/943).

The responses to the NEST paper made the industry's view clear that sufficient account should be taken of forward-looking network expansion when designing and carrying out efficiency benchmarking. Parameters relating to forward-looking network expansion (such as installed transformer capacity) should still be collected because the demand for capacity in the electricity networks would increase significantly as a result of the electrification of the energy supply. It was not sufficient to only take account of the development in load as this frequently lagged behind network expansion and conversion. There is therefore an increasing call for efficiency benchmarking to include one or more separate output parameters to take explicit account of forward-looking network expansion. The parameters proposed are mostly "potential" parameters.

The Bundesnetzagentur cannot see any substantial obstacles to forward-looking network expansion either from the regulatory framework in general or from efficiency benchmarking in particular.

The network operators' argument would be applicable if the development of the output parameters structurally "lagged behind" the development of the input parameters, resulting in disadvantages in the efficiency benchmarking.

Previous rounds of efficiency benchmarking have taken account of forward-looking network expansion using actual figures and therefore values that could actually be measured. Previous efficiency benchmarking models for electricity distribution system operators have taken account of between nine and 11 output parameters; these have included the circuit length, which is not set externally but internally by network operators. Additional power line kilometres due to a forward-looking, anticipated demand for network expansion are therefore taken into account directly in efficiency benchmarking, regardless of how much or how little the additional lines are used. Installed distributed generation capacity is also taken into account. In this respect, it is at least not essential to switch to projected or potential figures.

In addition, the Bundesnetzagentur has discussed and tested the use of potential parameters in the process of designing the model before each previous regulatory period. For instance, the efficiency benchmarking models for gas distribution system operators in the first regulatory periods included potential annual peak loads. These potential values were calculated from actual figures using relevant degrees of connection and deployment. The aim was to model any effects of a decrease in population. In subsequent regulatory periods these potential parameters were subject to regular engineering/scientific assessments and, despite being found to be of secondary importance compared with other parameters, were tested and evaluated in the process of designing the models.

As in the past, the Bundesnetzagentur will regularly assess and develop the methodology for future efficiency benchmarking. It will also continue to examine the use of potential parameters as called for by industry representatives. One of the questions to be looked at is how far it is possible to apply the current method in a similar way to an increase in energy consumption resulting from growth in installation and consumption areas to accommodate forward-looking electricity network expansion.

The methodology determination will describe and reflect this approach in an appropriate way. The specific arrangements for efficiency benchmarking in terms of the final design of the model will of course not be laid down until later in the period-related determination for the next regulatory period (see level 3).

As regards the potential parameters, the particular challenge is to find an appropriate and definitive way of calculating the parameters. It is absolutely essential to agree on, or for the regulator to specify, how the potential parameters should be derived and, if necessary, checked. Misplaced incentives must not be created.

As stated at the sector dialogue, the Bundesnetzagentur will hold in-depth discussions with individual industry representatives on any concrete suggestions from the industry on how to take account of forward-looking network expansion or on identifying potential parameters to be defined and/or tested.

4.4 Data quality/process acceleration

Which incentive mechanisms can be suggested to avoid data errors that negatively affect other operators in the efficiency benchmarking? Where can the volume of data be reduced in order to speed up the process without reducing the degree of accuracy?

Some responses to the NEST paper stated that data collection, for example, could potentially be simplified. Parameters not used in previous cost driver analyses or not necessary for other reasons should be identified and removed from the data collection.

Professional associations stated at the dialogue on efficiency benchmarking that the industry anticipated an increase and not a decrease in the required volume of data. There was no potential for reductions. It was essential for the Bundesnetzagentur to make intensive plausibility checks on the data. Improvements in quality were more likely to be achieved through consistent definitions.

The Bundesnetzagentur believes that efficiency benchmarking requires a valid basis, for which data must be collected from the relevant network operators in an extensive and complex process. As confirmed by the German Federal Court of Justice, the Bundesnetzagentur cannot directly access the data and therefore relies on the network operators providing (accurate) data; the Bundesnetzagentur can only check the data received for plausibility but nothing else (Federal Court of Justice judgment of 13 June 2023, EnVR 44/22, para 18; Düsseldorf higher regional court decision of 12 May 2022, 5 Kart 6/21 (V), para 65). Because of the way the data is collected, it is not possible to guarantee that the basis of data for nationwide efficiency benchmarking or the network operators' efficiency scores calculated in the efficiency benchmarking are completely free of errors (Düsseldorf higher regional court decision of 12 May 2022, 5 Kart 6/21 (V), para 65). Furthermore, there is a limited time window for efficiency benchmarking and the prior modelling (which is also a complex process) to be carried out, namely after the base year and before the beginning of the regulatory period. This means that the Bundesnetzagentur has to weigh up the time factor and the accuracy of the data against each other (Federal Court of Justice judgment of 13 June 2023, EnVR 44/22, para 18).

Publication at an early stage serves to support the extensive discussions with sector stakeholders in the process of designing the model for efficiency benchmarking and choosing the output parameters for the cost driver analysis.

However, after several rounds of efficiency benchmarking, it can also be assumed that companies now have a basic understanding of the processes and the importance of data quality.

Based on experience from previous data surveys and the subsequent use of the data, the Bundesnetzagentur plans to considerably reduce the number of data elements to be collected.

In addition, it should be possible to consider the data collected for a certain reporting date as essentially correct and complete since network operators have enough time beforehand to check and, if necessary, change their data and the Bundesnetzagentur itself makes extensive plausibility checks.

In the interests of a uniform basis of data, network operators must essentially keep to the data they provide; it would be contrary to the methodology of efficiency benchmarking if it were easily possible for network operators to correct their data after the efficiency benchmarking (see past case law: Federal Court of Justice judgment of 20 December 2022, EnVR 45/21, para 17, with reference to Federal Court of Justice judgment of 21 January 2014, EnVR 12/12, paras 122-3). Individual data errors can always occur in efficiency benchmarking but do not usually have a significant effect on the result because of the broad basis of data. The regulatory authority can

require a network operator to keep to an incorrectly reported parameter following completion of the data survey and consultation on the design of the efficiency benchmarking model if correcting the error in the complex system of efficiency benchmarking would delay and lead to other risks in the process and provided that there is no undue hardship for the network operator.

How would it be possible to speed up the overall process?

The actual time frame for efficiency benchmarking in connection with setting revenue caps will initially be the same, with a three-year and a five-year regulatory period. It is possible, however, to speed up the individual steps. As stated at the beginning, the requirements for efficiency benchmarking will be set out at three different levels. If the current efficiency benchmarking method is essentially retained as planned, the most scope for speeding up the process will be in the period-related determinations (level 3). The methodology determination would lay down the basic conditions for this, such as the possibility of setting deadlines and reporting dates as well as rules for data collection. Details would then be set out in specific determinations for each round of efficiency benchmarking.

The Bundesnetzagentur considers there to be significant potential for speeding up the process in the volume of data to be collected. Building on experience from the first four regulatory periods, the scope of the data to be collected would be reduced. Efficiency benchmarking requires a valid basis of data. Previous efficiency benchmarking has shown that a large number of variables are not absolutely essential for the process of designing the model. Reducing the data volume would speed up various parts of the process. Network operators would need less time to complete the data survey. Automatic processing would minimise the risk of errors from manual input. The data survey would be less complex. The Bundesnetzagentur's plausibility checks would be quicker. Feedback to and from network operators would be limited to the data actually relevant to efficiency benchmarking. The data checked for plausibility would still be published. The scope of mutual checks among network operators would be manageable. This could also increase the legal certainty of the procedure.

Industry representatives suggested that the different data surveys (not only for efficiency benchmarking) should be aligned to reduce the amount of work involved. One of the unanswered questions about the method is whether the set of data to be collected should be newly defined before each round of efficiency benchmarking as at present or whether it can be permanently defined in the methodology determination, accompanied by the requirement to provide data. Data collection could then possibly be integrated into the annual monitoring surveys, which would save time and effort.

The data supplied by the network operators is checked for plausibility in several steps in various formal, analytical and statistical tests. The automation and standardisation of analyses and reports is already being tested and is to be developed further in the future. An increasing degree of digitalisation (GIS data) also helps to speed up processing.

The process of designing the model to derive the efficiency threshold should be based on previous models. The basic assumptions should be kept as far as possible. A smaller data volume would also lead to a smaller volume of data for the cost driver analysis.

A threshold should be introduced in the methodology determination to enable an early start on designing the model and carrying out the calculations. One idea being discussed is to start with the cost driver analysis once a certain threshold has been reached, that is once a certain proportion of checked cost data or a certain proportion of the total cost volume is available that is adequate for a reliable analysis.

Further plans for the future regulatory framework also include elements that would speed up the overall process. For instance, a reduction in the permanently non-controllable costs, that is the costs not subject to efficiency benchmarking, would speed up the account reconciliation step.

The Bundesnetzagentur is confident that it will be possible to speed up the overall process considerably with a combination of these approaches.

4.5 Safeguarding mechanisms

Should the current five-year period for reducing inefficiencies be shortened?

The call from network operators is that the average annual efficiency requirements should not be tightened if the regulatory period is shortened. The current rule for a five-year regulatory period is an average reduction in inefficient costs of 60%. This average should not be increased in the case of a three-year regulatory period. Instead of reducing inefficiencies evenly over three years (33% in the first year, 66% in the second year, 100% in the third year), corresponding to an average reduction of 66%, the proposal for a three-year regulatory period is 20% in the first year, 60% in the second year and 100% in the third year, corresponding to the current average of 60%. The industry is against shortening the period for reducing inefficiencies to three years within a five-year regulatory period for the same reasons.

Allowing network operators to reduce inefficiencies over the whole regulatory period results in considerably higher costs, which are financed by network users through the network tariffs (see left-hand chart in Figure 1).

Revenue caps (allowed revenue) with different periods for reducing inefficiencies

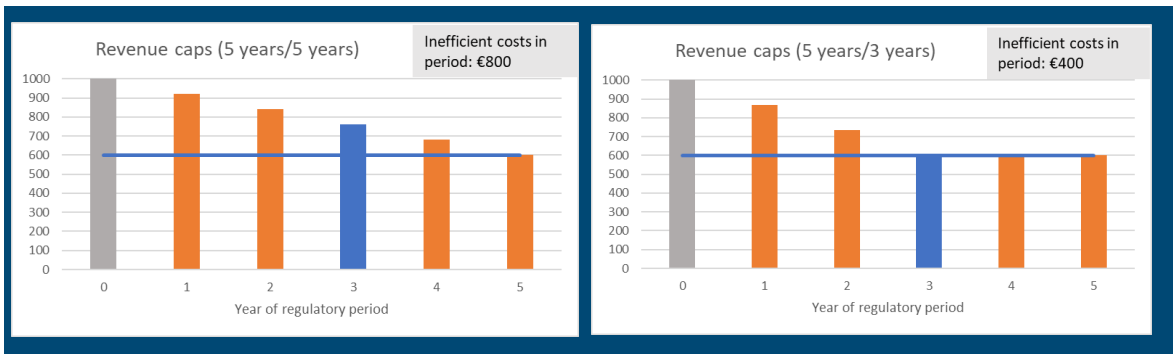

Figure 1: Revenue caps (allowed revenue) with different periods for reducing inefficiencies

If the period for reducing inefficiencies were shortened from five to three years and inefficiencies were reduced evenly over the three years, the inefficient costs would be halved (see right-hand chart in Figure 1). This means that network users would only have to finance half the amount of inefficiencies.

Shortening the period for reducing inefficiencies also makes sense in terms of consistency, as inefficiencies would have to be reduced to zero by the base year of the last five-year regulatory period.

The Bundesnetzagentur is considering shortening the period for reducing inefficiencies from five to three years to lessen the burden of network operators' inefficient costs on network users. Shortening the period for reducing inefficiencies can also be interpreted as a way towards shortening the regulatory period, as proposed in the draft operative part of the RAMEN determination.

Should the "best of" approach for the calculations using the different methods and types of costs be modified?

At the sector dialogue, industry representatives stated that they were in favour of retaining the safeguarding mechanism of the "best of four" of the calculations using the different methods and types of costs. Firstly, this was necessary to take account of the different effects of the parametric and non-parametric methods. Secondly, it ensured that cost differences among network operators due, for example, to different network lifetimes did not result in the efficiency scores being distorted.

In the first four regulatory periods, four efficiency scores were calculated and the best score – taking account of a minimum efficiency of 60% – was applied for the benefit of the network operators:

$$EW^{BO} = \max\{DEA; sDEA; SFA; sSFA; 0.6\}$$

where

DEA is the efficiency score calculated using the DEA method and actual capital costs;

sDEA is the efficiency score calculated using the DEA method and standardised capital costs;

SFA is the efficiency score calculated using the SFA method and actual capital costs; and

sSFA is the efficiency score calculated using the SFA method and standardised capital costs.

This approach was based on the idea that neither of the two efficiency benchmarking methods (DEA and SFA) was clearly better than the other and that using both methods and taking the best score was another way of protecting network operators against excessively high efficiency requirements. However, neither the fact that neither of the methods is clearly better nor protection against excessively high efficiency requirements makes a "best of" approach absolutely necessary. Another way of making sure that the advantages of the two efficiency benchmarking methods come into play is by calculating averages, as an average would also protect against excessive efficiency requirements. The Bundesnetzagentur therefore sees flexibility in achieving the two objectives.

The Bundesnetzagentur is considering a modified "best of" approach for future efficiency score calculations that would keep the advantages of the two efficiency benchmarking methods but would take equal account of the cost parameters in the efficiency score.

While both types of costs (actual and standardised total costs) would be taken into account, neither one nor the other would be used on its own to determine the efficiency score. This ensures that the effects of different lifetimes and depreciation methods will still be balanced out, but neither of the two types of costs can be seen as the "right" or "only relevant" type. As a result, individual increases in costs would generally lead to lower efficiency scores than at present and misplaced incentives could therefore be avoided.

The Bundesnetzagentur's analyses have shown that network operators would still benefit from the current safeguarding mechanisms if this modified "best of" approach were used, as individual increases in costs would still lead to disproportionately small decreases in efficiency scores.

The modified "best of" approach could work as follows:

1. First, four efficiency scores (DEA, sDEA, SFA, sSFA) are calculated, as at present.
2. Then the arithmetic mean of the efficiency scores calculated using the DEA method with actual and standardised capital costs (DEA and sDEA) and the arithmetic mean of the

efficiency scores calculated using the SFA method with actual and standardised costs (SFA and sSFA) are calculated:

$$\mathrm{EW}^{\mathrm{DEA}} = \frac{(\mathrm{DEA} + \mathrm{sDEA})}{2} \text{ and } \mathrm{EW}^{\mathrm{SFA}} = \frac{(\mathrm{SFA} + \mathrm{sSFA})}{2}$$

3. Finally, the best of these two averages is taken as the score for the network operator:

$$\mathrm{EW}_{\mathrm{mod}}^{\mathrm{BO}} = \max\{\mathrm{EW}^{\mathrm{DEA}}; \mathrm{EW}^{\mathrm{SFA}}; 0.6\}$$

where

$\mathrm{EW}^{\mathrm{DEA}}$ is the arithmetic mean of the efficiency scores calculated using the DEA method;

and

$\mathrm{EW}^{\mathrm{SFA}}$ is the arithmetic mean of the efficiency scores using the SFA method.

The Bundesnetzagentur also considered calculating the arithmetic mean of the efficiency scores using each type of costs and having a "best of" efficiency score based on the type of costs. However, this approach could mean that none of the companies in the efficiency benchmarking would achieve an efficiency score of 100%, as 100% could then only be achieved by those companies obtaining both a score of 100% in the DEA method and a (scaled) score of 100% in the SFA method.

However, calculating the arithmetic mean of the efficiency scores with each type of method would minimise the existing misplaced incentives to increase costs, as individual increases in costs would lead to larger (but still almost always disproportionately small) decreases in efficiency scores.

Should there still be a minimum efficiency score and, if so, what should it be?

Industry representatives were in favour of retaining the minimum efficiency score as a safeguarding mechanism.

The Bundesnetzagentur plans to retain the minimum efficiency score of 60%.

Should there be an efficiency bonus?

The majority of industry representatives were in favour of retaining the efficiency bonus as an incentive tool. They saw the efficiency bonus as an additional incentive to increase efficiency, giving particularly efficient network operators additional financial resources to cope with the energy transition.

The Bundesnetzagentur has not planned to provide for a bonus. The Bundesnetzagentur originally proposed an efficiency bonus in its evaluation report in connection with shortening the regulatory period to two years. Shortening the regulatory period to such an extent reduces the opportunity – together with the incentive – to generate additional revenue by increasing efficiency within the regulatory period. A bonus would be one way of balancing this out. As a five-year regulatory period is planned in the initial transitional phase, there will still be an opportunity and an incentive for network operators to generate additional revenue by reducing their costs during the regulatory period.

Do the current rules in section 15(1) of the Incentive Regulation Ordinance enable sufficient account to be taken of special structural circumstances? Are there any suggestions for checking and handling special structural circumstances relating to supply tasks?

The industry's view is that the current rules in section 15 of the Incentive Regulation Ordinance are too narrow in view of the increasing degree of heterogeneity among network operators and should be broadened. The rules should also be applicable when several network operators are affected by the same structural challenge that is not taken into account in the model.

The Bundesnetzagentur's view is that sufficient account is taken of special structural circumstances. The current rules in section 15(1) of the Ordinance have proven effective. The possibility of making the procedure under section 15 of the Ordinance a formal application procedure with separate decision-making is being examined. This could help to speed up the process and create legal certainty. Decisions under section 15 of the Ordinance could be contested in court separately from revenue cap decisions.

5. Particular issues relating to the future feasibility of efficiency benchmarking for the gas sector

5.1. Current situation and regulatory conclusions

What are the special challenges for future efficiency benchmarking for the gas sector?

Approximately one third of the distribution system operators in the standard procedure took up the option provided in the KANU 2.0 determination to adjust their depreciation arrangements for 2025 (in many cases declining balance depreciation with the maximum rate). Overall, this has resulted in moderate increases in costs, with a few outliers. This means that there is already a certain distortion in the total costs for 2025 as regards the efficiency benchmarking. The industry and the Bundesnetzagentur agree on this point.

According to the Bundesnetzagentur's current assessment, the additional aspects described below will increase in importance in the medium term, that is after the base year 2025 but at the latest beginning in the next base year; these aspects will not have a significant effect on efficiency benchmarking for the fifth regulatory period, but will later result in differences in transformation paths between individual network operators and regions, which will be heightened by the different decarbonisation target dates at national, regional and local level.

In future, the importance of repurposing natural gas pipelines for (mostly) hydrogen and the accompanying gas network reinforcement measures to maintain the security of natural gas supply in the transitional phase – which will affect network operators to varying degrees – will increase.

The importance of decommissioning pipelines will increase when the municipal heat plans (due in mid-2026/mid-2028 for municipalities with more than/up to 100,000 inhabitants) and the decommissioning plans to be developed in future in accordance with Directive (EU) 2024/1788 are in place. This, too, will affect network operators to varying degrees. It can be assumed that by the base year 2025 no significant provisions for the decommissioning costs will have been made nationwide with the level of detail required by regulation; under the current legislation, however, this may happen within the five-year regulatory period (probably 2028-2032).

Which regulatory conclusions has the Bundesnetzagentur drawn from the special challenges for future efficiency benchmarking for the gas sector?

The sector dialogue held on 15 November 2024 showed that the industry and the Bundesnetzagentur generally share the same views about the above-mentioned challenges for efficiency benchmarking in the gas sector that currently exist and will increase in importance in the future and about the need to analyse these challenges in more detail in connection with future efficiency benchmarking. However, FNB Gas e.V., the association of the German gas transmission operators, is considerably more sceptical about the possibility of carrying out efficiency benchmarking than the representatives of distribution system operators.

The Bundesnetzagentur still sees the need for efficiency incentives in the gas sector in the future, taking into account individual operators' different conversion and decommissioning paths. However, the budget principle as the only incentive component without any additional tools is not seen as adequate.

At present, the Bundesnetzagentur therefore considers comprehensive efficiency benchmarking in its current form, together with any necessary modifications, to be appropriate at least for

distribution system operators; this also seems advisable in view of the requirement in Regulation (EU) 2024/1789 for ACER to carry out efficiency benchmarking for transmission system operators at European level. Not carrying out efficiency benchmarking for distribution system operators would be very difficult to justify against this background.

As regards necessary modifications, the suitability of the current standardisation calculation arrangements to balance out cost distortions due to KANU 2.0 together with the possibility of not taking account of standardised total costs are two aspects that will need to be looked at in more detail in the short term. In the medium term, the use of potential parameters or other parameters to take account of the transformation of the gas networks will need to be examined more closely.

No practicable and expedient alternatives to the conventional form of comprehensive efficiency benchmarking currently exist or are foreseeable, although the development of such alternatives should continue to be pursued.

Nevertheless, the feasibility of efficiency benchmarking in the gas sector is being put to the test on account of the transformation of the gas networks. The draft operative part of the RAMEN framework determination assumes that efficiency benchmarking is generally feasible for both the electricity and the gas sector but that different arrangements can be made for gas.

If efficiency benchmarking for the gas sector is to be continued, the Bundesnetzagentur considers justified differences in the methodology for gas compared with that for the electricity sector to be possible.

The draft operative part of the framework determination provides for a separate determination that would define as volatile costs the provisions set aside for decommissioning gas supply networks in connection with the transformation of the gas networks and that would also allow these costs to be adjusted in the course of a regulatory period and lay down rules for incentives to guarantee that only efficient costs of this type would be taken into account in the revenue caps.

At present, the only group among distribution system operators participating in the standard procedure that can be defined according to objective criteria is operators without a concession area. No other groups are currently known. Other such groups may emerge in the medium to long term as a result of the transformation of the gas networks. As stated above, it was suggested at the sector dialogue held on 15 November 2024 that in-depth discussions with industry representatives could be held to address this question (see section 4.1).

In view of the aim to simplify and speed up regulatory processes, the level of complexity in efficiency benchmarking must not increase, at least not overall.

5.2. Commissioned report

What was the task of the authors of the report commissioned in September 2024 as regards efficiency benchmarking in the gas sector?

The authors were commissioned to make recommendations concerning the future applicability and design of efficiency benchmarking for distribution system operators.

The authors were to make a valid assessment of whether the current legal and practical design of efficiency benchmarking for distribution system operators as applied for the fourth regulatory period (2023-2027) will still be suitable in view of the varied transformation processes anticipated. The report was also to look at whether the cost drivers determined in the last efficiency

benchmarking (for the fourth regulatory period) will still be relevant. These assessments were to distinguish between short to medium-term and long-term scenarios.

The authors were also to look at the extent to which it is appropriate – with a view to meeting efficiency requirements – to calculate efficiency scores on the basis of a static base year assessment and apply the scores with a delay to the years in the regulatory period following the base year, during which there could be considerable changes in input and output parameters and the relation between the two compared with the base year.

If the current design of efficiency benchmarking was found not to be suitable for the future, proposals were to be made for developing the design to make it suitable.

The findings from the analyses were to be illustrated in a template to show which methods can be used to obtain transparent and logical results. The template would serve as a key aid in the Bundesnetzagentur's assessments necessary before the beginning of a regulatory period.

Material was also to be collected to outline alternative ways of assessing efficiency.

In addition, the authors were to look at whether the findings for distribution system operators can also be applied to transmission system operators within the meaning of section 3 para 5 of the Energy Industry Act. The report's findings are currently expected to be available at the end of February 2025 and will be taken into account in the consultation draft of the methodology determination.

It should be made clear that if the report concludes that efficiency benchmarking is still feasible, feasibility cannot be fully confirmed until concrete data for the next round of efficiency benchmarking is available, which will probably not be until the beginning of 2027 at the earliest.

5.3. Efficiency benchmarking for gas transmission system operators

Which role will ACER's future efficiency benchmarking and national efficiency benchmarking in its current form play?

FNB Gas e.V., the association of the German gas transmission operators, expressed a critical view of both national and international benchmarking (at the sector dialogue held on 15 November 2024). If the costs of national efficiency benchmarking outweighed the benefits, regulation based more on costs (without efficiency benchmarking) would seem appropriate during the transformation process. Alternatives to the current efficiency benchmarking method existed, but some of them also had considerable weaknesses. European efficiency benchmarking had all the same problems as national efficiency benchmarking. In addition, European efficiency benchmarking did not produce reliable results because of the still small sample size and the considerably greater degree of heterogeneity among operators; there was also a lack of data quality, limited transparency and more regulatory work involved.

Article 19(2) of Regulation (EU) 2024/1789 requires ACER to carry out efficiency benchmarking for transmission system operators. The first benchmarking must be carried out three years after the Regulation enters into force, so in August 2027, and then every four years; the benchmarking must be published, subject to the protection of data, with the data being provided by the national regulatory authorities and transmission system operators. The national regulatory authorities must take into account the benchmarking and national circumstances when setting revenue caps. Supplementary national efficiency benchmarking is also permissible. The draft operative part of the RAMEN framework determination provides for this option. It also states that more detailed rules will be set out in the draft methodology determination.

The Bundesnetzagentur currently believes that the results of ACER's efficiency benchmarking will need to be accompanied at least by taking into account national circumstances. At present, national efficiency benchmarking also seems to be a possibility, which means that the base year for the international benchmarking would not be the same as that for the national benchmarking. National efficiency benchmarking can provide key arguments specifically with respect to the need to supplement ACER's benchmarking.

The questions relating to exactly how account should be taken of national circumstances and the question of carrying out national efficiency benchmarking are not covered by the above-mentioned report. The report does, however, address the question of whether and to what extent the results for distribution system operators can be applied to transmission system operators.