Bundesnetzagentur

- Ruling Chamber 7 -

BK7-24-01-014 **19 December 2024**

Second consultation in the determination proceedings for a basic compensation and balancing model for hydrogen ("WasABi")

On 3 July 2024, on the basis of section 28n(5) para 1 in conjunction with section 29(1) of the Energy Industry Act (EnWG), Ruling Chamber 7 opened the WasABi determination proceedings for a basic compensation and balancing model for hydrogen together with the WaKandA determination and presented its initial deliberations for consultation:

see WasABi determination proceedings.

The purpose of the determination proceedings is to lay down the fundamental aspects of a balancing regime for hydrogen. The determination supplements and builds on the applicable European legal acts, national legislation and the Bundesnetzagentur's existing determinations and aims to ensure a transparent, reliable and legally secure regulatory framework for the ramp-up of hydrogen.

I. Responses to the first consultation

The ruling chamber received 22 responses to the first consultation. The responses are being published together with this second consultation document on the Bundesnetzagentur's website, except where respondents have stated that their response should not be published.

II. Draft operative part of the determination

Based on the ruling chamber's deliberations in the introductory document of 3 July 2024 and taking into account the responses to the document received in the first consultation, the ruling chamber has drafted the operative part of the legally binding decision:

Draft operative part of the determination:

1. Hydrogen transmission network operators must designate and establish by [two months after publication of the determination] a market area manager to, in particular, perform the tasks assigned by this determination and the WaKandA determination (BK7-24-01-15). Hydrogen transmission network operators may commission the market area manager to fulfil other tasks relating to the operation of the hydrogen network that are necessary for granting efficient access to the hydrogen network. Hydrogen transmission network operators must equip the market area manager with the necessary resources enabling the market area manager to fully perform the assigned tasks beginning on 1 October 2026. Hydrogen network operators must provide the market area manager with any data and information necessary to fulfil the tasks, with the level of detail required in each case. Hydrogen transmission network operators must involve hydrogen distribution network operators in an appropriate manner in the process of designating the market area manager.

2. Hydrogen network operators and the market area manager are required to carry out balancing of hydrogen quantities in accordance with the following principles:
    a) All quantities transported and traded by shippers and balance responsible parties must be balanced by the market area manager in balancing groups. Tolerances are not allowed. No time-defined balancing period is being set: balancing must take place continuously.
    b) Nominated and measured quantities in line with the following criteria are relevant for the purposes of the balancing:
        aa) Nominated quantities for the following points must generally be included in the balance; the “allocated as nominated” principle generally applies to these points:
            (i) entry and exit points at cross-border interconnection points
            (ii) entry points from domestic production facilities
            (iii) virtual entry and exit points
            (iv) entry and exit points from and to hydrogen storage facilities
            (v) entry points from hydrogen terminals.

        bb) In the case of exit points connecting final customers, measured data (actual consumption) is relevant to the balancing.

            The data must be measured every 15 minutes and must be transmitted without delay to the market area manager for allocation to the relevant balancing group. The measured data indicates the quantity for the previous 15 minutes.

    c) Balance responsible parties are required to keep their balancing groups balanced as far as possible at all times. Balance responsible parties must take all reasonable

measures to avoid predictable imbalances. The general requirement to keep a balancing group balanced applies irrespective of a balance responsible party's function as a helper within the meaning of operative part 5.

d) In order to continuously determine the differences in quantities for each balancing group, the provisional input and offtake quantities, that is the quantities not adjusted for missing or incorrect quantities or the calorific value, must be netted continuously in the balancing group to which they have been allocated. The market area manager must net the provisional quantities determined and allocated by the entry and exit network operators in the balancing group and must communicate the balance to the balance responsible party without delay.

e) The final quantities allocated to a balancing group must include adjustments for missing or incorrect measured data. The final quantities to be allocated must be determined by the entry and exit network operators by the end of the month of the day on which data was measured. The market area manager must net the final allocated quantities determined by the entry and exit network operators and must communicate the balance to the balance responsible party without delay on a daily basis.

f) The final allocated quantities must, where necessary, be adjusted for the calorific value used for settlement (quantities adjusted for calorific value). The balancing to be carried out on a daily basis by the market area manager for the balance responsible party of differences in quantities resulting from the calorific value adjustment of the final allocated quantities in a balancing group must take place at the end of the month.

g) The netting of the balancing groups using provisional measured data to be carried out as set out in point d) must take place continuously. The market area manager must ensure, by applying a suitable compensation mechanism, that the differences between the final quantities as referred to in points e) and f) and the provisional quantities are taken into account appropriately and cost-reflectively in the balancing without the netting of the balancing groups based on the provisional measured data as set out in point d) or the overall network balance status as defined in operative part 3 a) having to be changed retrospectively.

h) The compensation mechanism must also take into account the physical differences in quantities resulting in particular from the balancing-related differences in quantities in a hydrogen network.

i) The settlement of balancing groups, including settlement in accordance with the financial incentive system, must take place at the latest in the month following the month being settled.

3. The market area manager must publish the overall network balance status for the hydrogen market area continuously. The following rules apply here:
    a) The overall network balance status is the sum of the provisional allocated quantities as referred to in operative part 2 d) of the individual balancing groups in the hydrogen market area.
    b) The overall network status must be updated at least every 15 minutes. A forecast of the overall network status at the beginning of at least the next clock hour must be published in addition to the current overall network status.
    c) Hydrogen network operators must define flexibility zones and associated limits in kilowatt hours (kWh) for the hydrogen market area. The market area manager must publish these at least two hours before the beginning of each calendar day. The flexibility zone limits defined for the next calendar day become binding when they are published. The flexibility zone limits must be designed as follows, in particular taking into account the technical characteristics of the networks and the nominations and quantity notifications received:

        aa) Green zone: flexibility range indicating a stable condition. If the overall network status is within the green zone, no compensatory measures are required in the hydrogen market area.

        bb) Yellow zone: flexibility range indicating a critical condition. If the overall network status is within or reaches the yellow zone, compensatory measures are required in the hydrogen market area.

        cc) Red zone: flexibility range indicating a very critical condition. If the overall network status is within or reaches the red zone, compensatory measures are required without delay in the hydrogen market area. Further measures under section 28n(1a) sentence 2 EnWG remain unaffected.

    d) The hydrogen market area may initially comprise several networks or sub-networks operated by one or more hydrogen network operators that are not connected to each other, known as “clusters”. In this case, the rules set out in points a) to c) apply to each cluster. The use of such a procedure is restricted to the ramp-up period, when multi-cluster transport in the hydrogen market area on a fully firm basis is not yet possible for technical reasons and full multi-cluster netting of quantities is not possible.

4. The following applies to the use of balancing energy:

    If the overall network status exceeds the limit for the green zone or if the forecast shows that the overall network status will exceed the limit for the green zone at the beginning of the next clock hour, the market area manager must use balancing energy to bring the overall network status back into the green zone. The following rules apply here:

a) The market area manager is required to meet the demand for balancing energy by buying or selling quantities of hydrogen. The market area manager must use standardised short-term products that can be traded on an exchange in the market area manager's own market area.
b) The quantity to be procured corresponds to the difference between the forecast overall network status for the beginning of the next clock hour and the limit for the green zone.
c) The market area manager must publish information about the quantity and price of the balancing energy used on the data exchange platform referred to in operative part 6. The information must be published without delay and must include in particular the following: day of use, delivery point, duration of use, lot size, quantity, commodity charge.

5. The market area manager must introduce a financial incentive system in line with the following criteria:
   a) The market area manager must continuously record the status of the balancing groups as the balance between input and offtake based on the provisional allocated quantities as referred to in operative part 2 d). The balance must be cumulated and continuously updated for each balancing group. If the overall network status is in the yellow or red zone or if the forecast shows that the yellow or red zone will be reached at the beginning of the next clock hour, balance responsible parties must be classified as either helpers or causers. The following applies here:
      aa) Helper: a balance responsible party whose balancing group status is the opposite of the overall network status at the beginning of the clock hour.
      bb) Causer: a balance responsible party whose balancing group status is the same as the overall network status at the beginning of the clock hour.
   b) The following applies in the event that the overall network status indicates a short supply:
      aa) If the market area manager uses balancing energy (buys hydrogen) as set out in operative part 4, the market area manager charges the costs incurred to the causers as follows: the market area manager transfers the quantity of balancing energy used among the individual causers based on each causer's share of the causers' total quantity in the causer's balancing group and settles the share of balancing energy transferred using the volume-weighted average price of the balancing energy used.
      bb) If the market area manager does not use any balancing energy, the causers must pay a penalty to the market area manager. The penalty is calculated from the first EEX HYDRIX index for Germany that is published after the

balance responsible party was classified as a causer multiplied by the highest balance of the causer at the beginning of a clock hour on the relevant day.

c) The following applies in the event that the overall network status indicates a surplus supply:

aa) If the market area manager uses balancing energy (sells hydrogen) as set out in operative part 4, the market area manager transfers the quantity of balancing energy used from the balancing groups of the individual causers based on each causer's share of the causers' total quantity and settles the share of balancing energy transferred using the volume-weighted average prices of the balancing energy used.

bb) If the market area manager does not use any balancing energy, the causers must pay a penalty to the market area manager. The penalty is calculated from the first EEX HYDRIX index for Germany that is published after the balance responsible party was classified as a causer multiplied by the highest balance of the causer at the beginning of a clock hour on the relevant day.

d) In the case of points b) bb) and c) bb), the market area manager must disburse the penalty payments received among the individual helpers based on their share of the total quantity of all helpers.

e) If the market area manager considers the use of an index other than that referred to in points b) and c) to be appropriate for calculating the penalty payments, the market area manager may apply to the ruling chamber for approval of the use of a different index.

6. The information, in particular the measured data transmitted by hydrogen network operators and the balancing group quantities and network information, especially the overall network status, to be made available by the market area manager to the relevant market participants must be provided by the market area manager with the establishment of an internet-based central data exchange platform (data hub). In addition, a standardised IT data interface (application programming interface – API) must be established to enable the automated electronic exchange of data between market participants and the data exchange platform. The market area manager is centrally responsible for the purposes of hydrogen balancing and the other applications for the necessary incoming and outgoing data exchange, the processing and provision of information together with visualisations for all relevant market participants, including collecting the necessary core data. The necessary data must be made available to the market area manager with the required level of detail. The same applies to the receipt of nominations and quantity notifications to the

extent necessary for this purpose. The data exchange platform must also be designed to enable the exchange of data and processing of information for other technical applications using the platform, insofar as this is laid down in a determination. The provision of information and exchange of data must meet the following requirements:

a) The provision of information and exchange of data must be guaranteed every 15 minutes in each hour of a day. Continuous availability of the data exchange platform must be ensured with suitable technical measures.
b) The data exchange platform and the exchange of information and data using the IT interfaces must be protected against attacks and disruption within the framework of the relevant legislation and standards on IT and data security. The market area manager is entitled to specify the IT data interface standard (API), taking into account any existing API standardisation for market communication in the energy sector affecting the planned exchange of information.
c) The provision of information and exchange of data must be based on an access and authorisation concept ensuring that authenticated access to the relevant information is only possible for authorised parties, that is, in particular, balance responsible parties, shippers/suppliers, network operators and final customers.
d) The relevant data protection provisions must be taken into account in the provision of information and exchange of data. This applies in particular with respect to data integrity and to any necessary anonymisation or pseudonymisation of the data or information itself.
e) Market participants must register on the data exchange platform. The market area manager must make available the information necessary for registration and for application of the data interfaces.
f) The data exchange platform must be established by 1 August 2026 and must be tested with market participants during an introductory phase up to the date specified in operative part 9.

7. The market area manager must set up a virtual trading point (VTP). Potential market participants must conclude a balancing group contract with the market area manager to gain access to the hydrogen market area and the VTP. The market area manager may require registration and the provision of relevant information for the conclusion of a contract. The VTP is a point in the hydrogen market area where hydrogen can be exchanged between balancing groups but is not a physical entry or exit point in the hydrogen market area. Where clusters are defined, the exchange of quantities at the VTP may be restricted to individual clusters. In these cases, each cluster must be granted access to the VTP.

8. The following reporting, evaluation and publication requirements are being imposed:
   a) The market area manager is required to provide the ruling chamber with an annual report summarising the development and status of the hydrogen balancing regime in the hydrogen market area by 1 February of each year beginning on 1 February 2028. This report should include a history of the overall network status and the resulting measures, including the quantities and payment flows under the helper/causer incentive system, and an evaluation of the procurement and use of balancing energy.
   b) The reporting and evaluation requirements resulting from point a) may be met together with the reporting requirements from the WaKandA determination (BK7-24-01-15) by providing a combined report to the ruling chamber.
   c) The ruling chamber must publish the report provided in accordance with point a) or b).
   d) Hydrogen network operators must publish a coordinated methodology for defining the flexibility zones as set out in operative part 3 within a reasonable period of time before its application.
   e) The market area manager must develop the compensation mechanism referred to in operative part 2 h) and i) and must publish details of how it functions within a reasonable period of time before its application. The market area manager must take due account of the market roles affected when developing the compensation mechanism.

9. The market area manager and hydrogen network operators are required to apply the rules determined, with the exception of operative part 6 f), beginning on 1 October 2026.

III. Explanations on the draft operative part of the determination

The explanations and further considerations below serve to explain and contextualise the draft operative part of the determination.

Operative part 1

(1) The purpose of operative part 1 is to determine that hydrogen transmission network operators must designate a market area manager for the German hydrogen market area. Numerous respondents supported the ruling chamber's view that it makes sense to establish a market area manager (referred to in the introductory document as the "body to be designated"). The establishment of a market area manager will make a particular contribution to accelerating and harmonising processes in the interests of a targeted and orderly hydrogen ramp-up. The market area manager will, in particular, perform the tasks envisaged in this determination and in the WaKandA determination (BK7-24-01-015). These tasks include, above all, managing balancing and providing the information relevant to balancing by establishing an internet-based central data exchange platform. Hydrogen transmission network operators will also be able to

commission the market area manager to fulfil other tasks. The ruling chamber makes it clear that hydrogen transmission network operators must equip the market area manager with the necessary (financial, personnel, etc) resources to enable the market area manager to fulfil the assigned tasks. Likewise, hydrogen network operators must provide the market area manager with any data or information necessary to fulfil the tasks but not directly available to the market area manager. The responsibility for designating the market area manager is being assigned to hydrogen transmission network operators as the undertakings especially involved in the ramp-up of the hydrogen market. Hydrogen distribution network operators must be involved in an appropriate manner in the process of designating the market area manager to ensure that their interests are taken into account appropriately.

(2) The ruling chamber has acknowledged the call from respondents for the market area manager to be designated at an early stage by setting an earlier deadline for the establishment of the market area manager. This ensures that the market area manager is able to fulfil the assigned tasks when the rules in this determination take effect.

Operative part 2

(3) The purpose of operative part 2 is to lay down the principles applicable to the balancing to be carried out by hydrogen network operators and the market area manager of the quantities of hydrogen transported and traded by shippers and/or balance responsible parties. Balancing will take place continuously. The ruling chamber sees its view confirmed by respondents that the introduction of a time-defined balancing period with balancing group settlement at the end of the period is not necessary and has no added value. Instead, the balancing group balances should generally be updated continuously. Depending on the overall network status, a financial incentive system (helper/causer mechanism) will come into play that may result in causers whose conduct is detrimental to the network paying a penalty but not in settlement of the individual causers' balancing groups (see below).

(4) The majority of the respondents welcomed the introduction of a financial incentive system. However, some respondents stated that there should be no individual tolerances for balance responsible parties. Instead, all balance responsible parties should benefit from the resulting network flexibility with a generally larger "green zone". The ruling chamber has acknowledged this by not allowing individual tolerances for the balancing groups in point a). The ruling chamber believes that network users will still benefit from an appropriate share of the flexibility in the network for balancing group management even without individual tolerances. Overall, this share should be at least as large as it would be if the network buffer for defining the green zone (after deduction of the capacity required for network operation) and the individual tolerances for balance responsible parties had to be shared. The ruling chamber is also convinced by the argument that allowing individual tolerances would weaken the incentive effect of the helper/causer mechanism. There would be no financial incentives for balance responsible parties not exceeding their individual tolerance limits to act as helpers in a way that is beneficial to the network, even if the

overall network status showed that helpers were needed. In an extreme case, it could at least not be ruled out that, if all balance responsible parties exhausted their individual tolerance limits, the overall network status could reach a critical level but there would be no financial incentive for balancing groups to act in response. The ruling chamber also shares the concern raised that introducing individual tolerances coupled with the capacity allocated to the balancing groups could lead to balance responsible parties hoarding capacity so as to be granted the largest possible individual tolerance, which would be contrary to an efficient network access model.

(5) Balancing will take account of nominated and measured quantities as set out in point b). If hydrogen network operators control entry and exit points on the basis of nominations (cross-border interconnection points, entry and exit points from and to hydrogen storage facilities, entry points from hydrogen terminals, entry points from domestic production facilities, VTP), the “allocated as nominated” principle will apply. Two respondents pointed out that the introduction of operational balancing accounts (OBAs) was necessary to manage nominations, in particular to take account of steering differences. The ruling chamber shares this view and has included relevant rules in the WaKandA determination. The “allocated as measured” principle will apply to exit points connecting final customers, with the data relevant to the balancing being data measured using interval metering or an equivalent measurement method. The ruling chamber is making it clear with point b) bb) that alternative allocation methods at exit points connecting final customers will not be allowed. Unlike some respondents, the ruling chamber cannot see how an alternative allocation method could ensure the provision of information at the intervals necessary for the hydrogen sector with an adequate level of quality. It can be assumed that, for instance, standard load profiling as used in the gas sector will not be adequate for this purpose in the hydrogen sector. By contrast, smart metering systems offer equivalent measurement methods that could also be used in the hydrogen sector at a reasonable cost for customers with lower consumption as well. This means that these consumption groups will also be taken into due account and will not be excluded from the hydrogen market because of the “allocated as measured” principle.

(6) Point c) requires balance responsible parties to take all reasonable measures to keep their balancing groups balanced as far as possible at all times. The ruling chamber makes it clear here that an imbalance in the balancing group of a balance responsible party acting as a helper under the financial incentive scheme does not conflict with the general requirement to keep a balancing group balanced. This is in response to one comment that the planned general requirement to keep balancing groups balanced conflicted with the incentive to act as a helper and have an imbalance that would be beneficial to the network.

(7) The purpose of point d) is to ensure that the balance of each balancing group is determined continuously. The basic principle is that the continuous balance of a balancing group is the difference between input and offtake quantities at a given time. The continuous balance of a balancing group is determined by the market area manager netting the quantities determined and allocated to that balancing group by the entry and exit network operators.

(8) Some respondents stated that among the ruling chamber's proposed requirements for data exchange, which were welcomed by the majority of the respondents, the generation and transmission of any necessary substitute values did not seem practicable and subsequent corrections to a balancing group balance that were due to an event not controllable by the balance responsible party and that would lead to a retrospective penalty were not reasonable. The ruling chamber essentially shares these concerns. Retrospective penalties for balance responsible parties under the financial incentive system in accordance with operative part 5 as a result of corrections to data must be avoided. The ruling chamber makes it clear that provisional input and offtake quantities will be netted and transmitted and used for continuous balancing. No adjustments will be made for missing or incorrect data or for calorific value. Balance responsible parties can therefore be certain that the balance group status transmitted to them without delay or, in accordance with operative part 6, every 15 minutes represents the relevant balance that will not be changed afterwards.

(9) In addition to the provisional quantities used for continuous balancing, the market area manager will net the final quantities determined by the entry and exit network operators, allocate the quantities to the balancing groups and communicate the balance to the balance responsible parties on a daily basis. In accordance with point e), the final quantities will include adjustments for missing or incorrect measured data. The market area manager will determine the final quantities by the end of the month of the day on which data was measured and communicate the balance to the balance responsible parties without delay. At present, the ruling chamber cannot rule out the possibility that it may also be appropriate to adjust the quantities of the hydrogen transported and to be balanced in order to take account of different calorific values. Point f) therefore requires the market area manager to adjust the final allocated quantities for the calorific value for this eventuality.

(10) Point g) requires the market area manager to introduce a compensation mechanism to balance any differences between the provisional and the final quantities in the balancing groups. This is necessary because the provisional quantities used for continuous balancing in accordance with point d) may differ from the corrected quantities, in particular because of incorrect measured data. These differences in quantities must be allocated appropriately and cost-reflectively to the individual balancing groups. At the same time, it must be ensured that the balancing of the differences in quantities must not lead to retrospective penalties for balance responsible parties. This in turn means that that the overall network balance status, which is the sum of the individual balancing group balances, must not be changed retrospectively, otherwise balancing could lead to retrospective penalties for balance responsible parties. The ruling chamber also questions whether subsequent corrections to the provisional balancing group balances and to the overall network status would be compatible with the basic principle of continuous balancing, as a time would need to be defined by which all balancing groups had to be corrected. This would inevitably lead to a leap in the continuous time series.

(11) Nevertheless, the differences in quantities must be balanced because otherwise the quantities of hydrogen actually transported or supplied to final customers and the balanced quantities would not match in the long term. The ruling chamber believes that the compensation mechanism must in particular ensure that the quantities are balanced over a certain period of time and that the balanced quantities and the measured quantities corrected for incorrect data in the balancing groups match. One possible way of guaranteeing this would be for the market area manager to allocate the differences in quantities to the relevant balancing groups. The following example serves to illustrate this possible approach. A balance responsible party allocates to the balancing group 100 units of hydrogen on the entry and exit side in the course of one day D based on the provisional quantities reported for the purposes of continuous balancing. It becomes clear at the end of the month following day D that only 90 units physically exited the balancing group. The difference of +10 units does not have any retrospective effect on the balancing on day D. However, it is appropriate for the 10 units of surplus hydrogen allocated to the hydrogen market area to be transferred back to the balance responsible party. The market area manager allocates the 10 units as input into the balance responsible party's balancing group over a period of 10 days, for example, after informing the balance responsible party. The balance responsible party takes account of this allocation in their balancing group management and nominates one unit of input quantity less for each of the 10 days. If the clearing process shows that the balance responsible party physically supplied too little hydrogen to the hydrogen market area, the quantity would be allocated to the balance responsible party's balancing group on the exit side. The balance responsible party would therefore need to feed in more hydrogen over the next few days to compensate for the shortage. This means that the difference resulting from the incorrect measured data can be balanced out without having to change the balancing group balances and the overall network status retrospectively. The transfer of quantities back to or from a balance responsible party by the market area manager would therefore not lead to a penalty for the balance responsible party. Defining a reasonable period of time for quantities to be transferred back to or from balancing group(s) essentially ensures that this takes place at the current market price. Separate settlement of the quantities would therefore not be necessary. The ruling chamber makes it clear that the approach described above can provide the basis for a compensation mechanism. However, the market area manager may apply an alternative mechanism as long as it meets the requirements set out in points g) and h).

Operative part 3

(12) The purpose of operative part 3 is to implement the requirement for the market area manager to publish the overall network status for the hydrogen market area continuously. A large number of respondents welcomed the introduction of this requirement. However, the ruling chamber assumes that, when this determination comes into force, the hydrogen market area will only comprise networks or sub-networks that are not fully connected to each other, known as clusters. A number of respondents shared this view. The ruling chamber makes it clear in point d) that in this case the rules for publishing the overall network status will apply to each cluster. Here,

the ruling chamber has acknowledged the call made by two respondents for the requirement to initially apply to each cluster, then to merged clusters and ultimately to the single German hydrogen market area.

(13) Point a) is based on the methodology described in the introductory document for determining the overall network status. The overall network status is the sum of the individual balancing group balances at a given time and, as stated in two responses, therefore represents the state of the overall network in terms of the balancing groups. It does not directly represent the physical state of the individual hydrogen network operators' networks.

(14) Point b) states that the overall network status must be published and updated at least every 15 minutes. The ruling chamber considers it necessary for a forecast of the overall network status at the beginning of at least the next clock hour to be published in addition to the current overall network status. A forecast is necessary in particular because the forecast for the beginning of the next clock hour is relevant for classifying balance responsible parties as helpers or causers and thus for any payment of penalties. The interval of at least 15 minutes for updating the overall network status is the same as the interval for transmitting the balancing group status and, in combination with a netting period of one hour, was seen by a large number of respondents as reasonable. In addition, the ruling chamber makes it clear that the market area manager may also choose to publish a forecast of the overall network status at the beginning of a clock hour beyond the next clock hour, if they have the necessary information.

(15) Point c) requires the introduction of flexibility zones. Clear limits in kilowatt hours (kWh) for the individual zones must be defined and published. The helper/causer mechanism may come into play, depending on which of the three zones to be defined the overall network status is in. The majority of the respondents welcomed the mechanism proposed by the ruling chamber. The ruling chamber considers it necessary for reasons of transparency for balance responsible parties to be able to rely on the limits published by the market area manager. The ruling chamber therefore plans to require the market area manager to publish the binding limits defined for the next calendar day at least two hours before the beginning of the day. The ruling chamber explicitly emphasises, however, that the market area manager may publish the binding limits defined for the next day more than two hours in advance, as long as there are no disadvantages for balance responsible parties as regards the flexibility available to them. The ruling chamber believes that the main factors relevant to defining the limits are the technical parameters, such as pressure levels, in the individual hydrogen networks. However, account should also be taken of the balancing group management information available to hydrogen network operators, in particular nominations and quantity notifications. In any case, the input parameters for defining the limits must not be rigid but must be able to change over the course of time. The ruling chamber therefore considers it necessary for hydrogen network operators to be able to adjust the limits at short notice and agrees with the call from one respondent to allow the limits to be adjusted a short time in advance. The ruling chamber believes that the possibility for the limits for the next day to be adjusted up to two

hours in advance represents a balance of interests between the call for binding limits and the need to be able to adjust the limits a short time in advance.

(16) The ruling chamber has proposed three zones. The green zone is a range indicating that the overall network status is stable. This means that no compensatory measures are required and all the balancing group balances are such that it is not necessary to classify balance responsible parties as helpers or causers. The yellow zone is a range indicating that compensatory measures are required to bring the overall network status back into the green zone. The financial incentive system will come into play and balance responsible parties will be classified as helpers or causers. The red zone is a range indicating a critical overall network status. If the overall network status reaches the red zone, compensatory measures are required without delay. If the compensatory measures taken do not bring the overall network status back into the yellow or green zone or if hydrogen network operators and the market area manager do not expect the compensatory measures available to be able to achieve this, hydrogen network operators may take measures under section 28n(1a) sentence 2 EnWG to bring the overall network status back into the yellow or green zone. The ruling chamber makes it clear that it shares the view of several respondents that measures by hydrogen network operators to disconnect or reduce the supply of hydrogen should be a last resort. The ruling chamber does not, however, share the view of some respondents that the determination should lay down technical prerequisites for disconnection as well as compensation arrangements. Both these aspects are outside the scope of the rules for a balancing regime but are understandably important to the market and need to be discussed and regulated in other processes.

Operative part 4

(17) The purpose of operative part 4 is to lay down the basic rules for procuring and using balancing energy. The ruling chamber did not include rules for using balancing energy in its introductory document because it had assumed that it would not be possible to procure market-based balancing energy at the start of the market ramp-up. A number of respondents contradicted the ruling chamber's view. The ruling chamber was convinced in particular by the argument that the possibility of procuring market-based balancing energy at an early stage of market development could at least not be ruled out. Based on this assumption, the ruling chamber has acknowledged the call for the basic model to include rules for procuring and using balancing energy. If market-based balancing energy is available, it seems appropriate for the market area manager to use balancing energy to stabilise the overall network balance status.

(18) The aim behind using balancing energy is to bring the overall network status back into the green zone, that is back to a stable state. The market area manager should therefore use balancing energy if the overall network status crosses the boundary between the green and the yellow zone or if the forecast shows that the overall network status will cross the boundary at the beginning of the next clock hour. In accordance with point b), the quantity of balancing energy to be procured must therefore correspond to the difference between the level of the overall network

status outside the green zone at the beginning of the next clock hour and the limit for the green zone. The purpose of using balancing energy is not to fully balance the overall network status but to bring it back to a stable state. Depending on whether the overall network status indicates a short or a surplus supply in the hydrogen market area, the market area manager would either buy or sell the necessary quantity of hydrogen through the VTP. Point a) implements the requirement necessary in the ruling chamber's view to use short-term standardised products that can be traded on an exchange for the German hydrogen market area. The ruling chamber assumes that "rest-of-the-day" contracts would be particularly suitable, where available. The costs of using balancing energy must be charged to the causers under the financial incentive system in accordance with operative part 5. It is therefore appropriate for the costs of procuring balancing energy to be determined using the market price applicable at the time balancing energy is used. As the demand for balancing energy is the short-term result of the balancing group balances and the consequent overall network balance status, it is appropriate for short-term trading products to be used to meet the demand. The ruling chamber believes that the conclusion of long-term bilateral contracts or disconnection agreements, as proposed by a few respondents with respect to balancing energy, is therefore not appropriate. Furthermore, it can be assumed that such contracts would always involve the payment of capacity prices. The ruling chamber doubts whether it would be possible to appropriately allocate the associated fixed costs to the causers. The costs would then have to be shared among all balance responsible parties through a surcharge. By contrast, the ruling chamber considers it appropriate for the costs to be allocated as cost-reflectively as possible.

(19) Point c) requires the market area manager to publish information relevant to the market if balancing energy is used. The information needs to be published without delay for reasons of transparency and with regard to the financial incentive system.

Operative part 5

(20) Operative part 5 requires the market area manager to introduce a financial incentive system based on a helper/causer mechanism. The majority of the respondents welcomed the ruling chamber's proposals in the introductory document. By contrast, there was a varied response to the ruling chamber's initial proposal for an individual balancing group tolerance of 10% of the capacity allocated, as regards both the tolerance range and the question of whether the tolerance should be based on the entry or exit capacity allocated. Views also differed on whether balance responsible parties with a balancing group imbalance within their tolerance limits should be classified as a helper or causer. This ultimately supported the ruling chamber in its decision not to allow individual tolerances but to make the flexibility in the network available to all balance responsible parties equally through the arrangements for the green zone (see explanations on operative part 2).

(21) Point a) sets out that the financial incentive system will come into play whenever the overall network balance status exceeds the limit for the green zone. As long as the overall network status remains within the green zone, balancing group imbalances will not have any financial

consequences for balance responsible parties, irrespective of the size of an imbalance. If the overall network status exceeds the limit for the green zone, balance responsible parties whose balancing group status is the opposite of the overall network status will be classified as helpers. This does not mean that the helpers' balancing group imbalances will result in the helpers having to pay the market area manager for their imbalances through a penalty or another mechanism. This is appropriate because these balance responsible parties' imbalances are beneficial to the network as they help to reduce the imbalance in the overall network status. Balance responsible parties whose balancing group status is the same as the overall network status will be classified as causers. This means that either they will be incentivised by a penalty to reduce their balancing group imbalance with the aim of bringing the overall network status back into the green zone or they will have to bear the costs incurred by the market area manager from using balancing energy to achieve this same aim. The costs of using balancing energy may comprise components such as exchange fees as well as the actual commodity costs. Allocating the costs of using balancing energy to the causers is appropriate because the causers, with their balancing group imbalances, are infringing the general requirement set out in operative part 2 c) to keep their balancing groups balanced and are responsible for the imbalance in the overall network status. They should be incentivised to manage their balancing groups to benefit the network or bear the costs incurred by the market area manager from using balancing energy to bring the overall network status back into the green zone.

(22) The ruling chamber's reference to the next clock hour makes it clear that the interval of 15 minutes for transmitting data and the period of one clock hour for netting are different. The aim here is to enable balance responsible parties to control their balancing group, taking account of the balancing group status and overall network status communicated every 15 minutes, so as to avoid penalties and keep the overall network status within the green zone. With regard to the specific length of the data transmission interval and the netting period, respondents argued that a netting period of 15 minutes would require "real-time" transmission of data. At the same time, several respondents pointed out that, even if this were possible within the scope of data transmission and processing, there were currently no flexibility sources in the hydrogen sector that could be used effectively at such short notice. The majority of respondents across all the market roles stated that a data transmission interval of 15 minutes, as proposed by the ruling chamber in the introductory document, should be combined with a netting period of one hour. This would give balance responsible parties enough time and information to avoid impending penalties as well as flexibility sources that could be used effectively within the timescale. One respondent pointed out that a netting period of one hour combined with a data transmission interval of 15 minutes would also enable appropriate coupling with the electricity market, which was important in particular for the use of electrolysers. The ruling chamber agrees with the respondents' arguments in favour of a data transmission interval of 15 minutes and a netting period of one hour. In particular, the ruling chamber believes that this would give balance responsible parties a reasonable opportunity to respond to unwanted balancing group imbalances and thus comply with their greater responsibility

in terms of the overall network balance status. At the same time, the netting period is short enough to accommodate the smaller degree of flexibility in the hydrogen network compared with the natural gas network.

(23) Points b) and c) describe how the financial incentive system will work, depending on whether the overall network balance status indicates a short or a surplus supply. A distinction is also made between the market area manager using and not using balancing energy to bring the overall network status back into the green zone. If balancing energy is used, the ruling chamber considers it appropriate for the costs incurred to be charged to those responsible for balancing energy being used, that is the causers. This corresponds to calls from respondents in the first market consultation. At the same time, it is appropriate to transfer the quantity of balancing energy used among the causers based on each causer's share of the causers' total imbalance. It must also be taken into account, however, that no balancing energy is used to balance the overall network status. The ruling chamber considers it conceivable, especially in the early stages, that short-term standardised trading products for balancing energy will not be available in all the clusters at all times. The financial incentive system will come into play in such cases and incentivise causers to adjust their balancing group to benefit the network. The ruling chamber originally proposed basing a penalty for this case on the network tariff. While some respondents welcomed this proposal, the majority rejected it. Respondents who were against using the network tariff as a basis argued that the penalty should instead be based on the price of the commodity. Other respondents stated that the actual penalty amount should not be known beforehand; this would allow the incentive mechanism to take full effect and prevent balance responsible parties from benefiting financially. This would not be the case with a penalty known beforehand to be equivalent to a known percentage of an equally known network tariff. Several respondents instead suggested basing the penalty on the HYDRIX hydrogen index published by EEX; this index reflected the commodity price and was not known in advance. The ruling chamber was convinced in particular by the argument that a penalty should not be known beforehand if the incentive mechanism were to take full effect. In this respect, the ruling chamber agrees that basing the penalty on a market price index would be a better alternative than basing it on the network tariff. At the same time, the ruling chamber does not consider the HYDRIX index in its present form to be the best solution either because, according to the ruling chamber's information, the index does not reflect all the short-term trades concluded in Germany and is currently only updated once a week. However, the ruling chamber believes that it is possible and probable enough that the relevance of the index for the quantities of hydrogen traded in Germany will increase in future. It can therefore be expected that, by the time the financial incentive system is applied, the HYDRIX index will reflect the market price enough to be used as a relevant index for calculating the penalty under the financial incentive system. It can also be assumed that it will be possible in future to calculate the index on more than a weekly basis once a short-term trading market for hydrogen is established. However, the ruling chamber does not want to rule out the possibility of an alternative index that may seem more appropriate as a basis for calculating the penalty in future, and possibly

even before the rules in this determination are applied. Point e) therefore allows the market area manager to use an index other than the HYDRIX index to calculate the penalty. The ruling chamber considers it necessary for the market area manager to apply for approval of the use of an alternative index, giving adequate reasons, and for the ruling chamber to give its approval before the market area manager can apply the proposed alternative.

Operative part 6

(24) Operative part 6 makes the market area manager centrally responsible for the provision of the balancing group, quantity and network information to the market participants, with the establishment of an internet-based central data exchange platform (data hub). A standardised IT data interface (API) must also be established to enable the automated electronic exchange of data between market participants and the data exchange platform. The market area manager is centrally responsible, in particular for the purposes of hydrogen balancing, for managing and organising the necessary incoming and outgoing data exchange and the processing and provision of information together with visualisations for all relevant market participants, including collecting the necessary core data. The data exchange platform will serve as the market participants' single point of contact, with the market area manager being the sole and central point of contact for information and communication in the areas of responsibility described. Users of the hydrogen infrastructure (balance responsible parties, suppliers, etc) will therefore only have one point of contact for the various processes. A central data exchange platform will make communication in the hydrogen sector more effective and efficient compared to other sectors, including the gas sector, where various communication paths and points of contact exist for different tasks and responsibilities. This also adequately reflects the higher requirements for data exchange in the hydrogen sector.

(25) The ruling chamber has responded to a suggestion from some respondents by requiring the market area manager to use the central data exchange platform to collect nominations and quantity notifications and forward them to the relevant hydrogen network operators in addition to processing and communicating data and information for the purposes of balancing group management. This reflects the main idea behind an exchange platform, which is to reduce the number of communication paths and points of contact for the individual market participants, making processes more effective. Market participants will no longer also need to communicate with each individual network operator for these purposes but just with the market area manager.

(26) The ruling chamber also believes that the data exchange platform as described in the determination could represent the core for possible applications in other market processes. The design of the data exchange platform, including the underlying database structure, should therefore generally take into account the possibility of an extension to accommodate other process, information and data exchange requirements in future. These applications would be defined by the ruling chamber in separate determinations.

(27) The ruling chamber decided against including the requirement that it had originally considered for the market area manager to also process measured data and generate substitute values on the central data exchange platform. A large number of respondents pointed out that this task should remain the responsibility of the hydrogen network operators who, not least because of current practices in the gas sector, already had the necessary EDM systems and expertise to carry out these tasks effectively. Shifting the task of processing and managing measured data to the data exchange platform would therefore not be very efficient. The ruling chamber has followed this view for the time being but does not generally rule out the possibility of shifting the task in future. Account will need to be taken in particular of the extent to which hydrogen network operators will be able to make the necessary corrections to the measured data in time and with the required quality, also in view of the higher data transmission requirements. In general, central processing is likely to result in efficiency potential for the market as a whole, at least given automated checks on measured data using algorithmic methods. As this task will remain the responsibility of the hydrogen network operators, there is no need for error and correction management processes for measured data on the data exchange platform, which some respondents had called for. The explanations on operative part 2 cover how different qualities of measured data should be dealt with within the scope of this determination.

(28) The ruling chamber has not taken up the suggestion made by a few respondents to develop the data exchange platform into a central digital body for network access. The ruling chamber currently believes that transferring management of network access agreements to the data exchange platform, which would be necessary, would be a significant intervention in the relevant established practice and significant additional coordination would therefore be needed for the new practice to be accepted. Not least the need to enable a data hub to be established at the earliest possible stage of the ramp-up of the hydrogen market makes introducing such fundamental changes seem difficult, especially as this would also involve changing established market role concepts. Overall, the ruling chamber generally agrees with the basic idea behind the suggestion but, at this stage of the ramp-up of the hydrogen networks, believes that the focus of the data hub on balancing management is more fundamental and, for the time being, quite adequate in view of the objective of establishing a new, central platform for data and communication exchange.

(29) On account of the focus of the platform on communications and data exchange, the ruling chamber does not consider it necessary to require the market area manager to draw up a separate concept for the structure and use of the data exchange platform. This determination sets out the main requirements for the processes for balancing group management, including the provision of data and information to market participants. As other functions such as the central management of measured data or agreements are not initially planned, which would have required additional coordination on shifting tasks to a central body (a rather uncommon practice in the industry), the ruling chamber does not consider a separate concept for the arrangements for the data exchange platform to be necessary. If details of the process still need coordination in the market, they can easily be agreed with market participants within the scope of a hydrogen cooperation agreement.

In any case, the technical arrangements for the processing and provision of information in line with the balancing-related and other data requirements are the sole responsibility of the market area manager.

(30) In addition, points a) to d) set out the basic requirements for the establishment of the data exchange platform. Unlike some respondents, the ruling chamber does not see it necessary to determine the details of the processes for balancing or nominations, etc. These details can be worked out separately by market participants, such as in the hydrogen cooperation agreement, or in the case of the data exchange platform by the market area manager. The same applies to the nature and content of internet-based visualisations or data retrieval. In addition, the content to be included, such as the balancing group balance and the overall network status, is set out elsewhere in the determination. The aim here was rather to lay down the basic requirements for IT and data security and data protection, especially in connection with data access, for the market area manager, who is required to establish the data exchange platform. Due account must be taken of the state of the art in each case. Any existing rules for developing IT data interfaces (APIs) that are applicable to the planned exchange of data and information must be taken into account when developing the APIs for the data hub so as to enable synergies to be used. Point e) requires market participants to register on the data exchange platform. This is necessary, as otherwise the function as a central data exchange platform would be counteracted by possible bilateral communication paths. The market area manager is required to manage the relevant core data.

(31) Point f) gives the market area manager until 1 August 2026 to develop and establish the data exchange platform, including the underlying technical processes for processing information. The data exchange platform must then be tested with market participants during an introductory phase up to 1 October 2026, allowing any last, small technical changes to be made to the IT system. The ruling chamber considers this staggered introduction necessary to avoid delays to the general introduction of the hydrogen balancing regime on 1 October 2026. The ruling chamber assumes that with a likely implementation period of over a year, the market area manager will have enough time to apply the rules in the determination for the data exchange platform and the underlying processes and applications in line with practice. Nevertheless, the ruling chamber once again expressly invites comments on the aspect of the implementation time and calls on market participants to respond to this point in particular.

Operative part 7

(32) Operative part 7 requires the market area manager to set up a VTP for hydrogen. This will enable quantities of hydrogen to be transferred between balancing groups for the purposes of balancing. The exchange of quantities at the VTP may be restricted to individual clusters if clusters are not physically connected. In these cases, each cluster must be granted access to the VTP. As it is assumed that in the ramp-up phase there will initially only be individual hydrogen clusters that are not interconnected, setting up a hydrogen VTP will ensure that all clusters will still have access to the VTP and that hydrogen can be exchanged with each individual cluster in line with uniform

rules applicable to all clusters. All the respondents welcomed the proposal for the market area manager to set up a VTP, in particular in view of plans for uniform balancing of quantities and balancing groups across the market. With respect to the question left open in the introductory document as to whether access to the hydrogen VTP should initially be made conditional on booking transport capacity, the ruling chamber has decided not to set such a condition. The ruling chamber shares the view of those respondents who saw making access to the VTP conditional on booking transport rights as a barrier to market entry and who did not see sufficient reasons for such a restriction. In addition, making access to the VTP conditional on booking transport capacity would not be beneficial to the incentive effect with regard to the development of a liquid market allowing market participants to conduct purely commercial transactions at the VTP. The ruling chamber agrees with these arguments. Unlike some respondents, the ruling chamber does not believe that further consideration on the technical design of the VTP is needed within the scope of this determination. This can be considered in connection with implementation by the market area manager.

Operative part 8

(33) Operative part 8 sets out the reporting and evaluation requirements for the balancing regime. The objective of the annual reporting to the ruling chamber is continuous monitoring of the development and current status of the hydrogen balancing regime. This monitoring will comprise an evaluation of the main parameters of the balancing regime as set out in the operative part, such as a history of the overall network status and associated measures, the helper/causer incentive mechanism and any use of balancing energy (point a)) and will provide the ruling chamber with a sound, up-to-date foundation for assessing the state of development of the hydrogen access system, on the basis of which the ruling chamber will be able to make any adjustments or enhancements to the overall system.

(34) To obtain a full picture of the whole hydrogen network access regime, the ruling chamber has created the option in point b) for these reporting requirements to be met together with those from the WaKandA determination by providing a combined report, which the ruling chamber will subsequently publish (point c)).

(35) In setting the reporting and evaluation requirements, the ruling chamber has acknowledged the call from a large number of respondents for continuous monitoring of the ramp-up of the hydrogen network infrastructure, whose results could lead to adjustments to the network access system set out in this and in the WaKandA determination. However, unlike some respondents, the ruling chamber does not see it necessary to divide the hydrogen ramp-up into different phases or to distinguish between network or value chain levels and to evaluate these. On the contrary, the ruling chamber expects that the parameters to be evaluated in the WasABi (and the WaKandA) determination will provide a sufficient basis for assessment to take appropriate account of the new development stage of the hydrogen ramp-up or of cluster developments by amending the determination where necessary. Likewise, the evaluation period of a year will help to record and

assess market developments to a sufficient extent. The instrument of a determination may also be seen as flexible enough for this purpose to provide an adequate regulatory response to any need for change. Moreover, the ruling chamber does not consider it necessary at this time to provide a detailed list of the content of the reporting and evaluation requirements to be fulfilled. The ruling chamber's objective with this rule is to make clear that the major aspects describing the network access system – in this case with respect to hydrogen balancing – can be set down and evaluated in the report. Experience from the gas sector indicates that many more individual aspects will probably be added to the content of the report as the reporting process becomes established. The publication of the report envisaged in point c) will also provide the results to market participants for their own assessment, so that a transparent provision of information about the current status of the hydrogen network access regime is guaranteed.

(36) The purpose of the requirement in point d) to publish the coordinated methodology for defining the flexibility zones as set out in operative part 3 is to enable balance responsible parties, in particular, to understand and assess the scope of flexibility provided by hydrogen network operators, which will serve as the basis for balancing group management in line with the helper/causer incentive mechanism.

(37) The requirement for the market area manager to publish details of the compensation mechanism referred to in operative part 2 g) and h) is also linked to the need for transparency in relation to balance responsible parties and the market as a whole. The design of the compensation mechanism by the market area manager must cover at least the basic requirements set out in these determination proceedings. The market area manager is required to take due account of the market participants concerned and their interests when designing the compensation mechanism and to publish details of the mechanism. Details must be published in good time for the market participants to understand and assess how the compensation mechanism works and have enough time to prepare for the introduction of the mechanism on 1 October 2026.

Operative part 9

(38) Operative part 9 requires the hydrogen balancing rules to be implemented beginning on 1 October 2026. The only exceptions are the requirement to designate a market area manager (operative part 1) and the requirement to establish a data exchange platform by 1 August 2026 and test the platform with market participants during an introductory phase up until 1 October 2026 (operative part 6 f)). The ruling chamber assumes that with a likely implementation period of over a year, market participants will have enough time to apply the rules contained in the determination in line with their practices. Here, the fact was taken into account that the obligation to implement the requirements will largely fall on the market area manager, who will be responsible for the exchange of information, data and communications with the market participants. The ruling chamber assumes that synergies in terms of timescales will arise in the course of project implementation, making the implementation period seem sufficient. The fact also had to be taken into consideration that in early 2027, more individual hydrogen pipelines are likely to go into use,

making an implementation of these rules seem necessary. The chosen implementation thus also leaves room for fine-tuning of the market rules for comprehensive use in practice. This would avoid temporary solutions and related “stranded investments”, as was explicitly pointed out in the responses. Nevertheless, the ruling chamber once again expressly invites comments on the aspect of the implementation time and calls on market participants to respond to this point in particular.

IV. Consultation

Hydrogen network operators and all other market participants are hereby given the opportunity to comment on the draft operative part of this determination. All those participating in the consultation are invited to submit their responses

no later than 28 February 2025

to the ruling chamber.

Please use the form provided in Word format on the ruling chamber website to submit comments.

Responses may be sent to the following address:

Wasserstoff.Bilanzierung@BNetzA.de

or by post to:

Bundesnetzagentur
Ruling Chamber 7
Postfach 8001
53105 Bonn.

The responses will be published on the Bundesnetzagentur’s website.

In this connection, attention is drawn to the fact that consultation participants are required to indicate, upon submission, those parts of their responses that contain trade or business secrets or personal data (for example names, signatures, telephone numbers, email addresses containing names). Any business and trade secrets relating to third parties that are disclosed to the ruling chamber in the responses must also be indicated. If trade and business secrets are not indicated as such, the ruling chamber may assume, as provided for by section 71 sentence 3 EnWG, that consent is given to the information being made available to third parties. Attention is specifically drawn to the fact that if a response contains personal data, it is the responsibility of the participant submitting the response to obtain the data subject’s consent to the personal data being published, or to redact the personal data in the version to be published as described below.

Further information about the protection of trade and business secrets is set out in the notice relating to Ruling Chamber 6 and 7 proceedings at:

www.bundesnetzagentur.de/geheimnisschutz-enwg.

The Bundesnetzagentur has also published a notice “Scope and range of permissible redaction in the publication of the Bundesnetzagentur’s decisions for the electricity and gas sectors” dated 22 March 2019, which is also available at the above internet address.

The reasons why information is being claimed as trade and business secrets must be specified in the confidential information template, together with the page, line and wording of the blacked-out information. The template is also available on the Bundesnetzagentur’s website at:

www.bundesnetzagentur.de/geheimnisschutz-enwg.

It is not sufficient to state that there is a wish to keep the information confidential or that publication of the information would affect a company’s economic position. Rather, further details must be provided on why, from the consultation participant’s perspective, there is an interest in maintaining confidentiality. In particular, an explanation must be provided of why publication of the information is expected to entail competitive and/or economic disadvantages. The explanation must be sufficiently detailed to objectively demonstrate the interest in maintaining confidentiality. The template must be sent to the ruling chamber in an electronic format suitable for processing with standard software.

If the responses submitted contain any confidential information as described above, participants must, without delay, also submit two copies of a redacted version (with the confidential information blacked out) that they consider can be made public without disclosing trade and business secrets or personal data. The methods used to redact the confidential information must be suitable to guarantee that the information is rendered unreadable and non-retrievable. It is not sufficient to mark the confidential information in a different colour in an electronic version, nor is it permitted to leave a blank space in place of the information to be redacted.