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# ANCILLARY SERVICES TO BE DELIVERED IN DENMARK TENDER CONDITIONS

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*This is a translation. In case of inconsistencies, the Danish version applies.*

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## 0. Introduction

This document is divided into several sections, each describing the tender conditions applicable to a particular type of ancillary service. In addition to these specific conditions, the document includes a section on general commercial conditions as well as a section on the practical handling of the various services and their ranking and mutual dependencies.

Suppliers must enter into a main agreement with Energinet concerning the supply of ancillary services. The main agreement sets out the framework within which transactions take place on an ongoing basis, simplifying the processes involved. Unless otherwise agreed, suppliers having entered into a main agreement are not obliged to submit bids for reserves to the daily auctions concerning reserves.

Main agreements are made only with balance responsible parties (BRPs) for production or consumption in Eastern or Western Denmark. Also, the plants which are to supply the ancillary services must be approved by Energinet. The approval of plants is done in accordance with "Prequalification of units and aggregated portfolios", doc.nr: 13/80940-106. The document is available on Energinet's website.

Requests for a main agreement should be sent to Energinet's Flexibility and Ancillary Services department. Requests for the approval of plants should be sent to Energinet's Electricity System Operation Development department.

## 1. Ancillary services

In any power system, a balance must be struck at all times between the production and the consumption of electricity. Changes in consumption and disturbances at production facilities affect the system balance and cause grid frequency deviations. Energinet buys ancillary services to ensure access at all times to such resources as are necessary to ensure the stable and reliable electricity system operation.

The ancillary services which are procured from electricity generators and electricity consumers in Denmark and in neighbouring countries are used for various purposes, and different requirements therefore apply to the supply of the various services. These requirements are regulated by the ENTSO-E Continental Europe Operation Handbook, the Joint Nordic System Operation Agreement and by Energinet's regulations for grid connection.

Requirements to be met by suppliers of ancillary services vary slightly depending on whether the services are to be supplied in Eastern Denmark, ie east of the Great Belt (called DK2), or in Western Denmark, ie west of the Great Belt (called DK1). These tender conditions are therefore divided into subsections describing conditions for DK1 and DK2, respectively.

The following ancillary services to be delivered in DK1 are covered by these tender conditions:

- Primary reserve, FCR
- aFRR supply ability
- Secondary reserve, aFRR
- Manual reserves, mFRR
- Properties required to maintain power system stability.

The following ancillary services to be delivered in DK2 are covered by these tender conditions:

- Frequency-controlled disturbance reserve, FCR-D
- Frequency-controlled normal operation reserve, FCR-N
- aFRR supply ability
- Manual reserves, mFRR
- Properties required to maintain power system stability.

Bids are invited for all reserves as upward regulation reserves and downward regulation reserves, except for FCR-D in respect of which bids are invited for upward regulation reserves only.

Furthermore, a group of wind turbines cannot submit bids on their own in the different ancillary services markets. Wind turbines may be included along with other production to guarantee supply in the event that the wind turbines are unable to deliver the required performance due to failing wind.

## 1.1 Primary reserve, DK1 (FCR)

In the event of frequency deviations, the primary reserve regulation must ensure that the balance between production and consumption is restored, stabilising the frequency at close to, but deviating from 50 Hz.

Primary reserve regulation is automatic and provided by production or consumption units which, by means of control equipment, respond to grid frequency deviations.

Primary reserve consists of and is requested as an upward regulation reserve or a downward regulation reserve, as required.

The TSOs within ENTSO-E RG Continental Europe's synchronous area are jointly responsible for ensuring the availability of sufficient primary reserves. Each TSO is obliged to provide a share of the combined requirement for primary reserves of the ENTSO-E RG Continental Europe grid. The combined requirement in the ENTSO-E RG Continental Europe grid is  $\pm 3,000$  MW, of which Energinet is obliged to supply a proportionate share. Energinet's share is determined by production in Western Denmark relative to total production in ENTSO-E RG Continental Europe and is fixed once a year.

Energinet procures primary reserves at daily auctions. The requirement is published on Energinet's website. In 2017, the requirement is  $\pm 20$  MW.

The rules of ENTSO-E RG Continental Europe allow for the import/export of primary reserves, which means that suppliers outside DK1 can offer these reserves. These rules permit TSO-to-TSO exchanges and are limited to neighbouring TSOs or to TSOs within the same Control Block, ie Germany. A special agreement has to be made between the TSOs involved. Energinet may enter into agreements with other TSOs in ENTSO-E RG Continental Europe for the delivery of max.  $\pm 90$  MW.

### 1.1.1 Technical conditions

#### 1.1.1.1 Response and response time

Power frequency control must be supplied at a frequency deviation of up to  $\pm 200$  mHz relative to the reference frequency of 50 Hz. This will normally mean in the 49.8-50.2 Hz range. A deadband of  $\pm 20$  mHz is permitted.

The reserve must as a minimum be supplied linearly at frequency deviations of between 20 and 200 mHz. The first half of the activated reserve must be supplied within 15 seconds, while the last half must be supplied in full within 30 seconds at a frequency deviation of  $\pm 200$  mHz.

It must be possible to maintain the regulation until the automatic and manual regulating reserve can take over; however, minimum 15 minutes.

Following the end of the regulation, the reserve must be re-established after 15 minutes.

#### 1.1.1.2 Accuracy of measurements

The accuracy of frequency measurements for primary regulation must be better than 10 mHz. The sensitivity of frequency measurements must be better than  $\pm 10$  mHz.

The resolution of the player's SCADA system must be better than 1 second, and selected signals must be able to document the plants' response to frequency deviations. The supplier must store the signals for at least one week.

#### 1.1.1.3 Combined deliveries

A delivery may be made up of supplies from several production units with different properties which collectively can provide the required response within the required response time. A delivery may also be made up of supplies from several consumption units with different properties which collectively can provide the required response within the required response time. Any system for such combined deliveries must be verified to Energinet.

#### 1.1.2 Daily procurement of primary reserve

Energinet procures two types of primary reserve, upward regulation power (in case of underfrequency) and downward regulation power (in case of overfrequency). An auction is held once a day for the coming day of operation. For the purpose of the auction, the 24-hour period is divided into six equally sized blocks of four hours each:

- Block 1: 00.00 - 04.00
- Block 2: 04.00 - 08.00
- Block 3: 08.00 - 12.00
- Block 4: 12.00 - 16.00
- Block 5: 16.00 - 20.00
- Block 6: 20.00 - 24.00

##### 1.1.2.1 Bidding by player

Bids in connection with daily capacity auctions should be submitted to Energinet via Ediel or via the Self-service portal. Communication via Ediel is described in further detail in Appendix 1.

Bids must be submitted so that they reach Energinet no later than 15.00 on the day before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 15.00 are rejected unless all participating bidders are otherwise notified by email.

Players may amend bids already submitted up until 15.00. Bids received by Energinet by 15.00 are binding on the bidder.

The bids must state an hour-by-hour volume and a price for the following day of operation. As volume is stated the number of MWs which the bidder is offering to make available, and it must be the same within each block. The price is the price per MW asked by the bidder to make the volume stated available. The price must be stated as a price per MW per hour and must be the same for the entire block. If a bid states different prices or volumes for the individual hourly periods of a block, the price and volume stated for the first hour of the block will apply.

Each bid must be entered for a minimum of 0.3 MW and must always be stated in MW to one decimal point, and the price must be stated in DKK/MW/h or EUR/MW/h to two decimal points.

Please note that for practical reasons, the units used by Ediel are MWh and DKK/MWh – rather than the correct MW and DKK/MW, see Appendix 1.

Bids are indicated in the same way for upward and downward regulation, with a distinction being made between upward and downward regulation by means of product codes, see Appendix 1. Both volume and price must thus always be indicated by a positive sign.

#### **1.1.2.2 Energinet's acceptance of bids**

Energinet sorts the bids for upward and downward regulation capacity according to the price per MW and covers its requirements by selecting bids according to increasing price.

Bids are always accepted in their entirety or not at all. In situations where the acceptance of a bid for more than 5 MW will lead to excess fulfilment of the requirement for reserves in the block in question, Energinet may disregard such bids.

If two bids are priced the same, and Energinet only needs one, a mechanical random generator is used to select the bid to be included in the solution. The same applies if three or more bids are priced the same.

If the number of bids received is insufficient to cover Energinet's requirements, Energinet will send an email to all players asking them to submit more bids.

#### **1.1.2.3 Pricing and payment**

All bids for upward regulation accepted will receive an availability payment corresponding to the price of the highest bid for upward regulation accepted (marginal price). The same applies with regard to downward regulation.

No calculation is made of energy volumes supplied from primary reserves. Supplies of energy from primary reserves are settled like ordinary imbalances.

#### **1.1.2.4 Feedback to player**

At 15.30, Energinet informs the player of the bids which Energinet has accepted and of the availability payment allocated on an hour-by-hour basis.

Energinet does not send signals for the reserve to be activated during the day of operation. Activation of reserves is based on the supplier's own frequency measurements.

#### **1.1.2.5 Obligations of player**

For the availability payment to be effected, the capacity must in fact be available. This means that the availability payment is cancelled if it subsequently turns out that the capacity is not available, for example due to breakdowns, see sections 2.2 and 2.3.

In case of incidents which mean that a plant cannot supply primary reserve, the reserve must be re-established at one or more plants capable of supplying the reserve as soon as possible and within 30 minutes of the incident at the latest. If the supplier is unable to re-establish the reserve, Energinet should be contacted within 15 minutes and informed where and when the reserve can be re-established.

#### **1.1.2.6 Planning by player**

The player's operational schedules prior to and during the day of operation must state the volumes of primary upward regulation power and primary downward regulation power which

have been reserved on an hour-by-hour basis, see Regulation C3: Handling of notifications and schedules.

### 1.1.3 Checking the services

The services are checked on a sample basis and in case of significant frequency deviations. Energinet's checking takes the form of requesting documentation from the player's SCADA system of the plants' response to naturally occurring frequency deviations, see section 1.1.1.2.



## 1.2 aFRR supply ability, DK1 + DK2

The aFRR supply ability contracts were introduced to retain existing suppliers of aFRR reserves and attract new suppliers of aFRR reserves.

Procurement of aFRR supply ability contracts began effective from September 2015 and ends at the time when Energinet begins normal procurement of aFRR reserves.

The technical properties of plants belonging to suppliers wishing to bid on aFRR supply ability must be approved in advance.

### 1.2.1 Technical conditions

The technical requirements to be met by aFRR reserves differ in Eastern and Western Denmark.

In Eastern Denmark, the plants must be capable of delivering a full response within 5 minutes with a profile matching the requirements of the Nordic aFRR market.

In Western Denmark, the plants must be able to deliver a full response within 15 minutes.

It must be possible to constantly maintain the regulation in both Eastern and Western Denmark.

### 1.2.2 Procurement of aFRR supply ability

Energinet procures aFRR supply ability at monthly auctions for one month at a time. Only symmetrical products are procured, and generally +/-90 MW in Western Denmark and +/-12 MW in Eastern Denmark<sup>1</sup> are offered.

The deadline for receipt of aFRR supply ability bids by Energinet will be announced on Energinet's website. This will take place simultaneously with the announcement of the coming month's requirement for aFRR supply ability. aFRR supply ability bids must be valid for the entire month, and the contract cannot be terminated by either party during the contract term.

#### 1.2.2.1 Bidding by player

Bids for the monthly auction can be submitted via email to [info@energinet.dk](mailto:info@energinet.dk) marked 'aFRR supply ability bid (month/year)'.

Each bid must be for at least 1 MW and no more than 50 MW. A bid must always be stated in MW to one decimal point, while the price must be stated in DKK/MW to two decimal points.

#### 1.2.2.2 Energinet's acceptance of bids

Energinet selects the bids such that the total requirement is met at the lowest possible cost.

Bids are accepted in their entirety or not at all.

#### 1.2.2.3 Pricing and payment

All accepted bids will receive payment corresponding to the price requested by the supplier (pay-as-bid).

<sup>1</sup> The procurement of aFRR supply ability ended at the end of February 2016 in Eastern Denmark and will only be resumed when a firm plan for the initiation of the Nordic aFRR market is in place.

#### 1.2.2.4 Feedback to player

Immediately after the auction is closed, Energinet will notify all participating players of the result by email.

The volume and price for all accepted bids will also be announced on Energinet's website no later than the day after the auction.

#### 1.2.2.5 Obligations of player

All players with an aFRR supply ability contract must submit bids for aFRR reserves when requested by Energinet, see section 1.3. The size of the bid must at least correspond to the volume stated in the player's contract for aFRR supply ability.

Payment for aFRR supply ability will be cancelled for the entire month if the player is unable to submit bids for aFRR reserves to the extent set out in the player's supply ability contract. If, for instance, the player only submits bids corresponding to half the contracted volume, half of the monthly payment for aFRR supply ability will be offset.

### 1.3 Secondary reserve, DK1 (aFRR)

In the event of major system disturbances, the aFRR reserves are used to indirectly restore frequency to 50 Hz following the stabilisation of the frequency by means of power frequency control.

The secondary reserve serves two purposes. One is to release the primary reserve which has been activated, ie restore the frequency to 50.00 Hz. The other purpose is to restore any imbalances on the interconnections to follow the agreed plan.

Secondary reserve regulation is automatic and provided by production or consumption units which, by means of control equipment, respond to signals received from Energinet.

The secondary reserve consists of upward and downward regulation reserves which are requested as a combined, symmetrical reserve. The upward regulation reserve can be provided by a number of production units or, alternatively, of consumption units. Likewise, the downward regulation reserve can be provided by either production units or consumption units, but production and consumption must be kept separate within the same type of reserve, see section 1.3.1.3.

Energinet procures the secondary reserves as needed, which depends on a number of factors, including in particular the supply capacity of the Skagerrak 4 connection.

ENTSO-E RG Continental Europe's recommendation is of a secondary reserve of approx. +/-90 MW, but the individual TSOs (in DK1: Energinet) may increase their reserves to levels far in excess of 90 MW. This reserve is thus not required to be of a certain size. Energinet's requirements are determined on the basis of ENTSO-E RG Continental Europe's recommendations, especially taking account of the uncertainty of wind forecasting.

New rules are about to be introduced in ENTSO-E RG Continental Europe, and according to these it will be possible to purchase one third of the reserve outside DK1. Similarly, DK1 players may supply one third of the other TSOs' requirements for secondary reserves, subject to availability of transmission capacity. Such supplies are currently not covered by these tender conditions as the trade terms for such exchanges are not yet in place.

#### 1.3.1 Technical conditions

##### 1.3.1.1 Response and response time

Secondary reserve is primarily supplied by plants in operation. It must be possible to supply the reserve requested within 15 minutes. Alternatively, the reserve can be supplied by a combination of plants in operation and fast-start plants. The reserve to be supplied within any coming five-minute period must be provided by plants in operation.

It must be possible to maintain regulation continuously.

The regulation signal is sent online as a power rating from Energinet to the balance-responsible party with reference to the bid.

##### 1.3.1.2 Information/data

All production or consumption units supplying or contributing to the supply of aFRR reserves must be connected via information technology to Energinet's Control Centre in Erritsø. For

each individual production or consumption unit, the Control Centre must generally have online access to:

- Status reports, production or consumption unit in/out
- Online measurements of production and consumption (MW)
  
- Currently possible reserve up (MW)
- Current max. gradient up (MW/min.)
- Current time constant for upward regulation (sec.)
  
- Currently possible reserve down (MW)
- Current max. gradient down (MW/min.)
- Current time constant for downward regulation (sec.)

In addition, signals for the actual regulation must be exchanged as described in 'Prequalification of units and aggregated portfolios', doc. no.: 13/80940-106. The document is available for download on Energinet's website.

Requirements and the place of delivery for reports and measurements must be agreed with Energinet.

Costs incidental to IT connections and maintenance must be borne by the supplier.

#### 1.3.1.3 Combined deliveries

A delivery may be made up of supplies from several production units with different properties which collectively can provide the required response within the required response time. A delivery may also be made up of supplies from several consumption units with different properties which collectively can provide the required response within the required response time. Any system for such combined deliveries must be verified to Energinet.

A delivery can be made up of supplies from a mix of consumption and production units, provided that the following conditions are met:

- Balance responsibility for the consumption and production units must rest with the same BRP.
- The BRP submits a symmetrical bid for the month stating that the bid concerns a supply of combined services.
- Energinet still only sends one regulation signal to the BRP. The player must then ensure that the signal is sent to the relevant consumption and production units and inform Energinet of the distribution.

The specific signals are listed in "Prequalification of units and aggregated portfolios", doc. no.: 13/80940-106. The document is available for download on Energinet's website.

#### 1.3.2 Procurement of secondary reserves

Energinet procures secondary reserves as needed.

Demand falls into two categories:

- Absence of supplies via the Skagerrak connection as a result of planned outage time

- Absence of supplies via the Skagerrak connection due to sudden faults

In the first case, all approved suppliers will be notified directly by email several days before the need arises. At the time of tendering, the requested volumes will be stated, and the need will often be for several, consecutive days, but no more than one month. The players' bids must reach Energinet no later than 18 hours after the time of tendering, and the participating players will be notified of the outcome of the auction three hours after the expiry of the bidding deadline.

Any need arising from sudden faults will also be communicated to the approved suppliers via email – as a general rule, this will take place by 8:30 the day before the day of operation, when the need arises<sup>2</sup>. The need may be limited to a certain period in the coming day of operation or several consecutive days, but no more than one month. The players' bids must reach Energinet no later than 9.30 on the day before the day of operation, and the participating players will be notified of the outcome of the auction no more than one hour later.

If the reservation on the Skagerrak 4 connection is withdrawn, secondary reserves will be procured according to the same method as with planned outage time, see above. In this situation, however, a fixed tender period/contract duration of one calendar month will be used.

In all cases, the reserve is procured as a combined, symmetrical reserve for upward and downward regulation.

#### 1.3.2.1 Bidding by player

The player's bid must in all cases be sent by email to [kontrolcenterel@energinet.dk](mailto:kontrolcenterel@energinet.dk) marked 'Bid for aFRR reserves'.

Each bid must be entered for a minimum of 1 MW and a maximum of 50 MW and must be stated in MW to one decimal point. The price must be stated in DKK/MW and refer to the specified offer volume throughout the prescribed period to which the need refers.

The deadline for bids is specified in the above section 1.3.2.

#### 1.3.2.2 Energinet's acceptance of bids

Energinet selects the bids such that the total need is met at the lowest possible cost.

Bids are always accepted in their entirety or not at all.

If two bids are priced the same, and Energinet only needs one, a mechanical random generator is used to select the bid to be included in the solution. The same applies if three or more bids are priced the same.

If the number of bids received is insufficient to cover Energinet's requirements, Energinet will send an email to all players asking them to submit more bids.

<sup>2</sup> If the need arises after 8.30 on the day before the day of operation, Energinet will still send an email to all players, specifying the need and requesting bids. In this case, however, players with a supply ability contract are not obliged to submit bids.

### 1.3.2.3 Pricing and payment

All accepted bids will receive payment corresponding to the price requested by the supplier (pay-as-bid).

### 1.3.2.4 Feedback to player

Following the evaluation of the bids, a contract will be drawn up with the bidder(s) chosen in the form of a purchase order. The deadline for feedback is specified in section 1.3.2.

### 1.3.2.5 Obligations of player

For the availability payment to be effected, the capacity must in fact be available. This means that the availability payment is cancelled if it subsequently turns out that the capacity is not available, for example due to breakdowns, see sections 2.2 and 2.3.

In case of incidents which result in the supplier not being able to deliver the agreed service, for example due to a plant breakdown, the supplier must decide if he wants to deliver the service from other plants in his portfolio or notify Energinet of his inability to supply the service, including the duration of the outage etc. The supplier must inform Energinet of any service lapse within 30 minutes of the incident. After this time, ad hoc tendering will be carried out to cover the lack of reserves.

Suppliers, who have not been able to supply the capacity which they have received availability payment for, must repay availability payment for the non-supplied capacity, including any costs relating to replacement purchases. This amount must not exceed three times the player's availability payment, delimited to the period during which the player has not been able to supply the capacity agreed.

### 1.3.2.6 Planning by player

The player's operational schedules prior to and during the day of operation must state the volumes of secondary upward regulation power and secondary downward regulation power which have been reserved on an hour-by-hour basis, see Regulation C3: Handling of notifications and schedules.

## 1.3.3 Checking the services

Regular checks are performed to ascertain that the reserves are available based on online measurements.

In case of regulation of consumption facilities, operational schedules must be available.

### 1.3.3.1 Paying for energy volumes

Supplies of energy from secondary upward regulation reserves are settled per MWh at the DK1 electricity spot price plus DKK 100/MWh; however, based at least on the regulating power price for upward regulation. Supplies of energy from secondary downward regulation reserves are settled per MWh at the DK1 electricity spot price less DKK 100/MWh; however, not exceeding the regulating power price for downward regulation.

The energy supplied is calculated on the basis of registrations in Energinet's SCADA system as an integrated value of expected activated output per quarter.

#### 1.4 Frequency-controlled normal operation reserve, DK2 (FCR-N)

In the event of frequency deviations, the frequency-controlled normal operation reserve ensures that the equilibrium between production and consumption is restored, keeping the frequency close to 50 Hz.

Frequency-controlled normal operation reserve is automatic regulation provided by production or consumption units which, by means of control equipment, respond to grid frequency deviations. Frequency-controlled normal operation reserve consists of both upward and downward regulation and is provided as a symmetrical reserve where upward and downward regulation reserves are procured together.

The TSOs within the Nordic synchronous area are jointly responsible for the supply of frequency-controlled normal operation reserves.

Each individual TSO contributes to the total frequency-controlled normal operation reserve in the ENTSO-E RG Nordic grid. The combined requirement in the ENTSO-E RG Nordic grid is 600 MW, of which Energinet is obliged to supply a proportionate share. The share to be supplied by Energinet is determined by the production taking place in Eastern Denmark relative to the entire ENTSO-E RG Nordic production, and is determined once a year for a calendar year at a time.

Energinet procures the frequency-controlled normal operation reserve through daily auctions in collaboration with Svenska kraftnät. The requirement is published on Energinet's website. In 2017, Energinet's requirement is 23 MW, while Svenska kraftnät's requirement is 230 MW.

##### 1.4.1 Technical conditions

###### 1.4.1.1 Response and response time

The normal operation reserve must be supplied at a frequency deviation of up to +/-100 mHz relative to the reference frequency of 50 Hz. This means in the 49.9-50.1 Hz range. Deliveries must be made without deadband.

The reserve must as a minimum be supplied linearly at frequency deviations of between 0 and 100 mHz. The activated reserve must be supplied within 150 seconds, regardless of the size of the deviation.

It must be possible to maintain regulation continuously.

###### 1.4.1.2 Accuracy of measurements

The accuracy of frequency measurements for frequency-controlled normal operation reserves must be better than 10 mHz. The sensitivity of frequency measurements must be better than +/-10 mHz.

The resolution of the player's SCADA system must be better than 1 second, and selected signals must be able to document the plants' response to frequency deviations. The supplier must store the signals for at least one week.

#### 1.4.1.3 Combined deliveries

A delivery may be made up of supplies from several production units with different properties which collectively can provide the required response within the required response time. A delivery may also be made up of supplies from several consumption units with different properties which collectively can provide the required response within the required response time. Any system for such combined deliveries must be verified to Energinet.

A delivery can be made up of supplies of consumption and production units, if the balance responsibility for the consumption and production units rests with the same BRP, however, cf. section 1.4.2.6.

#### 1.4.2 Daily procurement of frequency-controlled normal operation reserve

Energinet procures frequency-controlled normal operation reserve in collaboration with Svenska kraftnät. Frequency-controlled normal operation reserve is procured as a symmetrical product where the supplier must also provide upward regulation power (in case of underfrequency) and downward regulation power (in case of overfrequency). Energinet's and Svenska kraftnät's total requirement (253 MW in 2017) is procured at daily auctions where part of the requirement is procured two days before the day of operation (D-2) and the remaining part is procured the day before the day of operation (D-1).

The supplier can submit bids hourly or as block bids. Block bids submitted at the auction two days before the day of operation (D-2) may have a duration of up to six hours. Block bids submitted at the auction the day before the day of operation (D-1) may have a duration of up to three hours. The player determines the hour at which the block bid commences. However, the block bid must end within the day of operation.

##### 1.4.2.1 Bidding by player

Bids in connection with daily capacity auctions should be submitted to Energinet via Ediel or via the Self-service portal. Communication via Ediel is described in further detail in Appendix 1.

Bids submitted to the auction two days before the day of operation (D-2) must be submitted so that they reach Energinet no later than 15.00 two days before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 15.00 are rejected unless all participating bidders are otherwise notified by email.

The player can change bids already submitted for D-2 until 15.00. Bids received by Energinet by 15.00 are binding on the bidder.

Bids submitted to the auction the day before the day of operation (D-1) must be submitted so that they reach Energinet no later than 18.00 on the day before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 18.00 are rejected unless all participating bidders are otherwise notified by email.

The player can change bids already submitted for D-1 until 18.00. Bids already received by Energinet by 18.00 are binding on the bidder.

The bids must state an hour-by-hour volume and a price for the day of operation. Both volume and price must always be stated with a positive sign when it comes to the player's sales. If the player wants to cancel/buy back quantities sold in the D-2 auction, this is possible in the D-1 auction by making a bid with a negative volume priced at zero. Generally, a bid time series



must use the same price for all quantities in the time series – meaning that volumes may change from hour to hour, but the price must be fixed.

The volume stated is the number of MWs which the bidder is offering to make available. If the player uses block bids, the volume must be the same within each block. The price is the price per MW asked by the bidder to make the volume stated available. The price must be stated as a price per MW per hour. If the player uses block bids, the price must be the same for the entire block. If the player uses block bids and the player's bid states different prices or volumes for the individual hourly periods of a block, the price and volume stated for the first hour of the block will be applied.

Each bid must be entered for a minimum of 0.3 MW and must always be stated in MW to one decimal point, and the price must be stated in DKK/MW or EUR/MW to two decimal points.

If a player submits a bid in DKK/MW, Energinet will convert the bid to EUR/MW before forwarding it to Svenska kraftnät. Energinet always uses the latest official listed price from Nord Pool on the day the auction is held. If a player submits a bid in EUR/MW, Energinet will forward the bid directly to Svenska kraftnät.

Please note that for practical reasons, the units used by Ediel, are MWh and DKK/MWh rather than the correct MW and DKK/MW, see Appendix 1.

#### 1.4.2.2 Acceptance of bids

As a general rule, bids for frequency-controlled normal operation reserve are always sorted according to the price per MW, and Energinet's and Svenska kraftnät's total requirement is covered by selecting the bids according to increasing price; however, such that the TSOs incur the least costs.

Bids are always accepted in their entirety or not at all.

If two bids are priced the same, and Energinet and Svenska kraftnät only need one, a mechanical random generator is used to select the bid to be included in the solution. The same applies if three or more bids are priced the same.

If not enough bids are received to cover Energinet's and Svenska kraftnät's requirements, Energinet will send an email to all players asking them to submit more bids.

#### 1.4.2.3 Pricing and payment

All accepted bids for frequency-controlled normal operation reserves receive an availability payment corresponding to the player's bidding price (pay-as-bid).<sup>3</sup>

Energy supplied from FCR-N upward regulation reserves is settled per MWh with the regulating power price for upward regulation. Energy supplied from FCR-N downward regulation reserves is settled per MWh with the regulating power price for downward regulation.

The energy supplied is calculated on the basis of registrations in Energinet's SCADA system as an integrated value of expected activated output per hour.

<sup>3</sup> Subject to rounding in connection with exchange rate conversions.

#### 1.4.2.4 Feedback to player

For bids submitted to the auction two days before the day of operation, Energinet will inform the player of the bid accepted by Energinet/Svenska kraftnät by 16.00 two days before the day of operation.

For bids submitted to the auction the day before the day of operation, Energinet will inform the player of the bid accepted by Energinet/Svenska kraftnät by 20.00 on the day before the day of operation.

The final settlement of reserved frequency-controlled normal operation reserves is made in DKK, using Nord Pool's official exchange rate for the day of the auction.

Energinet does not send signals for the reserve to be activated during the day of operation. Activation of reserves is based on the supplier's own frequency measurements.

#### 1.4.2.5 Obligations of player

For the availability payment to be effected, the capacity must in fact be available. This means that the availability payment is cancelled, and the player must cover any additional costs incurred in connection with cover purchases if it subsequently turns out that the capacity is not available, for example due to breakdowns, see sections 2.2 and 2.3.

In case of incidents which mean that a plant cannot supply frequency-controlled normal operation reserve, the reserve must be re-established at one or more plants which can supply the reserve as soon as possible and within 30 minutes of the incident at the latest. If the supplier is unable to re-establish the reserve, Energinet should be contacted within 15 minutes and informed where and when the reserve can be re-established.

#### 1.4.2.6 Planning by player

The player's operational schedules prior to and during the day of operation must state the volumes of frequency-controlled normal operation reserve which have been reserved on an hour-by-hour basis, see Regulation C3: Handling of notifications and schedules. The operational schedules must be updated after the auction results have been issued and in connection with changed operating conditions.

Suppliers that use both consumption and production for the regulation (see section 1.4.1.4) must for settlement purposes (see section 1.4.2.3) submit operational schedules that state how many MW reserves from consumption units supply upward or downward regulation, respectively, and how many MW reserves from production units supply upward or downward regulation, respectively.

#### 1.4.3 Checking the services

The services are checked on a sample basis and in case of significant frequency deviations. Energinet's checking takes the form of requesting documentation from the player's SCADA system of the plants' response to naturally occurring frequency deviations, see section 1.4.1.2.

## 1.5 Frequency-controlled disturbance reserve, DK2 (FCR-D)

In the event of major system disturbances, the frequency-controlled disturbance reserve is a fast reserve used for regulating the frequency following substantial frequency drops resulting from the outage of major production units or lines.

Frequency-controlled disturbance reserve is an automatic upward regulation reserve provided by production or consumption facilities which, by means of control equipment, respond to grid frequency deviations. The reserve is activated automatically in the event of sudden frequency drops to under 49.9 Hz and remains active until balance has been restored or until the manual reserve takes over the supply of power.

Each individual TSO contributes to the total frequency-controlled disturbance reserve in the ENTSO-E RG Nordic grid. The combined requirement in the ENTSO-E RG Nordic grid is the dimensioning fault (largest nuclear power station in operation) less 200 MW and is distributed in proportion to the dimensioning faults of each individual area. Energinet's share is determined by the largest dimensioning fault in Eastern Denmark and is fixed each Thursday for the coming week.

Energinet procures the frequency-controlled disturbance reserve in collaboration with Svenska kraftnät through daily auctions. The requirement is published on Energinet's website. In 2017, Energinet's total requirement is approx. 150-180 MW, and Svenska kraftnät's requirement is approx. 410 MW.

Some of the disturbance reserve is supplied to the ENTSO-E RG Nordic area from the HVDC interconnections between Germany and Zealand, Jutland and Sweden, and Jutland and Zealand, which means that Energinet's actual required procurement often ranges between 25 and 55 MW.

### 1.5.1 Technical conditions

#### 1.5.1.1 Response and response time

Frequency-controlled disturbance reserve must be able to:

- Supply non-inverse power at frequencies between 49.9 and 49.5 Hz
- Supply 50% of the response within 5 seconds
- Supply the remaining 50% of the response within an additional 25 seconds.

#### 1.5.1.2 Accuracy of measurements

The accuracy of frequency measurements for frequency-controlled disturbance reserve must be better than 10 mHz. The sensitivity of frequency measurements must be better than +/-10 mHz.

The resolution of the player's SCADA system must be better than 1 second, and selected signals must be able to document the plants' response to frequency deviations. The supplier must store the signals for at least one week.

### 1.5.1.3 Combined deliveries

A delivery can be made up of supplies from several production units with different properties which collectively can provide the required response within the required response time. A delivery may also be made up of supplies from several consumption units with different properties which collectively can provide the required response within the required response time. Any system for such combined deliveries must be verified to Energinet.

### 1.5.2 Daily procurement of frequency-controlled disturbance reserve

Energinet procures frequency-controlled disturbance reserve as upward regulation power in collaboration with Svenska kraftnät. Energinet's and Svenska kraftnät's total requirement (approx. 445-465 MW in 2017) is procured at daily auctions where part of the requirement is procured two days before the day of operation (D-2) and the remaining part is procured on the day before the day of operation (D-1).

The supplier can submit bids hourly or as block bids. Block bids submitted at the auction two days before the day of operation (D-2) may have a duration of up to six hours. Block bids submitted at the auction the day before the day of operation (D-1) may have a duration of up to three hours. The player will himself determine the hour at which the block bid commences. However, the block bid must end within the day of operation.

#### 1.5.2.1 Bidding by player

Bids in connection with daily capacity auctions should be submitted to Energinet via Ediel or via the Self-service portal. Communication via Ediel is described in further detail in Appendix 1.

Bids submitted to the auction two days before the day of operation (D-2) must be submitted so that they reach Energinet no later than 15.00 two days before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 15.00 are rejected unless all participating bidders are otherwise notified by email.

The player can change bids already submitted for D-2 until 15.00. Bids received by Energinet by 15.00 are binding on the bidder.

Bids submitted to the auction the day before the day of operation (D-1) must be submitted so that they reach Energinet no later than 18.00 on the day before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 18.00 are rejected unless all participating bidders are otherwise notified by email.

The player can change bids already submitted for D-1 until 18.00. Bids already received by Energinet by 18.00 are binding on the bidder.

The bids must state an hour-by-hour volume and a price for the day of operation. Both volume and price must always be stated with a positive sign when it comes to the player's sales. If the player wants to cancel/buy back quantities sold in the D-2 auction, this is possible in the D-1 auction by making a bid with a negative volume priced at zero. Generally, a bid time series must use the same price for all quantities in the time series – meaning that volumes may change from hour to hour, but the price must be fixed.

The volume stated is the number of MWs which the bidder is offering to make available. If the player uses block bids, the volume must be the same within each block. The price is the price per MW asked by the bidder to make the volume stated available. The price must be stated as

a price per MW per hour. If the player uses block bids, the price must be the same for the entire block. If the player uses block bids and the player's bid states different prices or volumes for the individual hourly periods of a block, the price and volume stated for the first hour of the block will be applied.

Each bid must be entered for a minimum of 0.3 MW and must always be stated in MW to one decimal point, and the price must be stated in DKK/MW or EUR/MW to two decimal points.

If a player submits a bid in DKK/MW, Energinet will convert the bid to EUR/MW before forwarding it to Svenska kraftnät. Energinet always uses the latest official listed price from Nord Pool on the day the auction is held. If a player submits a bid in EUR/MW, Energinet will forward the bid directly to Svenska kraftnät.

Please note that for practical reasons, the units used by Ediel, are MWh and DKK/MWh rather than the correct MW and DKK/MW, see Appendix 1.

#### 1.5.2.2 Acceptance of bids

As a general rule, bids for frequency-controlled normal operation reserve are always sorted according to the price per MW, and Energinet's and Svenska kraftnät's total requirement is covered by selecting the bids according to increasing price; however, such that the TSOs incur the least costs.

Bids are always accepted in their entirety or not at all.

If two bids are priced the same, and Energinet and Svenska kraftnät only need one, a mechanical random generator is used to select the bid to be included in the solution. The same applies if three or more bids are priced the same.

If not enough bids are received to cover Energinet's and Svenska kraftnät's requirements, Energinet will send an email to all players asking them to submit more bids.

#### 1.5.2.3 Pricing and payment

All bids accepted for upward regulation will receive an availability payment corresponding to the player's bidding price (pay-as-bid).<sup>4</sup>

No calculation is made of energy volumes supplied from frequency-controlled disturbance reserves. Supplies of energy from FCR-D reserves are settled like ordinary imbalances.

#### 1.5.2.4 Feedback to player

For bids submitted to the auction two days before the day of operation, Energinet will inform the player of the bid accepted by Energinet/Svenska kraftnät by 16.00 two days before the day of operation.

For bids submitted to the auction the day before the day of operation, Energinet will inform the player of the bid accepted by Energinet/Svenska kraftnät by 20.00 on the day before the day of operation.

<sup>4</sup> Subject to rounding in connection with exchange rate conversions.

Energinet does not send signals for the reserve to be activated during the day of operation. Activation of reserves is based on the supplier's own frequency measurements.

#### **1.5.2.5 Obligations of player**

For the availability payment to be effected, the capacity must in fact be available. This means that the availability payment is cancelled, and the player must cover any additional costs incurred in connection with cover purchases if it subsequently turns out that the capacity is not available, for example due to breakdowns, see sections 2.2 and 2.3.

In case of incidents which mean that a plant cannot supply FCR-D, the reserve must be re-established at one or more plants capable of supplying the reserve as soon as possible and within 30 minutes of the incident at the latest. If the supplier is unable to re-establish the reserve, Energinet should be contacted within 15 minutes and informed where and when the reserve can be re-established.

#### **1.5.2.6 Planning by player**

The player's operational schedules prior to and during the day of operation must state the volumes of frequency-controlled disturbance reserve which have been reserved on an hour-by-hour basis, see Regulation C3: Handling of notifications and schedules. The operational schedules must be updated after the auction results have been issued and in connection with changed operating conditions.

#### **1.5.3 Checking the services**

The services are checked on a sample basis and in case of significant frequency deviations. Energinet's checking takes the form of requesting documentation from the player's SCADA system of the plants' response to naturally occurring frequency deviations, see section 1.5.1.2.

## 1.6 Manual reserve, DK1 + DK2 (mFRR)

Manual reserve is a manual upward and downward regulation reserve which is activated by Energinet's Control Centre. The reserve is activated by manually ordering upward and downward regulation by the relevant suppliers. The reserve relieves the aFRR and the frequency-controlled normal operation reserve in the event of minor imbalances and ensures balance in the event of outages or restrictions affecting production facilities and interconnections.

These reserves are put up for sale at daily auctions. Manual reserves are requested in DK1 and DK2 to meet the demand during individual hours.

The manual reserve is used to restore system balance. The reserve is activated from Energinet's Control Centre in Erritsø via the regulating power market.

### 1.6.1 Technical conditions

#### 1.6.1.1 Response and response time

The manual reserve must be supplied in full within 15 minutes of activation.

#### 1.6.1.2 Activation

The reserve is activated by amending operational schedules or consumption forecasts following the prior exchange of schedules between Energinet and the supplier.

#### 1.6.1.3 Information/data

Each individual production or consumption unit supplying manual reserve must be connected via information technology to Energinet's Control Centre in Erritsø. The Control Centre must at least have online access to:

- Status reports concerning production or consumption unit in/out
- Measurements of the production or consumption unit's
  - Net production or consumption at the point of connection
  - Net production by balance responsible parties.

Requirements and the place of delivery for reports and measurements must be agreed with Energinet.

Costs incidental to IT connections and maintenance must be borne by the supplier.

#### 1.6.1.4 Combined deliveries

A delivery may be made up of supplies from several production units with different properties which collectively can provide the required response within the required response time. A delivery may also be made up of supplies from several consumption units with different properties which collectively can provide the required response within the required response time. Any system for such combined deliveries must be verified to Energinet. A delivery cannot be made up of supplies from a mix of consumption and production units, see Regulation C1.

### 1.6.2 Daily procurement of manual reserve

Energinet procures two types of manual reserve in DK1 and DK2, upward regulation power and downward regulation power<sup>5</sup>. An auction is held once a day for each of the hours of the coming day of operation, see, however, section 1.6.4.

Energinet announces the expected reserve requirement, stated in MW, for the upcoming day of operation at its website no later than 9.00 on the day before the day of operation.

#### 1.6.2.1 Bidding by player

Bids in connection with daily capacity auctions should be submitted to Energinet via Ediel or via the Self-service portal. Communication via Ediel is described in further detail in Appendix 1.

Bids must be submitted so that they reach Energinet no later than 9.30 on the day before the day of operation. Registration is based on Energinet's automatic registration of time of receipt. Bids received after 9.30 are rejected unless all participating bidders are otherwise notified by email.

Players may amend bids already submitted up until 9.30. Bids already received by Energinet by 9.30 are binding on the bidder.

The bids must state an hour-by-hour volume and a price for the following day of operation. As volume is stated the number of MWs which the bidder is offering to make available during the hour in question. The price is the price per MW asked by the bidder to make the volume stated available during the hour in question.

Each bid must be entered for a minimum of 5 MW and a maximum of 50 MW and must always be stated in MW to one decimal point, and the price must be stated in DKK/MW or EUR/MW to two decimal points.

Please note that for practical reasons, the units used by Ediel, are MWh and DKK/MWh rather than the correct MW and DKK/MW, see Appendix 1.

Bids are indicated in the same way for upward and downward regulation, with a distinction being made between upward and downward regulation by means of product codes, see Appendix 1. Both volume and price must thus always be indicated by a positive sign.

#### 1.6.2.2 Energinet's acceptance of bids

Energinet sorts the bids for upward and downward regulation capacity according to the price per MW and covers its requirements by selecting bids according to increasing price.

In special cases, Energinet may need capacity to be available at a particular geographical location. In such situations, Energinet may disregard bids not complying with this requirement. In such special situations, all participating players are notified by email.

Bids are always accepted in their entirety or not at all. In situations where the acceptance of a bid for more than 25 MW will lead to excess fulfilment of the requirement for reserves during the hour in question, Energinet may disregard such bids.

<sup>5</sup> Since 2010, Energinet has only procured downward regulation power in exceptional cases.



If two bids are priced the same, and Energinet only needs one, a mechanical random generator is used to select the bid to be included in the solution. The same applies if three or more bids are priced the same.

If the number of bids received is insufficient to cover Energinet's requirements, Energinet will send an email to all players asking them to submit more bids.

#### **1.6.2.3 Pricing**

All bids for upward regulation accepted will receive an availability payment corresponding to the price of the highest bid for upward regulation accepted. The same applies with regard to downward regulation.

#### **1.6.2.4 Feedback to player**

At 10.00, Energinet informs the player of the bids accepted by Energinet and of the availability payment allocated on an hour-by-hour basis.

#### **1.6.2.5 Obligations of player**

For the availability payment to be effected,

- 1) the player must subsequently submit a bid for activating all the capacity for which an availability payment is obtained.
- 2) the capacity must in fact be available.

The obligation mentioned under 1) concerns only those hours for which the player receives the availability payment. The player is welcome to submit bids for the activation of capacity in excess of the capacity for which the availability payment is obtained.

The obligation under 2) means that the availability payment is cancelled if it subsequently turns out that the capacity is not available, for example due to breakdowns, see sections 2.2 and 2.3.

In case of incidents which mean that a plant cannot supply manual reserves, the reserve must be re-established at one or more plants capable of supplying the reserve as soon as possible and within 30 minutes of the incident at the latest. If the supplier is unable to re-establish the reserve, Energinet should be contacted within 15 minutes and informed where and when the reserve can be re-established.

#### **1.6.2.6 Paying for energy volumes**

The calculation of the energy volumes supplied (regulating power) from manual reserves and the settlement of regulating power are based on Market Regulation C2 – The balancing market and balance settlement.

#### **1.6.2.7 Planning by player**

Regulating power orders must be included in the player's operational schedules prior to and during the day of operation, see Regulation C3.

#### **1.6.3 Checking the services**

The services are checked on a sample basis. Energinet's checking takes the form of analysing the response from suppliers in connection with activations.

In case of regulation of consumption facilities, operational schedules must be available.

#### 1.6.4 Procurement of additional manual reserves in DK1

If the Great Belt Power Link is fully loaded from DK2 to DK1, Energinet may require manual reserves in excess of the ones procured in DK1 in the morning. In these instances, Energinet will host an additional auction in the afternoon. The afternoon auction is conducted in the exact same way as the morning auction with the exception that separate bid IDs are used for exchanging bids relating to this auction.

The deadlines applying to afternoon auctions of manual reserves are as follows:

- The players are notified directly of the requirement for additional manual reserves no later than 14.30.
- On days when the requirement is not zero, an email stating the requirement is sent to the players.
- The players must submit their bids to Energinet no later than 15.00.
- Energinet completes the auction and notifies the players of the result by 15.30.

#### 1.6.5 Replacement purchases in DK2 in case of outage time on contracted plants

In case of outage time on plants with long-term agreements in DK2, Energinet must make replacement purchases to replace these reserves. In DK2, Energinet may set a maximum response time of between 15 and 90 minutes for replacement purchases. Energinet will set the response time to ensure that Energinet has a minimum of 300 MW of manual reserves available in DK2 with a response time of maximum 15 minutes.

Services from plants with response times exceeding 15 minutes are requested at the same time as services from plants with a response time of maximum 15 minutes. Energinet accepts that delivery from plants with slow response times may take up to 90 minutes. The player is not obligated to state the exact response time. The player is obligated to ensure that the response time does not exceed 90 minutes, and that the plant can deliver the reserve in full within 90 minutes of activation.

The need for additional purchases will be announced on Energinet's website by 9.00 on the day before the day of operation. The announcement will state the respective response times of the volumes to be purchased. Energinet will give notice to players of the need for replacement purchases by publishing a news item on Energinet's website with minimum delay.

The auction will be held at the same time as the daily auctions. Energinet sorts and selects bids as specified in section 1.6.2.2. In other words, there will be one joint auction for DK2, where all bids are sorted according to price, so that the lowest bid is chosen first and so on. If the 300 MW limit for slow reserves is reached, the remaining slow reserves are sorted out, and the remaining bids are then purchased from reserves with a response time of maximum 15 minutes in order of price.

Pricing will follow the procedure described in section 1.6.2.3. No distinction is made between reserves with response times of maximum 15 minutes and those with response times of maximum 90 minutes.

In addition to the regular auction, an email must be sent to Energinet at [info@energinet.dk](mailto:info@energinet.dk) with information about the bid ID for any reserve bid with a response time exceeding 15

minutes. Enter 'mFRR DK2 ' in the subject line. Energinet will send a confirmation email to the bidder. Energinet must, in the same email or in a separate email, state the bid ID of the bid subsequently selected for activation (regulating power) by 16.00, cf. section 1.6.2.5. Energinet sends a confirmation by email to the relevant bidder.

Several plants with response times exceeding 15 minutes may be pooled. Several plants with response times of less than or equal to 15 minutes may be pooled, cf. Section 1.6.1.4.

Bids must be submitted so that they reach Energinet by 9.30 on the day before the day of operation.

The bids must state an hour-by-hour volume and a price for the following day of operation. Volume is the MW quantity which the bidder is offering to make available during the hour in question. The price is the price per MW asked by the bidder to make the volume stated available during the hour in question.

Each bid must be entered for a minimum of 5 MW and a maximum of 50 MW and must always be stated in MW to one decimal point, and the price must be stated in DKK/MW or EUR/MW to two decimal points.

Feedback to the player is specified in section 1.6.2.4. In addition to this, Energinet prepares a report with an overview of the proportion of mFRR capacity purchased with response times of maximum 15 minutes and maximum 90 minutes, respectively.

The player's obligations are specified in section 1.6.2.5. In addition to the conditions stated in section 1.6.2.5, plants with response times of up to 90 minutes are obligated to report the regulating power bids for the two hours following the hour for which availability payment has been made. In other words, a winning bid for hour  $t$  entails an obligation to submit regulating power bids for hours  $t, t+1$  and  $t+2$ .

## 1.7 Properties required to maintain power system stability, DK1 and DK2

Properties required to maintain power system stability mainly consist of short-circuit power, inertia, reactive reserves and voltage control, which are all services that help to ensure stable and safe power system operation.

Every day, just after the first operational schedules have been received towards the end of the afternoon, Energinet checks:

- Load flow
- Short-circuit power
- N-1 situations
- Reactive reserves.

If changes occur during the day of operation, these checks must be performed again.

Properties required to maintain power system stability are demanded only from central plants because these plants are connected to the high-voltage grid.

### 1.7.1 Securing properties required to maintain power system stability in the transmission grid

Energinet may choose to advertise the procurement of properties required to maintain power system stability at different notices and durations:

- a. On a monthly basis
- b. On a weekly basis
- c. Very early on the previous day
- d. After closing of the spot market, before auctioning of frequency-controlled services
- e. Concurrently with auctioning of frequency-controlled services
- f. After receipt of first operational schedule
- g. During the day of operation if required.

If capacity featuring these properties is insufficient, the power system operator/balance operator will take measures to establish a sufficient level of system security. This may lead to special regulation and/or forced operation and will be handled by Energinet's operator by telephone.

Where the notice permits it, bids will be obtained from alternative suppliers of properties required to maintain power system stability. In special operating situations, the players may be required to submit bids at very short notice.

Forced operation will be settled as billed. As far as possible, bids or alternative ways of resolving the problem will be obtained. Players may thus be asked to place their bids at relatively short notice.

There will be no separate payment for the actual energy supply in connection with properties required to maintain power system stability, for example delivered or absorbed MVar.

See also section 3.5 concerning the ordering of reactive reserve/voltage control.

### 1.7.2 Tendering of properties required to maintain power system stability in the transmission grid

In connection with the tendering of properties required to maintain power system stability, Energinet will follow the procedure outlined below. When announcing a specific tender, Energinet may, however, stipulate terms for the award of the contract. In that case, the terms will be stated in the conditions for the tender in question.

#### 1.7.2.1 Award criterion

Tenderers are asked to submit prices for the delivery of properties required to maintain power system stability. Tenders will be evaluated using the lowest price award criterion.

#### 1.7.2.2 Energinet receives one bid

If, in connection with the evaluation of the bids, Energinet finds that only one bid has been submitted for a given period or category, the tender for this period or category is cancelled.

Energinet will then award the contract directly to the tenderer which submitted the bid for the period or category. The bidding price will **NOT** be taken into account when awarding the contract, but instead a settlement price will be calculated on the basis of the cost-plus method according to the settlement principles shown below<sup>6</sup>:

The settlement price to the tenderer is based on the following direct and indirect costs:

- a) Where the activities of the undertaking in question are confined to properties required to maintain power system stability, all its costs may be taken into consideration;
- b) Where the undertaking also carries out activities falling outside the scope of properties required to maintain power system stability, only the costs related to properties required to maintain power system stability will be taken into consideration;
- c) The costs allocated to the properties required to maintain power system stability may cover all the direct costs incurred in operating the service and an appropriate contribution to costs common to both the properties required to maintain power system stability and other activities;
- d) The costs linked with investments, notably concerning infrastructure, may be taken into account when necessary for the operation of properties required to maintain power system stability.

The revenue to be taken into consideration must include at least the entire revenue earned from properties required to maintain power system stability, regardless of whether the revenue is classified as state aid within the meaning of Article 107 of the Treaty. If the undertaking in question holds special or exclusive rights linked to activities, other than the properties required to maintain power system stability for which the aid is granted, that generate profits in excess of the reasonable profit, or benefits from other advantages granted by the State, these must be included in its revenue, irrespective of their classification for the purposes of Article 107 of the Treaty.

<sup>6</sup> Commission Decision of 20 December 2011 on the application of Article 106(2) of the Treaty on the Functioning of the European Union to State aid in the form of public service compensation granted to certain undertakings entrusted with the operation of services of general economic interest (2012/21/EU), Article 5.

**Term 'reasonable profit'**

'Reasonable profit' means the rate of return on capital that would be required by a typical undertaking considering whether or not to provide the service of general economic interest for the whole period of entrustment, taking into account the level of risk.

In determining what constitutes a reasonable rate of return, Energinet applies an estimate which is based on the following parameters:

- The asset base which forms the basis for the return
  - Composition of the return requirement
  - Interest level
  - Risk premium
- The asset base, which forms the basis for the rate of return is assessed against previous reporting as well as checks of deductions for depreciation, amortisation etc.
- Composition of the return requirement. Here the nature of the composition of the final return requirement in terms of loan financing and self-financing is registered, including whether interest rate benchmarks and reference checks have been used.
- Interest level. Here it is estimated whether the specified interest rate level is comparable to own known interest rates, such as the historical risk-free interest rates, represented by a 10-year government bond etc.
- Risk premium. Any risk premium is assessed against the relevant supplier's motivations, including that the risk premium does not differ substantially from one supplier to the next.

Where an undertaking carries out activities falling both inside and outside the scope of properties required to maintain power system stability, the costs linked to any activities outside the scope of properties required to maintain power system stability must cover all the direct costs, an appropriate contribution to the common costs and an adequate return on capital. No compensation may be granted in respect of those costs.

As proof that Energinet receives information about the tenderer's direct and indirect production costs, the information must be endorsed by an auditor appointed by FSR – Danish Auditors. The endorsement may be prepared subsequently.

In connection with the execution of the tender, Energinet may choose to organise it in a way that ensures the overall most cost-effective procurement. If Energinet chooses to organise the tender on the basis of these considerations, it will be specified in the tender conditions, which will be published in connection with the specific tender.

The compensation granted in periods or categories with only one tenderer will be reported to the European Commission pursuant to Commission Decision of 20 December 2011 on the application of Article 106(2) of the Treaty on the Functioning of the European Union to State aid in the form of public service compensation granted to certain undertakings entrusted with the operation of services of general economic interest (2012/21/EU). This reporting will take place every two years.

### 1.7.3 Bids on a monthly or weekly basis or on request

Bids submitted on a monthly or weekly basis or on request should be sent to:

Energinet

Tonne Kjærsevej 65

DK-7000 Fredericia

Email: [info@energinet.dk](mailto:info@energinet.dk)

### 1.7.4 Ordering services

After follow-up negotiations, if any are required, Energinet will place an order for the services in the form of a purchase order.

### 1.7.5 Obligations of player

Energinet pays the supplier to keep plants in operation. Payment is conditional on the plants being in operation, and payment is cancelled if it subsequently turns out that the plants are not available, see sections 2.2 and 2.3. However, section 2.3.1 on covering purchases does not apply in case of the breakdown of plants supplying short-circuit power, reactive reserves and voltage control in DK1 and DK2. In case of breakdowns, Energinet assumes the risk by covering the costs of starting up another unit.

## 2. Commercial terms

### 2.1 Payment

All expenses, including grid tariffs etc. for energy supplies, are borne by the supplier.

Payment for the services purchased at daily auctions (primary reserve, frequency-controlled normal operation reserve, frequency-controlled disturbance reserve and manual reserve) is settled monthly by Energinet through the issue of a credit note. Energinet will effect payment on the 25th of the month after the end of the current settlement month. If this is not a business day, payment is effected on the following business day.

In those cases where more than one invoice/credit note has been issued to the same BRP, eg for consumption and for production, net payment is made, unless otherwise agreed. Amounts owed by Energinet to a BRP will be settled net.

Payment for the services purchased on a monthly basis (aFRR reserve and short-circuit power, reactive reserves and voltage control) is effected based on the invoice issued by the supplier, the due date being the 25th day of the following month. If this is not a business day, the due date is the following business day.

Prior to effecting the monthly payments, Energinet reserves the right to withhold payment and to effect a set-off of such payment if it turns out that the supplier has not fulfilled/is not fulfilling its obligations under this Agreement, see sections 2.2 and 2.3.

### 2.2 Breach of contract

#### 2.2.1 Non-delivery/delivery of non-conforming services

In case of non-delivery of the service, including non-availability of the service and delivery of a non-conforming service, the payment made to the supplier is reduced proportionally, corresponding to the period of non-delivery of a conforming service. The period is calculated per commenced hour relative to the total number of hours in the contract period.

In case of non-delivery of the service, including non-availability of the service and delivery of a non-conforming service, Energinet may also quarantine the supplier to allow the supplier time to remedy the situation prior to resuming deliveries. The quarantine period stipulated by Energinet may be from two days and up to 30 days, depending on the nature and scope of the breach, previous instances of breach and the information provided by the supplier to Energinet prior to the breach, see below – last paragraph.

During the quarantine period, the supplier is precluded from taking part in the daily auction to which the non-available services relate.

In case of breach, Energinet notifies the supplier of the quarantine as soon as possible, with indication of the start date and the duration of the quarantine period.

The supplier is obliged to keep Energinet informed at all times of incidents which will lead to non-delivery of the service as defined in the first paragraph.



In the event of breach by the supplier, Energinet is obliged to complain to the supplier no later than three weekdays after the day of operation during which the breach took place. Otherwise, Energinet is no longer entitled to take action for breach of contract.

### 2.2.2 Non-conformities/remedial action

In case of the supply of non-conforming services during the term of this Agreement, the supplier is entitled and obliged to remedy the situation without undue delay.

In the event that the supplier does not take such remedial action as is required within a reasonable deadline stipulated by Energinet, Energinet is entitled to arrange for such remedial action to be taken at the supplier's expense.

### 2.2.3 Cancellation

Either party may, subject to two days' notice, cancel the main agreement in case of material breach of contract by the other party.

## 2.3 Compensation

### 2.3.1 Covering purchases

Energinet may demand that a supplier, who has failed to deliver, covers any additional costs incurred in connection with replacement purchases to replace non-deliveries, cf. however, special conditions in section 1.3.2.5 concerning procurement of secondary reserves.

### 2.3.2 Compensation

In the event of cancellation of the agreement by one of the parties due to breach on the part of the other party, the other party is liable in damages in accordance with the general rules of Danish law. The parties are not liable for operating losses, loss of profit or other indirect losses unless caused by gross negligence or premeditation.

## 2.4 Force majeure

Neither party is liable for matters outside their control which the parties should not have taken into account when concluding the agreement and which the party should not reasonably have avoided or overcome. Examples of force majeure include war, terrorism, natural disasters etc.

The first paragraph in section 2.2.1 also applies to non-deliveries due to force majeure.

Energinet does not accept breakdowns, lawful strikes or lockouts as force majeure.

## 2.5 Expert appraisal

In the event of disputes or where necessary in order to preserve the state of the evidence, the parties may request an expert appraisal in respect of the service.

The expert is appointed by the Danish Institute of Arbitration (Danish Arbitration).

## 2.6 Mediation

Any disputes arising out of this Agreement which cannot be settled between the parties through negotiation must first be attempted to be settled through mediation. The mediation takes place according to the applicable mediation rules under the Danish Institute of Arbitration.

## 2.7 Arbitration and governing law

This Agreement is governed by Danish law.

Any dispute arising out of this Agreement which cannot be resolved through the procedure described in section 2.6 must be settled in accordance with the arbitration rules of the Danish Institute of Arbitration (Danish Arbitration). Each party appoints one arbitrator, whereas the chairman of the arbitration tribunal is appointed by the Institute. If one of the parties has not appointed an arbitrator within 30 days of having submitted or received information about the request for arbitration, such arbitrator is appointed by the Institute according to the above-mentioned rules.

In connection with disputes concerning amounts of less than DKK 500,000, the arbitration tribunal, however, consists of one member to be appointed by the Council of the Danish Institute of Arbitration.

The arbitration tribunal must make a decision on the allocation of legal costs, including lawyers' fees, in its award. The award of the arbitration tribunal is final and binding on the parties.

## 2.8 Amendments

Throughout the term of the Agreement, Energinet is entitled to amend the technical conditions for the services if such amendments are founded on changing requirements with regard to security of supply and the efficient use of the electricity supply system as a whole. Amendments are subject to one month's written notice to all suppliers. The announcement of amendments must state the reasons for such amendments and include a list of the amendments made.

## 2.9 Publication

Energinet is entitled to publish the results of the individual auctions on its website.

## 2.10 Approval by authorities

These tender conditions have been registered with the Danish Utility Regulator under the provisions of the Danish Electricity Supply Act (*Elforsyningsloven*).

Any complaints about the tender conditions can be lodged with the Danish Utility Regulator, Torvegade 10, 3300 Frederiksværk, Denmark.

### 3. Practical requirements with regard to services

#### 3.1 Organisational requirements

The supplier must state a place of contact or a contact person who can be contacted by Energinet's Control Centre 24 hours a day.

The place of contact/the contact person is responsible for the supplier's production or consumption unit which is used to supply the service tendered.

The supplier must provide information about the current staffing.

Communication between Energinet's Control Centre and the place of contact or the contact person is by telephone.

#### 3.2 Reporting obligation

The supplier must immediately inform Energinet if the supplier is unable to supply the contractually agreed service in full.

#### 3.3 Prioritisation of ancillary services

In case of insufficient ancillary services, the services should usually be prioritised as follows:

1. Primary reserve in DK1 and frequency-controlled disturbance reserve in DK2, respectively
2. aFRR reserve in DK1 and frequency-controlled normal operation reserve in DK2, respectively
3. Manual reserves.

#### 3.4 Approval procedure

Prior to delivery, the supplier must, through documentation and testing, prove that the technical requirements are met. The test is conducted at least three weeks prior to the agreed delivery date.

Testing and trial will be agreed in further detail with Energinet's Control Centre in Erritsø prior to conclusion of the contract.

All expenses relating to testing/performance testing will be borne by the supplier.

Energinet may, during the term of the contract, request documentation of the supply of the tendered service on a regular basis.

The supplier must provide adequate documentation of the services supplied. Energinet reserves the right to carry out continuous performance testing.

All measures required in connection with performance testing must be taken and paid for by the supplier.

### 3.4.1 Conversion or modification of plants

If plant conversions or similar modifications of a more permanent nature result in changes to plant data, the supplier must immediately inform Energinet of this if the changed data have a bearing on the supply of ancillary services. The supplier must perform tests to verify the changed data vis-à-vis Energinet. See also Technical Regulation TR 5.4.1 Outage planning.

### 3.5 Ordering reactive reserve/voltage control

Energinet is responsible for ensuring that voltage control of the plants is adjusted to the reactive balance in the entire system on Zealand and in the Jutland and Funen areas.

The reactive power varies as a function of grid voltage. The set-point value is only relevant at the time of setting and should not be adjusted until a new voltage set-point value is announced by Energinet.

In case of changes to the reactive balance, and thereby the voltage distribution in the system, the plants automatically adjust the reactive production. Using passive reactive components, Energinet balances the voltage in the 132 kV and 400 kV grids to ensure that the plants' production/consumption of reactive power is within acceptable values. If this cannot bring production/consumption within acceptable values, Energinet orders the supplier to change the reactive production/consumption until acceptable levels are achieved.

#### ***Ordering in DK2:***

Ordering takes place using the production telegraph between Energinet and the supplier.

Energinet initially orders as follows:

1. Plant name
2. Requested reactive power Q (Mvar with sign).

Orders which Energinet would like to be effected immediately must be put into production immediately by the supplier. If necessary, several orders may be placed at the same time for parallel activation at several plants, as necessary.

The reactive power supplied may be any reactive power value within the plants' capacity.

Once the order has been given to the power station, the supplier acknowledges receipt of the order.

#### ***Ordering in DK1:***

Ordering takes place using the production telegraph between Energinet and the supplier.

Orders which Energinet would like to be effected immediately must be put into production immediately by the supplier. If necessary, several orders may be placed at the same time for parallel activation at several plants, as necessary.

The reactive power supplied may be any reactive power value within the plants' capacity.

Once the order has been given to the power station, the supplier acknowledges receipt of the order.

### 3.6 Handling of notifications and schedules in case of outages of production or reserves

This section describes in brief how BRPs for production – in addition to observing the duty of notification mentioned in section 3.2 – should act if they lose production capacity during the day of operation due to breakdowns etc.

The description below covers *balanced schedules* and *imbalances in schedules*.

- *Imbalances* in schedules describe operational schedules which are not in line with energy plans.
- *Balanced* schedules are operational schedules which are in line with energy plans.

(Energy plans = contract trading, spot trading, Elbas trading and intraday trading).

#### 3.6.1 Handling of reserves by BRPs for production

How the BRP for production should handle production outages depends on the answers to the following questions:

- Does the BRP for production have reserves available for handling production outages?
  - Has the BRP for production voluntarily offered regulating power?
  - Has the BRP for production sold reserves to the TSO?
- Does the BRP for production have its own reserves available for handling production outages?
  - Has the BRP for production sold reserves to the TSO?

It is the responsibility of the BRP for production to keep check on its own reserves and the reserves sold to the TSO.

#### 3.6.2 BRP for production has available reserves

If the BRP for production has reserves to cover production outages, the BRP for production may use its own reserves to make up for the imbalance or the BRP for production may elect to send an updated operational schedule (not balanced) stating the unavailable production.

If the BRP for production elects to use its own reserves to make up for the production outage, an updated operational schedule must be sent (balanced).

If the BRP for production elects not to use its own reserve to make up for the imbalance, an updated operational schedule is sent (not balanced).

##### 3.6.2.1 BRP for production voluntary offers regulating power

BRPs for production that have their own reserves may offer these to the regulating power market during the day of operation.

If the reserves of the BRP for production have been offered (voluntarily) to the regulating power market, and if these reserves are affected by the production outage to the extent that they are no longer available either in part or in full, the BRP for production must submit new regulating power bids (or possibly withdraw existing bids).

### 3.6.2.2 BRP for production has sold reserves

If the BRP for production has sold reserves to the TSO, and the reserve sold is impacted by the outage, the BRP for production has two options.

A:

- The BRP for production may choose to observe the existing operational schedule for plants not affected by the production outage.
- The BRP for production cannot make the reserve sold available or can only make part of the reserve available and must therefore inform the TSO about the non-available reserve.
- If the unavailable reserve is a manual reserve, new regulating power bids must be submitted.

B:

- Alternatively, the current production can be adjusted (if possible) to re-establish the reserve.
- If the available production is adjusted to re-establish the lacking reserve, the TSO must be informed of this.

In both cases, the BRP for production must submit an updated operational schedule.

### 3.6.3 The BRP for production has no available reserves

In the event of a production outage, a BRP for production which does not have its own reserves and has not sold reserves to the TSO must submit a new updated operational schedule (not balanced).

#### 3.6.3.1 BRP for production has sold reserves

If a BRP for production does not have its own reserves but has sold reserves to the TSO, the BRP for production must submit a new operational schedule (not balanced) if the outage does not affect the reserve sold.

If the outage affects the reserve sold, the BRP for production has two options:

A:

- The BRP for production may choose to follow the existing operational schedule for the plants which are not affected by the production outage.
- The BRP for production cannot make the reserve sold available or can only make part of the reserve available and must therefore inform the TSO about the non-available reserve.
- If the unavailable reserve is a manual reserve, new regulating power bids must be submitted.

B:

- Alternatively, the current production can be adjusted (if possible) to re-establish the reserve.
- If the available production is adjusted to re-establish the lacking reserve, the TSO must be informed of this.

In both cases, the BRP for production must submit an updated operational schedule.

#### 3.6.4 Information

BRPs for production having sold reserves to the TSO and electing to downward regulate the remaining production during an outage to re-establish the reserve must inform the TSO by telephone before regulating production downwards.

The TSO must be informed before submission of the updated operational schedule.

The BRP for production must inform the TSO by telephone immediately if a reserve sold cannot be made available.

## Appendix 1: Ediel communication

Bids in connection with daily capacity auctions are submitted to Energinet via Ediel in the format currently used in Eastern and Western Denmark for manual reserves. Before the agreement can come into force, the necessary time series must be created subject to the normal deadlines, ie 14 days beforehand.

All time series are exchanged as DELFOR messages.

Product codes etc. for use in bidding for upward and downward regulation capacity are stated in Tables 1, 2 and 3.

**Table 1:** Bidding for upward regulation capacity

| Product code | Object ID                          | Description                           | Unit    | Remarks                                 |
|--------------|------------------------------------|---------------------------------------|---------|---|
| 1025         | [To be completed by market player] | Bid no. 1 upward regulation<br>Volume | MWh     | A bid consists of a volume and a price  |
| 5018         | [To be completed by market player] | Bid no. 1 upward regulation<br>Price  | DKK/MWh |   |
| 1025         | [To be completed by market player] | Bid no. 2 upward regulation<br>Volume | MWh     | A bid consists of a volume and a price  |
| 5018         | [To be completed by market player] | Bid no. 2 upward regulation<br>Price  | DKK/MWh |   |
| ...          | ...                                | ...                                   | ...     | Repeated for all upward regulation bids |



**Table 2:** Bidding for downward regulation capacity

| Product code | Object ID                          | Description                          | Unit    | Remarks                                   |
|--------------|------------------------------------|--------------------------------------|---------|---|
| 1025         | [To be completed by market player] | Bid no. 1 downward regulation Volume | MWh     | A bid consists of a volume and a price    |
| 5016         | [To be completed by market player] | Bid no. 1 downward regulation Price  | DKK/MWh |   |
| 1025         | [To be completed by market player] | Bid no. 2 downward regulation Volume | MWh     | A bid consists of a volume and a price    |
| 5016         | [To be completed by market player] | Bid no. 2 downward regulation Price  | DKK/MWh |   |
| ...          | ...                                | ...                                  | ...     | Repeated for all downward regulation bids |

**Table 3:** Bidding for symmetrical reserve capacity

| Product code | Object ID                             | Description                                   | Unit                  | Remarks                                      |
|--------------|---------------------------------------|---|-----------------------|--|
| 1025         | [To be completed<br>by market player] | Bid no. 1<br>FNR/FDR bid<br>D-1/D-2<br>Volume | MWh                   | A bid consists of<br>a volume and a<br>price |
| 5021         | [To be completed<br>by market player] | Bid no. 1<br>FNR/FDR<br>price D-1             | DKK/MWh or<br>EUR/MWh |  |
| 5022         | [To be completed<br>by market player] | Bid no. 1<br>FNR/FDR<br>price D-2             | DKK/MWh or<br>EUR/MWh |  |
| ...          | ...                                   | ...   | ...                   | Repeated for all<br>symmetrical bids         |

Any enquiries concerning Ediel communication etc. should be directed to:

[plansupport@energinet.dk](mailto:plansupport@energinet.dk).

Similarly, product codes etc. for Energinet's feedback to players are stated in Table 4.

**Table 4:** Market result per player

| Produktkode | Objekt-ID                  | Beskrivelse                            | Enhed   | Bemærkninger                                 |
|-------------|----------------------------|--|---------|--|
| 1025        | [Udfyldes af Energinet.dk] | Reserveret mængde opregulering         | MWh     | 0 hvis der ikke reserveres noget hos aktøren |
| 1025        | [Udfyldes af Energinet.dk] | Reserveret mængde nedregulering        | MWh     | 0 hvis der ikke reserveres noget hos aktøren |
| 5018        | [Udfyldes af Energinet.dk] | Marginalpris opregulering              | DKK/MWh |  |
| 5016        | [Udfyldes af Energinet.dk] | Marginalpris nedregulering             | DKK/MWh |  |
| 5023        | [Udfyldes af Energinet.dk] | Reserveret mængde FNR D-1              | MWh     |  |
| 5024        | [Udfyldes af Energinet.dk] | Reserveret mængde FNR D-2              | MWh     |  |
| 5025        | [Udfyldes af Energinet.dk] | Reserveret mængde FDR D-1              | MWh     |  |
| 5026        | [Udfyldes af Energinet.dk] | Reserveret mængde FDR D-2              | MWh     |  |
| 5027        | [Udfyldes af Energinet.dk] | Gennemsnitlig FNR pris pr. aktør (D-1) | DKK/MWh |  |
| 5028        | [Udfyldes af Energinet.dk] | Gennemsnitlig FNR pris pr. aktør (D-2) | DKK/MWh |  |
| 5029        | [Udfyldes af Energinet.dk] | Gennemsnitlig FDR pris pr. aktør (D-1) | DKK/MWh |  |
| 5030        | [Udfyldes af Energinet.dk] | Gennemsnitlig FDR pris pr. aktør (D-2) | DKK/MWh |  |
| 5031        | [Udfyldes af Energinet.dk] | Gennemsnitlig FNR pris SE/DK2 (D-1)    | DKK/MWh |  |
| 5032        | [Udfyldes af Energinet.dk] | Gennemsnitlig FNR pris SE/DK2 (D-2)    | DKK/MWh |  |
| 5033        | [Udfyldes af Energinet.dk] | Gennemsnitlig FDR pris SE/DK2 (D-1)    | DKK/MWh |  |
| 5034        | [Udfyldes af Energinet.dk] | Gennemsnitlig FDR pris SE/DK2 (D-2)    | DKK/MWh |  |

Codes for differentiating between hourly bids and block bids for frequency-controlled normal operation reserves and frequency-controlled disturbance reserves must be agreed separately with Energinet. Object ID will state whether the result for frequency-controlled normal operation reserves and frequency-controlled disturbance reserves are preliminary or final in relation to the exchange rate conversion, see sections 1.3.2.4 and 1.4.2.4.

### Emergency procedure

If Ediel communication is not available for reasons for which Energinet is responsible, Energinet will notify the players by telephone that bids must be submitted to Energinet via the Self-service portal, the deadline being 10.00 (for manual reserves) or 15.00 (for primary and frequency-controlled reserves) or 18.00 (for frequency-controlled reserves).

The players must submit bids via the Self-service portal so that bids for manual reserves reach Energinet no later than 10.15. No later than 10.30, Energinet will inform the participating players of the volumes and prices that apply for the coming day of operation.

For the primary reserves, frequency-controlled normal operation reserves (D-2 auction) and frequency-controlled disturbance reserves (D-2 auction), the players must submit their bids via the Self-service portal so that they reach Energinet no later than 15.45. No later than 16.30,

Energinet will inform the participating players of the volumes and prices that apply for the coming day of operation.

For frequency-controlled normal operation reserves (D-1 auction) and frequency-controlled disturbance reserves (D-1 auction), the players must submit their bids via the Self-service portal so that they reach Energinet no later than 18.45. Energinet will inform the participating players of the volumes and prices that apply for the coming day of operation by 20.30.

Players are notified of the result of the auction by email.