



Electricity market needs
fixing – What can we do?

Feedback & conclusions

FINGRID

Preface

In mid-May, we published a discussion paper entitled “Electricity market needs fixing – What can we do?”. In the discussion paper, we proposed various measures aimed at developing the functioning of the markets in response to the changing structure of electricity generation. Our objective was to invite stakeholders to broadly reflect on the transformation in the electricity market and the means for saving the market.

A key issue has been how to develop the electricity market in a way that would enable the switch to a future carbon-free power system cost-effectively and without compromising power adequacy.

We requested feedback on the discussion paper by mid-September. The interest expressed in it was greater than we could have hoped for: a total of 36 different parties, including companies, organisations and private individuals, sent in written feedback. We would like to thank all respondents for the significant amount of feedback we received, both in writing and verbally.

The topics covered in the discussion paper were developing the day-ahead and intraday markets, the strategic reserve, the balancing power and reserve markets, an imbalance power model and reinforcing the connection between the wholesale and retail markets.

In this paper, we present a summary of the feedback, as well as Fingrid’s conclusions on matters where Fingrid has already formed opinions. We will draw on the feedback in our internal development projects and in regional and European TSO collaboration where market development themes are key items on the agenda.

We are continuing the dialogue with all our stakeholders, and we are open to hearing your proposed alternatives and solutions for developing the markets. We are striving for a green, bright and reasonably priced power system – built together with you.

In Helsinki, 23 November 2016

Fingrid Oyj

Markets



Asta Sihvonen-Punkka

Director

1 Developing the day-ahead and intraday markets

The rules governing the day-ahead and intraday electricity markets will be revised as part of the next step in building Europe's single electricity market. The objective is to create common operating principles for the electricity markets throughout the EU area, and to ensure that transmission capacity is available in the markets as efficiently as possible. The requirements of the new legislation concern the setting of minimum and maximum prices for the day-ahead market, and capacity allocation between the different market time frames.

1.1 Do you see a need to change the current price caps and price floors in the day-ahead market?

A majority of the respondents were of the opinion that there is no need to change the current price limits. The arguments supporting that view included the effectiveness of the current price limits and the fact that the current limits have thus far never been reached. High price caps were also seen to increase not only market actors' price risks, but also the risk of political intervention in the electricity market. The harmonisation of procedures in Europe was, however, considered important. If price limits elsewhere are changed, there is also reason to consider changing them in Finland.

A few of the respondents favoured lowering the price caps and raising the price floors. Among the grounds cited were especially harmonising practices when it comes to arranging a second auction round in the day-ahead market, which is in use, for instance, in Germany. On the other hand, some respondents were also in favour of a slight raising or elimination of price caps in order to reinforce market-based investment incentives.

In Fingrid's view, it is important that electricity market actors that are capable of a quick response have the incentive to trade close to the hour of delivery. In practice this means, for example, that in electricity transactions that take place close to the hour of supply, the price caps must be higher than they are in the day-ahead market. As the structure of power generation becomes increasingly variable, it will be more and more challenging to balance production and consumption. Currently, consumption has limited flexibility in the day-ahead market, and a significant proportion of it is offered at the maximum price. In terms of flexibility in the electricity market, Fingrid believes more price-dependent bids should be made in the day-ahead market. Raising the price cap in the day-ahead market could help in that respect.

Under existing European legislation, the decision on minimum and maximum prices in the day-ahead market fall within the jurisdiction of the energy authorities, which in Finland is the Energy Authority (Energiavirasto). The nominated European electricity market operators are jointly responsible for making a proposal after first consulting stakeholders on the matter. The electricity market operators' proposal is currently under consideration by stakeholders. According to the proposal, no changes would be made to the current minimum and maximum prices (€-500/MWh and €3,000/MWh). Although Fingrid considers the proposal acceptable, the company believes the price cap in the day-ahead market could be re-evaluated at some point from the perspective of the value of lost load (VoLL). Two alternatives have been proposed for the intraday market: either price limits that are consistent with those of the day-ahead market, or the setting of a price cap at €9,999/MWh and a price floor at €-9,999/MWh. Fingrid supports the latter proposal, i.e. broader price limits, as enabling price variations closer to the delivery time is important in terms of determining the value of flexible capacity.

1.2 **Do you share the view that the value of transmission capacity between the bidding zones can change in the different market time frames due to deviations in the prices on the day-ahead market and in trade that takes place close to the hour of consumption?**

The respondents believe the transition from the day-ahead market closer to the delivery time could cause the value of transmission capacity to change. Their reasoning was that the value of transmission capacity reflects the transmission need, which, for its part, is dependent on the market situation at any given time. As the hour of supply approaches, forecasts of production and consumption become more accurate compared with the previous day's forecast, which means the transmission need could also change.

One future option proposed in the responses is the idea of switching from one auction a day to several auction rounds a day. The reasoning was that the changing structure of electricity generation could create a need to re-evaluate the time frames of trade. In the new situation, a once-a-day auction might not necessarily allocate transmission capacity as optimally as it did before.

Fingrid considers it important to determine the kind of needs that will arise in the development of trade periods in the long term as a result of the changing electricity generation structure. Capacity calculations for markets will in future be more detailed when switching from once-a-day calculations to increasingly accurate calculations made several times a day. One potential way of ensuring the optimal use of transmission capacity in a changing power system could be to arrange intraday auction rounds, e.g., such that the intraday market is opened through auction. Fingrid welcomes this type of procedure. If, after the day-ahead market, more transmission capacity can be allocated to the intraday market, it is important that it is made equally available to all market operators. The realisation of intraday auctions is now also being looked into for the purpose of legislation, as the existing European legislation requires that a price be set for transmission capacity on the intraday markets. Intraday auctions are one way of responding to this requirement. Fingrid is involved in the preparatory work headed by ENTSO-E in arranging intraday auctions. The stakeholders will be consulted on the proposal in spring 2017, and it will be submitted to the regulatory authorities for approval by August 2017 at the latest.

1.3 **Should some of the transmission capacity between the bidding zones be directed, i.e. allocated, in a market-based way to different market time frames instead of directing all available transmission capacity primarily to the day-ahead market?**

The answers highlighted that the value of transmission capacity in the current situation is the highest in the day-ahead market, so allocating transmission capacity fully to the time frame of this market was also considered important. In addition, the central role of the price of the day-ahead market as a reference price for the electricity derivatives market was stressed. Some respondents proposed that if, because of the change in the electricity generation structure, there begins to be signs of a trend requiring capacity allocation not only in the day-ahead market, but also in other market time frames, then it would be a good idea to carefully determine the pros and cons of such measures in advance.

Capacity allocation is regulated by European legislation. Legislation already enables transmission capacity to be allocated also, for example, to the intraday market instead of the day-ahead market, if there are socioeconomic grounds for such a measure. Fingrid considers it important to determine the kinds of situations where capacity allocation partly to markets other than the day-ahead market would be justified from an overall economic standpoint. In such a case, the issue is not a fixed administrative capacity reservation, but rather its volume and value would be determined on market terms.

Nordic TSOs are establishing a common market for the automatic frequency control reserve in 2018. This inter-Nordic market enables the efficient utilisation of reserve capacity and the optimisation of costs by making use of daily transmission capacity reservations on the basis of a benefit analysis. Stakeholders will have the opportunity to state their opinion on the method of reserving transmission capacity before approval by the authorities.

Changes are also expected in the transmission capacity calculation methods, which will be used to calculate the capacity to be allocated to the markets. In future, Nordic TSOs will begin calculating transmission capacities for the day-ahead markets using a common grid model for the entire Nordic market area. Individual countries previously calculated transmission capacities each with their own grid models. Future calculations will be made by a joint Nordic Regional Security Coordinator (RSC) to be set up in Copenhagen, and which is scheduled to start up operations at the end of 2017, and which Fingrid is a part of.

2 Power adequacy and the strategic reserve

The closing down of condensing power plants in recent years has created greater concern about the level of power adequacy in Finland. The ratio of available production capacity in winter to the forecasted peak electricity consumption has fallen to a record low level. At the same time, however, the transmission connections with neighbouring countries have strengthened.

As a solution that supports power adequacy, Finland has in place a strategic reserve, i.e., a peak load capacity reserve, based on national legislation. The purpose of the strategic reserve is to cost-effectively safeguard the balance between electricity production and consumption in winter.

2.1 **Should a target level of power adequacy be specified in Finland? How do you think the target level should be determined?**

Setting a target level of power adequacy was widely supported. The respondents considered it important that the target level be a non-binding recommendation, as the level of power adequacy

should, as a general rule, be specified in the electricity markets. The target level of power adequacy, or at least a method for specifying a target level, should be harmonised by region, and it was deemed to be the task of the authorities. In specifying a target level, it should be noted that the VoLL is different for different customer groups. Setting a target level of power adequacy could increase market-based demand-side management, and it could make cutting off an electricity consumer from the grid by an administrative decision more acceptable than it currently is. Some respondents saw the setting of a target level of power adequacy as a risk that could lead to the introduction of a capacity mechanism if the target level were to be reached. Some respondents were also of the opinion that there is no need to set a target level, because the responsibilities of the authorities and Fingrid are already clear nowadays.

Fingrid is in favour of and promotes a dialogue on a target level of power adequacy. The clearest solution would be to have a policy stating the recommended target level. Such a level may differ for the various types of electricity consumers. A target level of power adequacy can be beneficial, for instance, in specifying and planning the strategic reserve and how to go about cutting off an electricity consumer from the grid by an administrative decision in possible electricity shortage situations. We consider it important that the sufficiency of electrical power is analysed regionally. The target level of power adequacy could also be harmonised by region. Ideally, the level of power adequacy will be market-based and customer-specific, which means the administratively determined target level can be abandoned.

2.2 What should be the price of energy supplied by strategic reserves, such as the peak load capacity reserve: about the same as the VoLL or another price?

Many respondents were of the opinion that the price of energy supplied by the strategic reserve should be close to the VoLL or the price cap in the electricity market. If this is not the case, the strategic reserve is used to influence the formation of the market-based price of electricity. The respondents saw this pricing principle as contributing to an increase in the active participation of demand-side management in price forming in the energy markets.

Others believed that the VoLL would be the right price for energy supplied by the strategic reserve only in a well-functioning, perfect market. The respondents pointed out that not all electricity consumers take part in the markets as active operators. The price of energy supplied by the strategic reserve should reflect its changing production costs, in terms of both electricity production and demand-side management.

In Fingrid's view, it is important that the strategic reserve does not influence the electricity market's short- or long-term price signal. We have proposed to the Energy Authority that the pricing principle for energy supplied by the strategic reserve be changed to the value of the price cap for the day-ahead markets. This principle would ensure that the strategic reserve does not distort the electricity market's price signals. Fingrid is in favour of harmonising the pricing principle in the Baltic Sea region.

2.3 **Should strategic reserve legislation primarily safeguard the preservation of power plant capacity that is under threat of closure, or should the legislation be developed to enable the demand side of electricity consumption (e.g. household consumption) to take part more flexibly than now in the reserve market?**

In general, it was considered important that the strategic reserve is cost-effective and as technology neutral as possible. The most important task of the system will be to safeguard transmission reliability, i.e. a balance between production and consumption, and not to support, for example, the preservation of power plant capacity that is under threat of closure or the creation of new demand-side management.

Some respondents were of the opinion that due to the low level of supply, creating an efficiently functioning strategic reserve market is unrealistic. For that reason, it should be possible to acquire a strategic reserve under a longer contract than now and to include the participation of new capacity.

Fingrid considers the current strategic reserve to be, for the most part, effective, and does not see an immediate need to change the strategic reserve legislation. We are focused on increasing market-based demand-side management's opportunities to participate in the energy and reserve markets by increasing the opportunities for aggregation and by reducing the offer sizes. Demand-side electricity management that has the prerequisites for market-based flexibility should not be reserved in a strategic reserve that operates outside the electricity markets.

Fingrid considers it important that, in order to be prepared for longer periods of electricity shortages, the strategic reserve should primarily be based on electricity generation capacity. This would enable the strategic reserve to be used also for national emergency preparedness.

2.4 Is there reason to develop other aspects of the strategic reserve system? If yes, how?

A number of good suggestions for developing the strategic reserve system were put forward. Many respondents considered it important to make the system more compatible with a low-carbon power system. One problem respondents saw with the current operating principle is that it sidelines the intraday market.

The respondents also considered whether some of the strategic reserve could be, for example, in a higher state of readiness than now, and correspondingly some in a slower state of readiness, or whether the period of readiness should also extend beyond wintertime. Another topic was whether the participation opportunities of demand-side management could be increased or whether a power plant could participate in the strategic reserve with less than 100% of its capacity. Another development idea that was raised was allocating the costs of the strategic reserve more clearly to the consumers causing the need for the reserve.

Fingrid considers it important to increase the possibilities to make use of the intraday market in managing electricity shortage situations. For example, if intraday auctions are initiated, it should be determined whether a decision to start up a strategic reserve can be made also in these markets. As the electricity production structure changes, it will be harder to predict the need for the strategic reserve than before. The current 12-hour readiness to produce limits the availability of the strategic reserve. We consider it important to increase the flexibility of the strategic reserve and introduce the procedure for raising readiness proposed by us. In future, there could be a need for the strategic reserve also beyond the winter season.

In Fingrid's view, the costs of maintaining the strategic reserve should, in keeping with the "polluter pays principle", be allocated to balance service customers, but the existing strategic reserve legislation does not allow it. We also consider it important to harmonise the key market and operating principles of the strategic reserve system regionally.

3 Developing regulating power and the reserve markets

Fingrid ensures a real-time balance between consumption and production by ordering balancing power and the sufficiency of balancing resources by reserving reserve capacity. A condition for efficient regulating power and reserve markets is that various actors and resources capable of flexibility can participate in them regardless of the technology.

In the discussion paper, Fingrid promised to lower the minimum size of the balancing power market offers in autumn 2016 to 5 MW along with new balancing power agreements. Fingrid also announced that it will prepare a test period to study the possibilities of increasing the transparency of the balancing power markets. To enable wider participation in the balancing power markets, Fingrid announced it will also look into the matter of lowering the minimum offer size requirement to below 5 MW, combining the small offers from more than one balance, and assessing the measurement requirements.

3.1 What impacts, benefits or detriments would the proposals mentioned in the discussion paper have on your operations?

A smaller offer size was seen to generally increase liquidity in the markets and the opportunities of demand side management to take part in the markets. The respondents believed the consequent increase in supply would reduce the price peaks of balancing power, and thus also that of imbalance power. Allowing balancing power offers to be combined from the balances of more than one balance responsible party was seen to enable the market entry of new energy services and new types of service providers. The view on increasing the transparency of the balancing power markets and publishing the regulating price was that this would place different operators on a more equal footing in the markets and enable them to self-regulate.

Although a smaller offer size in the balancing power markets is generally considered a positive development, it was also considered to increase administrative costs. Opinion was divided on the idea of an outside service provider combining balancing power offers from the balances of more than one balance responsible party. The most glaring concern was a balance error potentially caused by an outside service provider in the open electricity supply chain and which the balance responsible party would be liable for.

Fingrid has lowered the minimum size of the balancing power market offers to 5 MW. Fingrid's goal is to develop the balancing power markets in a way that facilitates market entry for new operators. For example, a further reduction in offer size in the balancing power market would allow smaller players to take part. Making use of digitalisation and the development of IT systems is also expected to contribute to the effective participation of small players.

In winter 2016–2017, Fingrid will carry out a test related to the balancing power markets that involves publishing the real-time balancing price in scarcity situations. During the testing period, the level of participation among market operators in supporting the power system will be explored. The test will be used to gather experiences of the impacts that making prices public could have on managing the power system when the balancing price is published in real time during scarcity situations.

In November 2016, Fingrid decided on the procurement of frequency controlled reserves for normal operation and disturbances for 2017. The supply grew especially in terms of consumption in the disturbance reserve, where combining an offer from more than one balance was made possible. Fingrid is currently launching a pilot on combining offers from more than one balance, including in the balancing power markets, in order to identify any problems that may arise in the model. Fingrid's goal is a customer-focused model, whereby customers can choose whether to offer their demand-side opportunities through an electricity supplier or service provider. The model should not include compensation that the service provider would have to pay the electricity supplier or balance responsible party.

The objective is to develop, based on what has been learned in the pilot project, procedures for combining offers from more than one balance in collaboration with domestic and Nordic stakeholders. In addition, a change is in the planning that would enable consumption and production resources to be combined into a single offer from the same open supply chain. The change is scheduled for implementation in 2017.

3.2 In your opinion, how can the supply in the balancing power markets be increased?

The responses highlighted the importance of continuous dialogue and of increasing awareness and transparency in both the balancing power markets and in other reserve markets. Among the means suggested for increasing the supply were reducing the offer size and increasing the opportunities for combining offers. In addition, flexibility in product specifications and measurement requirements, as well as making use of digitalisation, were highlighted. The real-time publication of balancing power prices was also seen to increase liquidity in the balancing power markets. Some of the responses proposed that the reserve capacity that Fingrid reserves in advance be increased, as well as a support system and/or a quota for demand-side management. Some responses included the suggestion of combining the intraday and balancing power marketplaces. Increasing balancing power collaboration with the neighbouring countries was also considered important.

The responses also put forth proposals that would not directly increase the supply in the balancing power markets, but which could potentially lead to a lowering of the volume of balancing measures carried out by TSOs. These proposals included switching to a single balance model in balance settlement and reserving transmission capacity for the intraday electricity market.

Fingrid considers maintaining a continuous dialogue with market operators to be an important part of developing the balancing power markets and is happy to discuss development measures with both existing and potential operators. Our objective is to increase the amount of straightforward information on the earning opportunities that exist in the balancing power and reserve markets. Measures that currently are under way to reduce the offer size and to improve the opportunities to combine offers will be continued with the market operators. When it comes to managing the power balance, the role of demand-side management will be highlighted in the coming years. Fingrid is involved in facilitating the participation of demand-side management, for example, in renewing the specifications of balancing products.

European balance management legislation, which is currently being drafted, cites the promotion of cross-border regional balancing power markets as a key objective. The creation of broader markets requires standardised products for balancing power and transmission capacity available for possible activation. Fingrid's goal is to create ever-broader markets for balancing power and reserves and to participate in projects to expand the markets both regionally and on the European level.

3.3 How can high-quality production plans be ensured?

According to the responses, the current practices were deemed satisfactory, and any major changes were considered unnecessary. Moving the notification deadline for production plans closer to the hour of consumption was the only proposed improvement by several respondents. The price of imbalance power was seen to be a significant driver of the operator's balance. One proposal put forth was the idea of staggering the price of imbalance power in relation to its volume – a smaller volume of imbalance power would also mean a lower unit price.

It is important for Fingrid that production plans are available to the transmission system operator in good time, so that balance management close to the hour of consumption can be planned in advance. In assessing whether the notification deadline for production plans should be moved closer to the hour of consumption, the balance management measures as a whole should be assessed, in addition to the quality of the production plans. Fingrid's goal is for the price of imbalance power to reflect the state of the power system and at the same time guide operators' behaviour in supporting the measures of imbalance management. It is important to further analyse the incentive provided by the price of imbalance power.

4 Imbalance power and imbalance power pricing

In developing models and pricing for imbalance power, Fingrid places importance on a regional perspective that takes into account not only the Nordic countries, but also integration with the Baltics and continental Europe.

The imbalance power models and pricing currently in the planning stage will probably not be in full use until the 2020s. The new principles must be able to respond to the change in the structure of electricity generation and to a consumer-focussed electricity market. They must also promote the active participation of market actors in balancing the power system.

Making full use of the flexibility potential related to the power system and increasing transparency will also influence the operational maintenance of the power balance. The related challenges and technical preconditions must be resolved alongside the development work.

4.1 Do you see reasons to develop imbalance power pricing and, if yes, how?

Although the existing imbalance power model was considered functional, broad groups of electricity parties expressed hopes that it would be developed further. An increase in transparency was also requested almost without exception. The respondents believed it would enable operators to participate in supporting the entire system's balance and it was seen to increase confidence in the operations of the balancing power markets. In addition, electricity producers also encouraged a switch to a single price system for production balance. Among the grounds for the need for change were that attention would then be focused on supporting the system's balance, rather than on balance deviations. A single price model would also facilitate market entry for renewable energy and it would be equal and consistent with the general European practices.

Fingrid considers it important that all of the flexibility potential that exists in the system can be utilised and that the price of imbalance power fully reflects the value of flexibility. This requires raising the current price cap of imbalance power. Consideration should be given to raising the price cap in line with the VoLL. It is important for the market parties to be able to respond to the price signals. In terms of fairness, it is problematic that some balancing power market parties nowadays essentially have insight into the formation of the price of balancing power. Fingrid is in favour of increasing transparency and is launching a pilot project that involves publishing the price of balancing power in scarcity situations by the end of 2016.

Fingrid considers the basic structure of the current balancing power model to be functional and also an option for the future. The strengths of the current model are underscored in normal operating conditions and especially in countries where the transmission grid limits the opportunities of balance management. With the changing electricity generation structure and a consumer-focused electricity market, however, the strengths of a single-price system could increasingly come into play. It is also evident that a single price model would improve control of the system in extreme situations. The applicability of a single price model in the Nordic power system demands further research.

The structural change in the power system and the increasingly active participation of operators will weaken the predictability of the power system, and the need for automatic balancing will grow. For example, use of the automatic Frequency Restoration Reserve (aFRR) is growing alongside the growth of the inter-Nordic market, and some of the measures currently being carried out on the balancing power markets may be replaced by the automatic activation markets. In future, the energy prices of this product and possibly other similar products should also be included in the imbalance power prices.

4.2 **What is your view on the significance of the duration of the imbalance settlement period in terms of increasing the flexibility of the power system? What kind of role do you see for the markets and market actors in terms of balancing?**

The majority of respondents believed that a shorter imbalance settlement period is an inevitable part of the changing market structure in the transition towards a future low-carbon power system. Some respondents believed that the current one-hour imbalance settlement period would be sufficient also in future, and that no change is needed. The main driver was considered to be the change in the electricity production structure, and some electricity consumers also felt that the imbalance settlement period for electricity consumption could be longer than that for production.

Opinion was divided on the impacts of a shorter imbalance settlement period on demand-side management's opportunities to participate in the market. Some felt that a short imbalance settlement period increases the opportunities for demand-side management, whereas others believed it reduces such opportunities in the markets. The respondents were broadly in favour of increasing the current frequency controlled reserves and, e.g., hour change regulations as a solution during the transition period for delaying the introduction of a shorter imbalance settlement period.

A particular concern was that the electricity meters of small customers would have to be replaced prematurely. On the other hand, a situation where customers would have different metering periods was also considered problematic. Ideally, the entire market structure would shift to a shorter period: the day-ahead market, the intraday market, and the balancing power market, as well as the metering of electricity consumption and generation. Many responses stressed the regional perspective, and that harmonisation should at least strive for a Nordic solution.

Fingrid considers switching to a 15-minute imbalance settlement period to be an unavoidable part of reconciling the market structure with a green power system. A short imbalance settlement period brings a more market-based approach to balancing the power system. In the long term, all key marketplaces will be based on a 15-minute trade period; the day-ahead market, the intraday market and the imbalance power market. In an ideal situation, electricity consumption and production measurements would be made in 15-minute periods; however, various temporary solutions, such as dividing hourly measurements into 15-minute periods, will be needed during the transition period. As the market structure transitions to 15-minute periods, a gate closure will be applied to each trade period, which will extend the trading time for the last three quarters of the hour.

It is important to switch to a shorter imbalance settlement period at the same time as other Nordic countries. Before a large-scale transition, we will look into the possibility of carrying out voluntary or national pilots together with the Nordic TSOs. Along with adopting a shorter imbalance settlement period, Fingrid is developing other procedures for the changing production structure, such as building a Nordic Automatic Frequency Restoration Reserve (aFRR) market.

A market model that would see a different imbalance settlement period applied for production and consumption would, in our understanding, lead to market segregation and reduced competition and does not enable full participation of demand-side management in the electricity markets.

4.3 Should the cost of reserves be allocated according to the “polluter pays principle” instead of the current model where costs are distributed to all parties?

Both the current practice of allocating costs to everyone and a broader adoption of the polluter pays principle were widely endorsed by the respondents. The idea of a scarcity adder, however, raised many questions and was widely shunned.

Supporters of the equal division of costs did not see a need to change the current practice; the power system is a unified entity where extensive cost distribution on the polluter pays principle should not be applied. Electricity consumers in particular were concerned that the polluter pays principle would lead to a two-price system in the consumption balance and would support large market parties at the expense of smaller ones.

Those in favour of the polluter pays system consider it appropriate in principle in cases where costs can be meaningfully allocated. The arguments for it were that it would increase cost-effectiveness and fairness. Transparency was considered important if such a system were adopted. The responses also raised the issue that some reserves serve the purpose of preparing for grid faults, and this part of the reserve costs should be covered by grid fees.

Fingrid considers the polluter pays principle important in cases where costs can be meaningfully allocated. According to the polluter pays principle, covering some of the reserve costs with grid fees is justified.

Fingrid will look into various options for applying the polluter pays principle more extensively, for example, in the fast active disturbance reserve. The scarcity adder in the imbalance power pricing is an interesting option. The scarcity adder concept is also becoming an increasingly popular topic in the dialogue concerning the European electricity market. It was, for instance, among the interim positions presented in the European Commission's Winter Package 2016 to be published in December. There are still, however, many unanswered questions surrounding the scarcity adder, and these need further exploration.

4.4 Do you see a need to hedge the price of imbalance power using financial instruments, and what kinds of instruments could these be? Would you consider offering or acquiring price-hedging instruments?

The majority of respondents did not see a need to hedge the price of imbalance power at this time. The liquidity of the instruments was also a concern for the respondents. Some respondents, however, brought up the notion that over time, there might be a need for price-hedging instruments for imbalance power in the form of market-based products. Transmission system operators were not considered to have a role as issuers of hedging instruments.

Fingrid believes that an increasingly variable production structure will increase the need for trade closer to the hour of consumption. It is important that the value of flexibility is reflected in market prices close to the operating hour as well as in the imbalance power prices. Pricing variations are likely to increase.

In Fingrid's estimation, it is important for the market parties to be able to engage in trade if they so wish and to hedge against price fluctuations. As demand for hedging instruments grows, they should also be offered in increasing amounts on market terms. In Fingrid's opinion, it would be easier to realise price hedging for imbalance power in a single-price system than in a double-price system. Fingrid shares the view of market operators that transmission system operators should not have a role as issuers of hedging instruments.

5 Linking the wholesale and retail markets

Safeguarding the adequacy of power in a changing power system requires that the markets have sufficient production and consumption that can quickly adapt to rapid changes. The role of consumption, in particular, will grow. Large electricity consumers already operate with great flexibility in the markets, but in future the participation of small-scale consumers will be ever more important.

5.1 **In what ways would it be possible to increase the participation of small-scale consumers in demand-side management? Could clearer roles for retail market operators and, for example, a supplier-based market model contribute to demand-side management?**

The respondents considered the participation of small-scale consumers in demand-side management important, and they saw commercial potential in offering demand-side services. It was believed that the role of small-scale consumers in general will grow in the electricity markets in future. Clarifying the roles and operating models of the electricity supplier, distribution network operator and third party was mentioned as an important action to promote the demand-side management of small-scale consumers. The increase of fair and openly available information thanks to the introduction of the Datahub was considered positive in terms of promoting small-scale consumers' demand side management. Respondents additionally brought to light the general increase in microgeneration, the development of electricity storage technologies, and digitalisation as factors that increase the participation of small-scale consumers in the electricity markets.

The majority of respondents did not express a view on the retail market model. Of those that did, most were of the opinion that a supplier-driven retail market model would promote demand-side management. The advantages of a supplier-driven model were considered to be that it takes customer needs better into account and is more convenient for consumers. According to the respondents, a commercial player that operates in a competitive market can more efficiently create new products and services. It was believed that new services would be created if they have business potential in Fingrid's imbalance power and/or reserve markets or in other electricity markets. On the other hand, the current incentives for flexibility are not necessarily passed on to the consumer and from that perspective, price signals could be sharpened.

Fingrid considers it important to clarify the roles of electricity market operators to promote the demand-side management of small-scale consumers, and Fingrid is in favour of a solution in which demand-side management is defined as a component of competitive business activities. Offering demand-side management to the markets is, above all, the task of electricity sellers and other service providers.

Fingrid supports a model that places the consumer centre stage. Fingrid considers it important to facilitate the participation of small-scale consumers in demand-side management in the electricity markets. That means, among other things, that when combining and offering demand-side resources to the markets, the service provider does not need to pay compensation to the balance responsible party.

Fingrid is also in favour of the regional harmonisation of operating methods in the retail markets, which would help create Nordic retail markets. Broader, ever more coherent markets would provide the opportunity, for instance, to harmonise the exchange of information related to demand-side management, to lower the price of demand-side management services and attract innovative new players.

5.2 **Should the current form of fixed time-based control for electric heating be abandoned? How should a shift to price-based control be realised?**

The respondents saw the switch from fixed time control to market price-based control for electric heating as heading in the right direction. In the respondents' opinion, fixed time control should be opened up to competition, which would enable a shift to more flexible, market-based modes of control. Some respondents also pointed out that it would be natural for the seller to optimise electricity use on behalf of the customer. The respondents also proposed opening up the AMR meter control opportunities to competition, even though other means of control are replacing AMR control along with advancing technology. Switching from an energy-based distribution network tariff to a power-based tariff was considered important.

Fingrid is in favour of switching from fixed time-based control to market-based price control for electric heating, and for equitably freeing up distribution system operators' AMR controls for the use of all commercial operators. Currently a large proportion of the demand-side management potential of small-scale customers falls within the scope of DSOs' fixed time control, which reduces the business opportunities of service providers and reduces the demand-side management offered to various marketplaces.

Fingrid considers it important to also look into the introduction of power-based distribution network tariffs that would support the development of demand-side management infrastructure by creating an incentive for small-scale customers to balance their consumption. This infrastructure consists of real-time information exchange platforms, terminals for small-scale customers and the communications between them.

5.3 Other retail market matters

Respondents demanded that electricity storages be given equal status with production and consumption. Cutting down on red tape was proposed as a measure to facilitate the increase in households' electricity storage. The respondents also pointed out that solar power should be treated equally with other production in the production balance.

Fingrid considers the rise of electricity storages important, as they will bring more flexibility to the power system and improve transmission reliability. Electricity storages are not explicitly consumption, nor are they production, and thus they merit treatment as a class of their own. Fingrid's opinion is that all forms of production, thus also solar power, must be treated equally.

In conclusion

The power system is undergoing a change. Decentralized power generation is being taken into use at an accelerating rate, homes are becoming increasingly energy efficient and consumers have better opportunities than ever to generate part of the electricity they need independently. In a changing power system, new tools are needed especially to manage the rapid variations in weather-dependent solar and wind power generation. The changes will also increase the complexity of the electricity markets and bring the challenge of updating the rules of the game.

Responding to the power system transformation will require establishing an operating environment that enables maximum flexibility. The sources of flexibility are demand-side management, electricity storage solutions and flexible, quickly regulated production.

Fingrid wants to be involved in developing markets that encourage new players to respond to the challenge posed by variable production by increasing flexibility in consumption, improving the regulating capacity of power plants and developing electricity storage services. Achieving these targets cost-effectively will require well-functioning markets. The price signals in the markets reflect whether there is demand for new production, whether it is worthwhile to invest in electricity storage, and the benefits consumers can expect by making their electricity consumption more efficient or by investing in their own production. Price signals create incentives for investments and innovations.

A road map indicating measures, the timing thereof and the roles of the various parties would help in managing the change. The measures could be analysed in the road map on the basis of the time required to realise them and scheduled, e.g. into short-term, mid-term and long-term tasks. In addition to the tasks and scheduling, important aspects would be identifying and agreeing on the parties responsible for taking the various measures forward. The solutions that the change in the electricity markets calls for will come about as the result of competition and open business. Regulation concerning the electricity markets is in need of development and must support the change.

Fingrid will continue its work to develop the electricity markets to ensure that the power system's transition to a green and bright future energy system takes place cost-effectively and without compromising power adequacy. We promote the flexibility of the electricity markets in different ways and strengthen market mechanisms. We conduct work in our internal development projects and in collaboration with Nordic, Baltic and other European transmission system operators. A key aspect of future measures is including customers and all stakeholders in the efforts to come up with solutions.

We will continue to be part of the efforts to develop solutions concerning the electricity markets, openly and responsibly for the good of society as a whole.



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