



NordREG  
Nordic Energy Regulators

# Monitoring of the Nordic Regulation Power Market

Report 6/2007



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## Preface

The Nordic energy ministers at their meeting in Bodø in September 2006 requested NordREG to study the link between the monitoring of the regulation power market with the monitoring of Elspot, Elbas and the financial power market. The study should address the need for full disclosure of information to Nord Pool and how this can be achieved.

Based on this request NordREG has formulated the task for this work in the Work Programme for 2007. The responsible group is also working with the Regulation of Nord Pool Spot.

The participants in the Monitoring of the Nordic regulation power market working group are Borgny Hatlestad Tveekrem (chair), Gunn Oland and Jon Sagen (NVE), Margareta Bergström and Maria Persson (EMI), Veli-Pekka Saajo (EMV), Peter Hoffmann, (DERA).

According to the Work programme the working group shall during 2007:

- Map the present situation regarding monitoring of the different markets.
- Describe different cases/situations where monitoring across borders and across markets is necessary /useful.
- Map the legal framework regarding monitoring and information exchange in the different Nordic countries.
- Describe alternative models which can serve the need for co-ordinated monitoring across borders and markets
- Put forward a proposal on monitoring, information exchange and possible need for changes in legal framework and regulation.

This report include descriptions and brief analysis of how the joint Nordic regulation power market is functioning today, definition of “regulation power” and the interfaces to other ancillary services as well as to “balance settlement” – the payment of balance responsible market players for their imbalances compared to scheduled production or consumption.

The initial work has taken into account the ongoing work within Nordel and meetings with the TSOs in the four Nordic countries has been organised. The meetings have been important to get an overview of their perception of the functioning of the regulation power market and map the present situation regarding their monitoring. In addition the discussions with the TSOs have helped us identifying existing challenges concerning different options for monitoring of the Nordic regulation power market. NordREG has also had meetings with Nord Pool Market Surveillance and relevant market players.

The report has been send on public consultation. NordREG has received comments from seven different participants in the Nordic market. These are referred in chapter 9.

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## 1. Introduction

The Nordic regulation power market was established in 2002. This market is a compilation of bids delivered to the four national balancing markets, and is used for balancing and frequency control in the Nordic synchronous power system and on 1 January 2006; also Western Denmark was included in the Nordic regulating power collaborations. A common regulation market can provide the Nordic market with the cheapest regulation objects, which will be a benefit to all consumers. On the other side, due to limited liquidity, limited transparency and asymmetry of information it is a possibility that this market can be used to exercise market power.

The Nordic regulation market differs from the markets at Nord Pool. The Nord Pool markets are organised as a common market place with common member agreements and bidding rules. The Nordic regulation market (or regulation list) on the other hand is a compilation of bids given to the national balancing market places i.e. TSOs under rules and agreements set by the TSOs. This can make monitoring of the market more complex. The Nordic regulation market has some Nordic rules given in the Nordic system agreement, but the rules for bidding and payments are primarily given in the national balancing markets, and they may differ. The report looks at possible need for increased harmonisation of national rules and/or a further specification of the rules in the Nordic system operations agreement.

In this report NordREG has not tried to provide a distinct definition and delimitation of objectives and contents of monitoring. NordREG takes a broad view. Monitoring include activities to oversee the compliance with the rules given in the national balancing arrangements, compliance with rules given in the Nordic system agreement as well as the overall efficiency of the Nordic regulation market as such and how this market is working in relation with the other physical and financial markets. Monitoring may include both analysis of market design with regard to how the different markets are working and interacting with each other, as well as overseeing the behaviour of the individual actors in the market. A general conclusion is that transparency in market rules and price formulation is of utmost importance and a prerequisite for any efficient market monitoring.

## 2. Conclusions

The report is briefly describing the existing Nordic regulation power market and looks at further needs for monitoring of this market. The suggestions for improvement of the present monitoring and the suggestions for further work are based on interviews with the TSOs and market actors and discussions within NordREG. Based on this preliminary report NordREG states:

### *Transparency*

There is a need for increased transparency of the regulation power market. A detailed description of the existing rules and operations of the market should be published by the TSOs.

The ongoing work on transparency connected to the Congestion Management Guidelines for EU Member States and the work on transparency within ERGEG will be taken into account in the further work.

### *Monitoring framework*

Monitoring of the regulation power market might need to be more harmonised in order to secure equal treatment of the market participants and to get a better overview between the different electricity markets. Not desirable arbitrage between the markets might exist and the abuse of market power must be avoided.

NordREG also notices that, according to Nord Pool Spot Market Surveillance, that Nord Pool Market Surveillance receives the information needed from the TSOs, when asking for additional information about activities on the Nordic regulation power market.

In the further work NordREG intends to address e.g.

- roles and responsibilities in monitoring
- level of co-operation between TSOs, regulators and competition authorities
- requirements for reporting and data flows among TSOs, regulators, competition authorities and Nord Pool Market Surveillance.
- needs for common rules and reactions towards the participants not following the existing market rules.

An increased level of harmonization might be a necessity both to improve the functioning of the market and in order to be able to monitor the Nordic regulation power market. NordREG proposes the following issues to be further elaborated by the TSOs through Nordel in cooperation with NordREG:

- common bidding rules, i.e. duration of bids, how near the operational hour should it be possible to change bids, activation time, firmness, conditions for acceptance of bids
- more standardised products
- interaction between regulation power market and primary reserves, i.e. procurement of all reserves (voluntary vs. mandatory bidding)

## **3. A brief description of the Nordic Regulation Power Market**

### **3.1 The legal basis**

#### *EU perspectives*

Within Europe there is an increasing need for regulating power. ERGEG aims to integrate European electricity balancing markets as far as technically possible in order to minimise cost. This will be a long-term goal as there are several obstacles. The medium-term goal is to make balancing markets compatible. The Guidelines of Good Practice on Electricity Balancing Markets Integration (GGP-EBMI) include general principles and detailed rules, as well as a roadmap with proposed options for the integration of electricity balancing markets.

Furthermore the legal basis for the regulation power market, other power reserves and the TSO activities in this relation are stated in the EU IEM directive. It stipulates the following relevant elements:

- The TSO is responsible for the availability of ancillary services (art. 9)
- Any procurement of energy and reserve capacity of the TSO must be based on procedures which are transparent, non discriminatory and market based (art. 11.6)
- Provision of balancing services must be non discriminatory, cost reflective and published (art. 11.7)
- Regulator must fix or approve rules/methodologies on provision of balancing services (art. 23.2)

In addition the EU general procurement rules apply.

The Nordic countries already have a common Regulation Power Market. The legal basis for this market differs between the Nordic Countries. In general there is a weak legal basis for the Regulation Power Market in the different Nordic countries, except for Norway.

#### *Finland*

Finnish Electricity Market Act includes no direct rules relating to the Regulation Power Market. Chapter 4 deals with the system responsibility and balance management, where the legal basis affecting the Regulation Power Market is stated. Terms and conditions on regulation power market are defined in the balance agreement between the TSO and the balance responsible parties. The balance agreement shall be approved ex-ante by the Energy Market Authority.

#### *Sweden*

Also in Sweden there are no laws or regulations directly related to the Nordic Regulation Power Market. Those actors participating on the market must follow the rules and conditions that are written down in the Balancing agreement. According to the Electricity Act a balance responsible party must enter into a balancing agreement with the TSO. The methods applied in order to set the conditions must be approved by the Energy Markets Inspectorate before they are signed.

#### *Denmark*

The implementation of the EU rules in the Danish Electricity Act is so to say done indirectly. § 27.1 states as one responsibility of the TSO to keep technical quality and balance at any time. In accordance with the basic principle of the law not to address the competitive market but only monopoly tasks and public service obligation kind of elements the regulation power market is not addressed. However, the TSO is given a number of requirements and competences and the minister of energy in general can change or specify all these rules. Energinet.dk has laid down the rules on participation in the regulation power market in “guidelines” (“forskrifter”) notified to DERA.

#### *Norway*

The Norwegian market for regulation power is more regulated than the other Nordic countries. The market is operated by the System Operator under Regulations relating to system operator responsibilities in the power system (Reg. no 448 of 7 May 2002). This regulation is issued by NVE under the provisions given in the Energy Act regulations (Reg. no 959 of 7 December 1990) issued by the Ministry of Petroleum and Energy.

The Energy Act Regulations states that: *“Whenever possible, the system operator shall employ policy instruments that are founded on market based principles, including the operation and development of a regulating power market.”* The Energy Act Regulations also states that the system operator may demand that all available regulating capacity in generation and demand shall be bid into the regulation power market.

The System Operations Regulation gives further provisions with relevance on the regulation power market and bidding in the physical markets. It is stated that any market actor, when submitting bids in the Elspot market, shall ensure that they achieve the planned balance between their commitments and rights, including their own production.

The regulations further state that the system operator shall obtain information from the entity with settlement responsibility to uncover systematic violations of the provisions referred to in the paragraph above. Any non-compliance shall be reported to NVE.

It is further stated that if it is obvious that the market is failing to set socio-economically efficient prices within a limited geographical area, the system operator may suspend offers on the regulation power market and make use of reported volumes and electricity spot prices for the area.

#### *The common Nordic Regulation Power Market*

The framework for the co-operation within the Nordic Regulation Power Market is stated in the Nordic system operation agreement. Below follow an overall description of how this market works.

### **3.2 Description of the operations**

The Nordic TSOs are combining their balancing resources for the balancing of the total Nordic system as a whole. The dispatch criterion is the frequency in the synchronous system and the balance on the border to Germany for Western Denmark. The balancing is conducted in such a way that reserves are activated in the area with the lowest cost. Equal balancing prices in the areas result if there are no congestions. Parties with activated reserves shall be compensated for their costs.

A joint list of bids for regulating power is compiled, in order of price, containing bids from all the Nordic countries. The TSOs are responsible for transferring bids in their area to the common TSO information system, NOIS<sup>1</sup>. During the hour the activation of bids is carried out for balancing, i.e. to maintain the frequency or for network reasons, According to the Nordic system operation agreement, Svenska Kraftnät and Statnett are jointly responsible for keeping the frequency and activating necessary reserves. Depending on the frequency situation Svenska Kraftnät and Statnett agree, over the phone, on necessary steps. It is Svenska Kraftnäts responsibility to activate bids in Finland through Fingrid and Eastern Denmark through Energinet.dk. Statnett has the similar responsibility towards Western Denmark. The activation process takes approximately 10-15 minutes.

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<sup>1</sup> NOIS is the common TSO information system for regulation power,. Sometimes the common Nordic Regulation Power list is called NOIS.

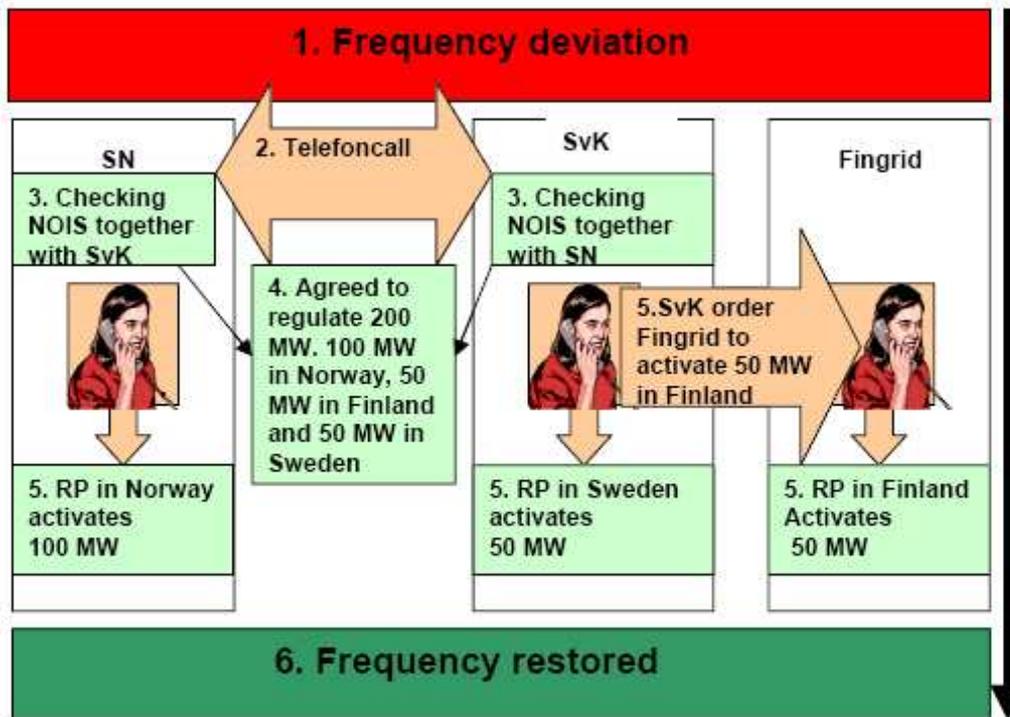


Figure 5: The NORDEL balancing process

To control the frequency of the synchronous system, the bids on the joint list for regulating power are used in price order, with the exception of bids confined behind a bottleneck. The activated bids are marked as activated for balancing and included when calculating the balancing price and volume. For each hour, the balancing price is determined in all Elspot areas. The balancing price is set at the marginal price of activated bids in the joint list. When bottlenecks do not arise during the hour of operation, the marginal balancing prices will be equal. When a bottleneck arises, the relevant area will obtain a balancing price of its own. This balancing price will be decided by the last bid activated in the joint list for regulating power prior to the bottleneck arising.

When regulation is done for internal network constraints in an Elspot area, bids are used from the common Nordic merit order list of regulating power bids, for relieving the network problem in the subsystems. When choosing a bid, attention must be paid to both the price and the effectiveness of the activation of the regulating object behind the bid. Normally the cheapest bids are used in the subsystems relieving the network problem.

There is a need for further harmonisation and a more transparent set of rules and procedures for the regulation power market, in order to increase the effective functioning of this market. Another important prerequisite for a well functioning market is a common gate closure for all the Nordic countries. At present there are different gate closure times for the regulation power market in the different Nordic countries. A common gate closure time is proposed by Nordel as a part of a common Nordic balance management.

Further descriptions of the national regulation power markets are found in Annex 1.

## 4. The current monitoring by the national TSOs

Monitoring includes several elements and it is closely linked to transparency. A good description of the market itself and the operation of this market is a prerequisite for any kind of monitoring. Different levels of monitoring might be:

1. Monitoring of bids and market participants following existing requirements
2. Monitoring of the TSO's operation of the market
3. Monitoring of market actors behaviour in the different markets, cross-market monitoring
4. Monitoring of the overall functioning of the RPM system

The Nordic Regulation Power Market does not have any common monitoring today. The monitoring is realised by the national TSOs, based on the national regulation and responsibility within their country. Beneath are referred some of the comments from the discussions with the national TSOs. It is not a fully description of each country's monitoring.

### Monitoring in Denmark

- Regular monitoring to see if “strange” things have happened. Might be reported to the Competition Authorities. There are certain examples on such reporting, but they have not resulted in specific cases.
- It is monitored ex post that each market actor has performed his up- or down-regulation according to bids accepted.
- A more proactive form of monitoring is being developed. This will even focus on producers not bidding into the RPM, but being potential bidders in the regulation power market.
- Energinet.dk means that it might be obligatory to bid all available capacity into the RPM. This is the case at present in relation to the spot market for market players with a dominant position. However for the regulation power market there might be lack of a legal basis.
- In principle there should be common monitoring when there is a common Nordic regulation list.
- Possibility to monitor is dependent on competence and available information

### Monitoring in Finland

- It is Fingrid's opinion that common monitoring will both be easier and more important after we have got at common Nordic balance settlement.
- It is important to give signals to the participants that there are some rules to be followed and that someone is monitoring it. It is important that the participants can trust that they will be monitored in the same way.
- Physical markets should, according to Fingrid, be monitored together. It is Fingrid's impression that also the market participants would appreciate this.
- Fingrid's monitoring consists of analysis of each balance provider concerning bidding, balance etc. These analyses are sent to the actors as preventing behaviour on manipulation.
- Fingrid measures in real time the power plants and the possible activation time of the power plants involved in the regulation power market.
- It is not Fingrid's obligation to set or intervene the prices neither at the regulation power market.

### Monitoring in Norway

- Statnett is given an own responsibility to monitor the Norwegian bids and prices at the regulation power market. The other TSOs do not have the same responsibility in their countries.

- Statnett investigates “strange” bids and is under specific circumstances allowed to change the pricing of bids.
- Common Nordic rules and procedures for putting the bids into the regulation power list are necessary. A certain and common level of monitoring should be introduced in all the Nordic countries. E.g. the TSOs should be able to exchange necessary information between each other.
- It is not a good solution to make a separate Nordic organisation for monitoring. Monitoring must be done by the national TSOs since detailed knowledge and competence about the data and the grid structure is crucial to be able to monitor the regulation power market. In addition it is crucial to be online with the daily operations at the regulation power market in order to be able to monitor it.
- Efficient monitoring is dependent on information concerning bids in the spot market. The information exchange between Statnett and Nord Pool Market Surveillance is functioning well.

### **Monitoring in Sweden**

- SvK has no obligation or authority to monitor the RPM.
- SvK shall monitor that the participants follow the Balance obligation agreement and address the problems with the balance responsible party. If a participant does not comply with the balance agreement the participant might be excluded.
- It is important to separate the market place and the monitoring.

## **5. Interaction between power markets**

To some degree participation in the physical markets Nord Pool Spot, Elbas and the Regulation Power market are mutually exclusive and in this way interact. Interaction is also a business tool for market actors when optimising their total profit. There might also be some interaction with the financial markets.

On one hand the interaction between the physical markets is part of the competitive forces contributing to socioeconomic optimisation. On the other hand the interaction might be a source of practising dominance – especially if the markets are not transparent and offer all participants symmetrical information. And the interaction also has an important say in security of supply.

Procurement of capacity for the regulation power market (and for other ancillary services) draws capacity and thus potential bids from the spot market (and intra day market) – tending to reduce liquidity in these markets. This should be considered especially if mandatory bidding is applied. This aspect was explicitly addressed when Energinet.dk recently announced that they would stop procurement of long term contracts until further notice. Procurement of capacity influences the spot market (and intra day market) in the following ways:

- Generating units selected for up regulation cannot bid into the other physical markets as they must be ready for increasing production
- Generating units selected for down regulation must bid into the spot-market, as they must be in producing mode in order to be ready for decreasing production. But as they must run in principle they must bid at zero price and thus they are not active participants in this market.

The producer has in principle a daily choice on which physical markets to engage. The considerations will comprise e.g.

- Expected price levels in the markets
- The advantages of marginal pricing (price cross) versus the advantages of “pay as bid” (Elbas)
- Own opportunity costs, including restrictions due to commercial heat supply, start/stop costs

Even if there are certain formal requirements to bid into a market the pricing can be used as a way to aim at producing or not.

Asymmetric information could be a source of choosing market too. If you have a specific knowledge on expected outages it might be profitable to spare generation capacity in the spot market (or even purchase) and subsequently sell in the regulation power market.

The above observations are only a sample of elements which might link the activities of the physical markets. The existence of several physical markets gives opportunities to the market actors to operate effectively in all these markets depending on the characteristics of their production capacity. Some cross market activities will be fully legal, while others might be judged as abuse of dominant position. To highlight this field would require much more work, but it points to the necessity to engage in a comprehensive “cross-market” monitoring – preferably on a cross-country level (Nordic).

## 6. Views on monitoring by market actors

NordREG has during its work discussed the Nordic regulation power market and its monitoring with some market participants, both large producers and brokers operating in all or several of the Nordic countries. Below is referred some of their opinions.

### Opinions on the Nordic Regulation Power Market:

- One large producer is positive to the development from national to a joint Nordic regulation power market. However, there is a need for some additional harmonization. Especially it seems that the "product offers" on the common Nordic regulation power list are not quite comparable. An example is that the West Danish requirement of 5 minutes intervals, instead of hourly, is not an incentive to participate in the regulation power market.
- Concerning capacity payment for thermal power stations this is just "cost coverage" as the units cannot be used in the spot market as long as they must be available for regulation - either by not producing to allow for up-regulation or producing to allow for down regulation.
- Gas turbines and CHP plants are very expensive to start. If it is activated through the common Nordic regulation power list it is hard to know how long it will be in operation. It is then hard to estimate the relevant bid. The producer wants to be sure that the costs will be covered.
- High bids might be cost reflective as they might reflect high alternative costs of units that are costly to activate.
- Sometimes the TSO have to call to the balance responsible parties in order to see whether there is someone that can give a bid. They might then put the bid on max price.
- The competition is not good enough regarding primary regulation (automatically activated frequency reserves)<sup>2</sup>.

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<sup>2</sup> There is today no existing market for automatically activated frequency reserves and they are not included in the common Nordic regulation power list.

- As a balance responsible you are exposed to a big risk. This is possible to handle for bigger market participants, but for small and even medium sized participant it is a big challenge. As an example one company choose not to be a balance responsible in Finland and have now withdrawn as a balance responsible from the Swedish market also.
- The market participants are not treated equally today, the big players have a scale advantage. The two price system favours the big participants.

#### **Opinions on Transparency and Monitoring of the Nordic regulation power market:**

- Several market participants state that the most important concerning monitoring is to increase the transparency. There is little knowledge and transparency on how the market works, e.g. why some bids are activated and others are not even if the price was better.
- There are examples of asymmetric information between market participants - for instance specific "knowledge" of regulation strategy can give the market actor with this knowledge purchase heavily in the intraday market in order to be able to offer up regulation in the regulation power market.
- There are rather few companies that can bid primary regulation (automatically activated frequency reserves). Since the competition is limited, monitoring is needed. If monitoring is efficient it is only needed to check mistakes.

## **7. Shortcomings of the present monitoring**

The activities on Nord Pool Spot and Nord Pool ASA (spot, intraday and financial markets) are to a great extent continuously monitored by Nord Pool Market Surveillance. According to Nord Pool Spot Market Surveillance they receive the information needed from the TSOs when they ask for additional information about activities on the Nordic regulation power market.

However, the Nordic Regulation Power Market is a TSO single buyer market with certain joint aspects (the NOIS list) and certain national aspects (procuring reserve capacity, receiving and possibly evaluating bids etc.). The monitoring of this market is not done in any comprehensive way.

Monitoring elements in principle include several themes:

1. *Monitoring of bids and market participants following existing requirements*
2. *Monitoring the TSO's operation of the market*
3. *Monitoring of market actors behaviour in the different markets, cross-market monitoring*
4. *Monitoring of the overall functioning of the RPM system*

While it is not obvious that non compliance and abuse of any sort is a major problem, the lack of clear definitions of roles and responsibilities could be a problem in preparing for the future. In addition the Nordic aspect of the market will call for cross country cooperation – or even over-national bodies - which were also stressed by most stakeholders during the interviews.

One problem today is that roles and responsibilities in relation to monitoring are not well defined. It seems appropriate that the national TSOs are responsible for monitoring theme 1 and it seems to be like this in practice. To the degree that there will be more harmonization of the framework and elements of the regulation power market some harmonization of the TSO monitoring process might become appropriate too, but it should still be done by the national TSOs according to well defined rules.

Theme 2 formally in most countries is a key task of national regulators, regulators legal competences versus the TSOs, however, differing. There is probably a need for further harmonization as well as a need for operational cooperation between the regulators.

Theme 3 on the market behaviour of market actors is very closely linked to the need for a more comprehensive view on the different physical market interaction. It is obvious that the monitoring of this theme is not very well defined and the level of monitoring seems to be very different among the Nordic countries. Individual national TSOs are the ones with primary access to bids and are the ones who have knowledge about the bidders. On the other hand as single buyers they are themselves an important part in the trade. It will also be hard for the national TSOs to monitor bids cross country (to focus on multinational bidders) and cross market (interaction spot, intra-day, regulation power). Here seems to be a clear call for a much more comprehensive solution. This solution in addition must address roles and responsibilities of regulators versus national competition authorities.

Concerning theme 4 there is a role for national regulators. But as we to some degree have a Nordic regulation market – and this Nordic perspective might be strengthened by way of some degree of harmonization – there will certainly be a need for close regulatory cooperation on a Nordic level. This will subsequently be extended to other European countries as regional and later pan-European integration develops.

## **8. Alternative models for joint Nordic monitoring**

Some alternative models of how to proceed with the monitoring of the common Nordic regulation power market has been discussed within NordREG:

### **National TSOs responsible for the monitoring**

This model means that the national TSOs will be responsible for the national bids and the operational regulations within their country. It continues today's practice with the common Nordic regulation list. To continue with this model implies that the monitoring, or lack of monitoring, will be a national responsibility.

### **National TSOs responsible but with some common rules and procedures for what and how to monitor**

This model means a further development of monitoring practices. The national TSOs will be responsible for the national bids and the operational regulations within their country. There should, however, be developed some common rules and procedures for bidding, operation and activation of bids and monitoring of the common Nordic Regulation Power Market.

### **A common Nordic organisation for the monitoring**

This model implies that a new organization is to be established, with the task to monitor the regulation power market. The advantage of this model is that it would secure the common monitoring in the whole Nordic regulation market. But it might be a problem to establish a new organization with efficient working methods since there are so many different rules and practices in the Nordic countries today. This alternative would require more harmonised rules and practices to be applied among Nordic countries.

### **Nord Pool Market Surveillance responsible for the monitoring**

This model gives Nord Pool Market Surveillance the responsibility to monitor the RPM. This model would secure the common monitoring in the whole Nordic regulation power market and it might be an advantage to monitor the spot market and the regulation power market together. The ownership and organization of Nord Pool may raise some questions regarding this model because Nord Pool Market Surveillance is today a part of Nord Pool ASA which operates the financial power exchange. Nord Pool Spot has outsourced the monitoring of the physical Elspot market to “Nord Pool Market Surveillance” which is a unit within Nord Pool ASA.

Energy regulators, competition authorities, TSOs and Nord Pool Market Surveillance may be involved in monitoring of the Nordic regulation power market. A combination of the different models may therefore be a solution, depending on what to monitor and how the monitoring framework is to be designed, according to the monitoring elements 1-4.

Roles and responsibilities must be further elaborated, as well as the requirement of additional national legislation in order to secure sufficient monitoring.

## **9. Comments from the public consultation**

Through the public consultation NordREG has received comments from: DanskEnergi, Finnish Energy Industry, Fortum, Nordel, Nordenergi, Svensk Energi and Vattenfall. Below follows a summary of the comments from the market participants.

All the received comments from the hearing supports the idea of a common monitoring of the Nordic regulation power market. A majority also highlights that increased transparency is important for monitoring and beneficial to the overall market. In addition it is pointed out by Dansk Energi that monitoring must be based on a solid common regulation and by several that monitoring must be the same in the Nordic area, preferably done by one common body.

Dansk Energi stresses that market monitoring should be separated from the TSO's and be lead by the competition authorities or by a new common Nordic company established for this purpose. Finnish Energy Industry points out that the link to the other physical markets is important and the monitoring of these different markets must be connected. Therefore Finnish Energy Industry points at Nord Pool Market Surveillance as an actual body for monitoring. It is head lighted by Svensk Energi that joint Nordic monitoring is a central issue and that this discussion should be extended in the final report. Fortum also writes that alternative models must be studied further and they mean that implications of a Nordic ISO must be looked at.

Dansk Energi stresses that both sides of the market must be monitored, both selling and buying. They point out that the TSO's also must be monitored based on the fact that they are users of the market and that this might influence the balancing price in a non-transparent way. Further on they argue that the TSO's also reserves capacity on the transmission lines and this influences commercial trade and is a reason for monitoring. A last argument by Dansk Energi is that the TSO's use different methods for procurement of regulation power and it should be monitored if these are compliant to a specific regulation.

Dansk Energi also points out that participants outside the Nordic countries should be looked at in the report, as they are also a part of the market.

It is emphasized by Dansk Energi that increased harmonisation of the regulation power product is necessary and that a common Nordic regulation product definition should be the basis for the common Nordic regulation power market. It is argued that one common product definition will be an important step to a well functioning market and that this should be prioritized and initiated fast.

It is also mentioned by Svensk Energi that the report lacks a discussion of different types of reserves available to the TSO's. They also mention that a discussion on situations with extreme load and distribution of costs of reserves between monopoly and market is missing.

Another input from Vattenfall is the expression of worries of the lack of ideal, or theoretically optimal way of monitoring the TSO's, in this and other respects. They say that the report lack a clear definition of roles between the regulators and the regulated entities. A more detailed plan for goals and institutional setting must be outlined before giving the task to regulated entities. It is argued that describing the current situation is not a good basis for further work. The ideal should be agreed on and then the necessary changes to achieve that can be discussed.

Nordel welcomes the report and would like to contribute to the suggested issues in the report. They do agree that there is a need for a closer regulatory cooperation on a Nordic level concerning monitoring. Nordel clarify in their comments that some TSOs today conduct active market surveillance in the regulation market, and also to some extent in the Elspot market. They express that today Nord Pool Market Surveillance is not an active agent in the monitoring of the regulation market. Nordel headlights that it will be a challenge to establish a new organisation with the different rules and practices existing in the Nordic countries today. They stress that it is important with detailed knowledge and competence about the physical market and daily operations in order to be able to monitor the regulation power market in an efficient way.

The received comments will be taken into account in NordREGs further work concerning monitoring.

## **10. Literature**

Elkraft system paper: "The common Nordic regulating power market (RPM)" 30.03.2004

ERGEG: "Guidelines of Good Practice for Electricity Balancing Markets Integration (GGP-EBMI).  
Ref: E05-ESO-06-08 06.12.2006

ETSO paper: "Current State of Trading Tertiary Reserves Across Borders in Europe" 29.11.2005

Nordel: "AGREEMENT regarding operation of the interconnected Nordic power system  
(System Operation Agreement)" 13.06.2006

Nordel: "Gemensam nordisk reglermarknad (RK-marknad) –tillämpningsregler och principer"

## Annex 1

### Country descriptions of the specifications in the Regulation Power Market.

#### Denmark

The following elements describe the set-up of the rules on participation in the regulation power market:

- The technical quality requirements for generating units to participate in the regulation power market as well as the documentation necessary are described in separate technical guidelines (“tekniske forskrifter”) drafted by the TSO and notified to DERA.
- “Regulation power” consists of manual fast operational reserves for normal conditions. Bids received are included in the common Nordic regulation power list. Danish bids are activated in 2 ways
  - Basically alongside with other Nordic bids on a price basis – in case that there are no network constraints. Energinet.dk will activate/deactivate Danish bids (up- and down regulation).
  - In case of regulation specific for East or West Denmark only those bids on the common Nordic regulation list which concerns generating or consumption units in each of these areas are taken into account.
- Other types of regulation are named “special regulation” and are procured outside the common Nordic regulation list.

Regulation power is procured together with procurement of capacity for other ancillary services. The procurement is basically performed according to EU rules on negotiated tendering. Potential participants in the tender are pre-qualified via a pre-qualification system. The capacity contracts tendered are of 3 types:

- Long term contracts
- Monthly
- Daily (since February 2007)

An appropriate balance of the different contracts is aimed at. Long term contracts will be limited to around one third of the total requirement for ancillary service capacity. It was recently announced that this “ceiling” was reached and that there will be no long term capacity tendering until further notice.

Down regulation reserves are since recently only procured by daily tendering and this market has proved quite liquid.

In addition to capacity for the regulation power market (manual regulation reserve) the following types of reserves are tendered:

- “Primary regulation” (automatic)
- Automatic regulation reserve
- Reactive reserve etc.
- Black start reserve

Capacities selected for bidding for up- or down regulation in the regulation power market is not actively bidding into other physical markets (spot or intraday). The capacity contracts can contain more specific requirements. This capacity is paid a fixed compensation for not being available for bidding in other physical markets. These generation units are eligible for bidding into the regulation power market as individual units or as groups of units. Also other units can bid into the regulation power market, but they will not receive any capacity payment. Bidding is done via the so called Power system NOIS and can be changed until 1 (2 west) hours before operational hour.

Units prepared for up regulation are not allowed to bid into spot or intraday markets.

Units prepared for down regulation must become running and will therefore bid into the spot market with zero prices.

Energinet.dk call on generators having delivered bids to activate/deactivate up- and down-regulation.

There are a number of different monitoring elements in the market:

- Monitoring guidelines on regulation power notified by Energinet.dk  
*Both guidelines on market issues and on technical issues must be notified to DERA. DERA is not to approve the guidelines but can order changes. It is a relatively new area of work for DERA (until recently in Danish Energy Authority) and not much experience has been gathered yet.*
- Generating and consumption units compliance with technical requirements  
*Energinet.dk checks*
- Generating and consumption units compliance with market guidelines requirements  
*Energinet.dk checks*
- Generating and consumption units production according to bids activated  
*Energinet.dk checks ex post*
- Bidding behaviour of participants  
*Energinet.dk performs some degree of monitoring. A more systematic ex post monitoring is under way. Energinet.dk has approached Danish Competition Authority in a couple of cases, but it has never led to any formal case. Interaction with bidding behaviour in other markets is not monitored.*
- The Energinet.dk procurement behaviour in relation to procurement of reserve capacity and regulation power  
*DERA does not monitor on any systematic basis, but will deal with any complaints.*

## **Finland**

### **Regulation power market**

TSO (Fingrid Plc.) maintains the regulation power market in Finland because it does not have regulation capacity of its own to maintain the power balance. Through the regulation power market, TSO can adjust production or loads whenever necessary on the basis of the prevailing operational situation. Finnish regulation power market is part of the Nordic regulation power market. Holders of production or loads can submit electronically regulation bids to the regulation power market concerning their capacity which can be regulated. TSO's balance service agreement gives balance providers a right to participate in the regulation power market. Other holders of capacity can participate in the regulation market through their balance provider or by signing a separate regulation power market agreement with the TSO.

### **Regulation bids**

The minimum capacity of a single bid is 10 MW and it must be able to carry it out in 10 minutes. The bids can be submitted of all resources which fulfil predefined conditions. The bid must state the power, price and location and they must be submitted to the TSO no later than 30 minutes before the operational hour. The bid applies to a whole hour and it can be activated to start immediately from the beginning of the hour or during the hour. The TSO secures the bids by checking if they are abnormal from usual bidding or if capacity is really available and it will be carried out (real time measurement).

#### ***Up-regulation bid***

- Increase in production
- Decrease in consumption
- Owner of resource sells electricity to TSO

#### ***Down-regulation bid***

- Decrease in production
- Increase in consumption
- Owner of resource buys electricity from TSO

The regulation bids submitted to the TSO are delivered to the Nordic regulation power market, where a Nordic regulation bid list is established by placing all regulation bids in price order.

### **Using the regulation bids**

There may be several different power plants behind one regulation bid but hydropower plants are best suited for the regulation power. In the Nordic regulation power market, production or consumption is adjusted up or down, usually on the basis of frequency.

The regulation bids are used in price order as well as this is possible taking into account the operational situation and congestions of the power system. The cheapest up-regulation bid is used first, and correspondingly, the most expensive down-regulation bid is used first.

### **Pricing of regulation power**

The prices of regulation power are determined on the basis of regulations carried out in the Nordic regulation power market. Both an up-regulation and a down-regulation price are specified for each hour. The up-regulation price is the price of the most expensive up-regulation used. However, it is at least the price for price area Finland in Nord Pool Spot. The down-regulation price is the price of the cheapest down-regulation used (at the highest the price for price area Finland in Nord Pool Spot). The prices of regulating power also serve as the basis in the pricing of balance power.

## **Norway**

The system operator, Statnett, has issued conditions for the regulation market. These conditions state that bids in the regulation market for the next 24 hours shall be delivered to Statnett before 19.30 hours. With electronic communication the bids can be changed by 1 hour notice, else by 2 hours notice. When there are documented technical failures or sudden and large changes in inflow, the bidder may withdraw the bid outside these time limits.

The minimum quantity for any bid is 25 MW, and the minimum duration is 1 hour. There is a maximum price limit which is two times the highest allowed bid in the Elspot market at Nord Pool, although the price ceiling shall not be lower than 50 000 NOK/kWh. Any regulation must be possible to effectuate within 15 minutes.

Regulation bids from other Nordic countries are used on equal terms with bids given in the Norwegian market for regulating power.

When there is a need for up or down regulation the bids are used according to the price rank. When there are system technical problems specific bids outside the price rank may be used.

When there are up regulation the most expensive bid used is deciding the regulation price, and when there are down regulation the cheapest bid used decides the price.

## **Sweden**

In order for the Balance services to establish regulating objects the Balance responsible parties must provide a list to the Balance services with facilities that have:

- a production exceeding 10 MW or
- a load shedding (furnace and electricity furnace) exceeding 5 MW or
- other regulating consumption in industries exceeding 10 MW

The list must be updated when changes have been made.

In the Balance agreement for 2007 regulating object plans for production and consumption was introduced.

### **The regulating object plans for production**

A regulating object is defined as one or more regulating facilities that together fulfil a number of criteria, thus, basically, a regulation object is a group of similar facilities that can be regulated.

The regulating objects are divided after different conditions.

- A production regulating object must enclose the same source of energy like water, wind, nuclear power etc
- A production facility with real time measuring cannot be placed in the same regulating object with a production facility without real-time measuring
- A production facility that has a capacity exceeding 250 MW makes one regulating object itself
- Every facility that the Balance responsible party is responsible for and which is part of the peak load reserve should be one regulating object
- Production facilities that have the same source of energy, are located in the same net (settlement) area and have a total (combined) effect in the interval between 10 to 250 MW makes one regulating object
- In each cut area SvK establish a default regulating object for each energy source based on information from the grid owners. If all the facilities and criteria's above are covered there is no need for additional regulating objects.

The sizes of the regulating objects are restricted by the Balance service who decides which production facilities should be placed in each regulating objects. The regulating object plans gives the Balance services more detailed information about how different facilities can be used in order for example to be better prepared for different situations when there are capacity constrains. The dividing into regulating objects gives the Balance responsible parties, who cannot fully attain the requirement described in Balance agreement, possibilities to make supported power with the Balance services.

## **The regulation object plans for consumption**

The regulating objects are divided after different conditions

- Facilities that are part of the peak load reserve make one regulating object itself
- Load shedding makes one regulating object itself

### *Regulating objects in the Nordic Regulation Power List (NOIS List)*

In order to be on the joint Nordic merit order regulation list (NOIS list) every regulating object must fulfil certain conditions which are for example:

- Real time measuring
- be able to start a facility 10 minutes after an order
- smallest volume to bid is 10 MW and the largest is 500 MW
- bids can be delivered, changed and withdrawn continuously 14 days before the operational hour
- bids can freely be changed up to 30 minutes before the operational hour
- an up regulation price is not allowed to exceed 50 000 kr/MWh

In agreement with the other countries TSOs all the reserves should be on the common Nordic regulation power list but must fulfil those conditions described above. The order to activate them is following:

1. the bids that are market based,
2. the peak load reserve and
3. the manually controlled disturbance reserve

There are no obligations to be part of the Regulation Power Market.

### *Regulating objects not in the Nordic Regulation Power List*

Those regulating objects that are not on the joint Nordic merit order regulation list (NOIS list) are those that do not fulfil those conditions presented above. This may change due to different circumstances. For instance, a regulation object containing a hydro plant that frequently is troubled with ice during the winter may not be put on the common Nordic regulation power list during that time of the year, since the 10 min limit cannot safely be upheld. This means that there may be a “reserve” of possible regulation bids that can be called if necessary.

### *The regulation process*

The TSOs have the responsibility for real time balance management. Because the TSOs have no regulation capacity of their own, they maintain the regulation power market. In regulation power market TSOs as single buyers, accept bids - volume (power in MW) and price (€/MWh) - from balance providers or other market participants who are willing to quickly (within 10 minutes) increase or decrease their level of production or consumption. Bids for balance regulation are arranged in a common Nordic merit order price list (NOIS list) for each hour of operation. When the TSOs need to do regulations they can activate the most favourable bids.

When for example a net problem occurs the TSO can search for other bids not on the common Nordic regulation power list in order to see whether it is possible to use another regulating object (special regulation). This however does not occur very often.

### *Price setting*

The prices of up and down regulations set the regulating power price, which is used to settle imbalances between bidding areas and to settle market participants' imbalances. Every hour, the regulation power price is set at the price of latest up or down regulation according to whether the total regulation volume has been. If there have been no regulations, the regulation price is the same as the spot market price.

If there are no bottlenecks, the regulation price becomes the same for all TSO areas. If bottlenecks leading to a price area, the regulating power price for this area becomes different from the neighbouring area.



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