

The Norwegian Security of Supply Situation during the Winter 2002/-03

Part II - Conclusions and Recommendations

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1. Introduction and background

Norway was one of the first countries in the world to open the electricity market to full competition, and has been stated as a successful example to follow for other countries wanting to liberalize their power market. During the winter 2002/03, however, the Scandinavian market design was put on a test with regard to how it would deal with situations of shortage of supply. Following the market failure in California in 2000, security of supply has been a much-discussed issue all over the world. The important question that is being asked is whether security of supply is sufficiently taken care of in electricity markets with full competition.

The European regulators, already having liberalized their energy markets or being in the process of doing so, have also put the subject of security of supply high on their agenda. The Council of European Energy Regulators (CEER), being concerned that deregulated electricity markets might, under specific circumstances not provide sufficient long-term investment signals, has established a Working Group dealing with this issue. As a consequence of the skyrocketing prices in the Scandinavian market due to the tight supply situation appearing this winter, and the heavy public discussions following it, the Working Group decided to investigate the apparent supply problems more thoroughly. A Task Force consisting of the Austrian and Portuguese regulators was established, and the Norwegian regulator provided background information and helped organize the necessary meetings in order to get a good picture of the situation.

The findings from the Task Force have been organized in two separate reports:

- **The Norwegian Security of Supply Situation during the Winter 2002/-03. Part I – Analysis:** The report contains facts and figures regarding the Norwegian, respectively the Scandinavian, power situation during the Winter 2002/-03.
- **The Norwegian Security of Supply Situation during the Winter 2002/-03. Part II - Recommendations and Conclusions:** The report contains the recommendations and conclusions following the analysis of the Norwegian, respectively the Scandinavian, power situation during the Winter 2002/-03.

The EU Commission has also dealt with Security of Supply issues in the draft version of the strategy paper on "Medium term vision for the internal electricity market" distributed for discussions in March 2003. The strategy paper particularly stresses the importance of:

- *Improved interconnection between the member states:* In order to achieve a well-functioning internal electricity market the level of interconnection should be increased. In order to promote this, the decision-making process for regulators, Transmission System Operators (TSOs) and governments need to be clarified and the roles defined. Here a European view is necessary. Furthermore, investors have to be secured certainty with respect to regulatory treatment of profit and losses from interconnector projects.
- *Consistent approach to generation adequacy:* A few Member States, such as the Nordic system, Ireland and Greece, have faced a diminishing generation adequacy over the last years. A consistent approach, which does not have the potential to distort competition, is required to deal with this. So far this issue has been dealt with on a national level in the respective countries. From the point of view of economic efficiency, however, it is clearly of benefit if Member States can share reserve capacity since it means a lower level of reserve is needed in each Member State. The Commission furthermore points to the fact that the generation investment authorisation and planning process in some Member States are unnecessarily tough, and that this process should be streamlined and harmonised throughout the EU.
- *Market monitoring and reporting:* The operation of the electricity market is to be monitored, and an annual report on the overall functioning of the internal market is to be published. This report will include an examination of public service obligations and the supply-demand situation in every Member State every second year.

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2. The Scandinavian situation in light of the EU Commission strategy paper

Although the requirements with respect to security of supply indicated in the EU Commission strategy paper have not been decided on yet, an overview of how these requirements are fulfilled in the current Scandinavian market gives indications with regards to what actions should be made:

- *Interconnections*: The fact that the high electricity prices in Scandinavia during the Winter 2002/-03 were not found elsewhere in Europe indicates that the current interconnection capacity to and from Scandinavia is insufficient, particularly in dry years. New interconnection investments within and to/from Scandinavia are not currently well coordinated on a regional level in Scandinavia. Each country considers these issues relatively individually. The regulatory rules and financial arrangements for investments in interconnection capacity might be clear within each country, but are not harmonized across the borders.

- *Adequate generation:* The Scandinavian countries have no coordinated approach with regard to securing generation adequacy. Whereas the Swedish TSO is allowed to keep reserve capacity, the Norwegian is not. Whereas the Swedes plan on decommissioning their last nuclear power station, the Finns are investing in a new one. The arrangements for supporting specific generation resources furthermore vary between the countries. The fact that the interconnection capacity is insufficient in dry years also raises the issue of keeping reserve margins. It could be that regions with insufficient interconnection capacity are required to have a larger reserve margin than countries with sufficient interconnection capacity. However, this has to be harmonized on a regional level in Scandinavia.
- *Monitoring and reporting on security of supply:* Prior to 2002 there were no monitoring and reporting on security of supply on a regional level in Scandinavia. However, as a response to the tight security of supply situation during the winter 2002/-03 the Norwegian regulator started publishing weekly prognosis in Internet, reporting on the current reservoir levels in different regions as well as possible filling levels depending on different patterns of precipitation. The system impacts with regard to possible congestions were also analysed. The main lesson from this is that more information can be made public in case of security of supply problems. Whether this information should be made public on a continuous basis, or just in case of tight supply situations, is not determined. Furthermore, although data from all Scandinavian countries were included in developing these prognoses there was no coordinated approach on a regional level.

3. Conclusions and recommendations

“Security of supply” means that customers have access to the electric energy at the time they need it. Security of supply requires:

1. Clear and well functioning market design.
2. Clearly defined roles and responsibilities related to security of supply.
3. A broadly integrated market.

3.1. Clear and well functioning market design

Although the tight supply situation in Scandinavia resulted in very high electricity prices, the market still cleared and no supply interruptions were registered. Reduced supply combined with higher consumption should be reflected in higher prices in a competitive market. The high prices also made the consumers reduce their consumption, although the cold weather combined with a dominance of electric heating to some extent limits the possibilities for consumption reductions. Furthermore, there were no visible signs of market abuse.

The Scandinavian spot prices reached very high levels during December 2002 and January 2003. As the majority of the Norwegian household customers have their price linked to the spot price, the household customers benefit from low prices when the spot prices are low, and opposite. During the Winter 2002/-03 they have experienced high prices.

One of the problems of the California market design was caused by the fixed prices to the customers combined with the mandatory pool solution. This let the suppliers (or the Distribution Utility Companies) bear all the risk when the supply situation went tight, facing high prices as buyers in the wholesale market and low prices as sellers in the retail market. The end customers did not face the high wholesale prices caused by the tight supply, and did therefore not respond to price signals that reflected supply problems. In Norway, on the other hand, the end customers faced the high prices of the wholesale market, and did respond to these prices. Therefore, the market worked not only on a wholesale level, but also on the retail level. This is a very important feature of a competitive market and corresponds to economic theory. As the California experience shows, it is dangerous to mess with these mechanisms.

The Norwegian situation has had big repercussions in the media and public opinion with the consequent political pressure. In such situations, there is a danger for short-term actions that might have unwanted and unforeseen long-term consequences.

The most important recommendations related to security of supply and market design can be summed up as:

- Involving demand side reactions through allowing for customer load responses and/or by promoting distributed/embedded generation is essential.

- Refrain from disrupting a market design that works, even when prices spike, as long as there are “reasonable” market responses.
- Remove any barriers to effective competition, since market power often obstructs new entry.
- Provide as much information and transparency to market participants as possible on a continuous basis.

3.2. Clearly defined roles and responsibilities

In the days of the vertically integrated utilities security of supply was supervised by the authorities and implemented by the utilities. Nowadays, there are a lot of agents (generators, network operators, traders, suppliers) and the responsibilities might not be so well defined anymore.

The Norwegian regulator has a formal and central role in contingency planning and organisation. Furthermore, NVE has recently issued regulation plans in case the security of supply in Norway would have to be dealt with through rationing. These plans both have to be in place in order to deal with short term, unforeseen security of supply problems. However, plans for dealing with possible longer-term security of supply issues could also be needed.

One aspect is rules how to deal with crisis situations, such as lack of, or interruptions in, the supply of the primary energy source (for instance coal, oil and gas). The current hydrological autumn has been the driest in the last 70 years, due to the lack of autumn rains. At the end of January 2003, the reservoir filling levels were the lowest ever recorded. The question is, whether this can be seen as an extra-ordinary situation that has to be secured through some extra-ordinary measures or not. Some kind of plans to deal with such situations should be designed, and the stage at which a crisis situation is to be defined has to be clarified. However, any measures of this kind should lead to minimum distortion of the market.

Although there would be periodic price spikes, a fully competitive liberalized market should result in a more efficient industry in the long term, given that the market participants act rational. Rational behaviour can be promoted through providing as much information to the market as possible. As a consequence of the Norwegian

situation during the Winter 2002/-03 some agents think it would be necessary to give the market more information than in the past, through issuing forecasts for the reservoir levels as well as the power system. Defining what is the required information revelation is a task of the regulator in defining the market rules.

In liberalized electricity markets the government defines strategic goals regarding generation mix and consumption structure. The generators will invest in technologies they regard as profitable given the expected price development, at a time they regard suitable. The profitability of the different technologies is not only dependent on the costs of the particular technology, but also through the financial conditions (e.g., subsidies) defined by the government for this technology. The same is the case for different demand side technologies.

Although experts have been forecasting tight supply in case of a dry year for several years, no particular actions have been taken to prepare for such a situation. Not only have several of the planned interconnections between Norway and the Continent been cancelled for financial reasons, investments in new generation have been restricted through environmental decisions. Future investments in new power plants, particularly gas fired power plants, are more expensive than in the neighbouring countries due to the costs of the national environmental requirements. Differences in taxes and transmission tariffs have been mentioned as another element driving the costs of new gas fired power plants higher in Norway than in the other Scandinavian countries. Concerning new hydro power plants, the river protection plan limits the construction of new dams reducing the potential and making the possible investments less profitable. Generators are therefore waiting for higher prices in the future market to trigger any new investments. Analysis show, that both Norway and Sweden depend on import in a normal hydrological year. A diversification of the generation mix could be an appropriate measure in order to prevent situations like the winter 2002/-03.

Not only is the generation in Norway very dependent on one source, the energy systems of the household customers are similarly undifferentiated. Most household customers have electric heating and limited possibilities of switching to other sources as for instance firewood, gas or oil. Promoting more diversified energy systems among the end customers would be another measure that could contribute to a more flexible market. Normally this responsibility is left with the government.

The TSOs (or possibly ISOs) are responsible for the operational security of supply according to defined rules. In order to fulfil its responsibility, the TSOs have to be provided appropriate tools or rights. One such tool that could be considered is allowing the TSO to control some back up generation. The Swedish TSO has, for instance, been allowed to buy power stations that are being decommissioned in order to possess some back up generation. As a monopoly, however, the TSO should not be authorised to intervene on the competitive market. Thus, if the TSO owns some generation plants, or possess some right to use a third party's plant, it may use it only for system related purposes, and not for bidding in the competitive market (after having bought a power plant, the danger is, that it would be used even for other purposes). An efficient way to ensure this may be that the TSO is forbidden to sell any power but for balancing needs.

It is also important to be aware of the fact that security of supply has a short term and a long-term aspect. Short-term security of supply can partly be secured through a reasonable long-term solution for security of supply. Long-term solutions for security of supply would imply securing a well functioning market and a stable power system. However, should there be a short-term security of supply problem, long-term solutions are not useful anymore, and other mechanisms such as "crisis plans" would have to be implemented.

Below the most important recommendations related to security of supply and clear role and responsibility definitions are presented:

- Prepare plans for dealing with, and monitoring, security of supply.
- Define the roles and responsibilities of security of supply in the market.
- Increased transparency for all market participants.
- Responsibilities require the appropriate tools and rights in order to be fulfilled.
- A diversified generation mix and diversified energy systems could contribute to stability.

3.3. A broadly integrated market

Security of supply is addressed most effectively in a broad integrated market, because tight supply in one country can be relieved through exchange with the neighbouring countries. In addition, power systems of different countries would normally be more complementary than a power system of a single country. Even with the relative similar power systems of Scandinavia, this has been confirmed during the Winter 2002/-03. However, a broad integrated market requires an integrated handling of security of supply, involving at least governments, regulators and TSOs. Particularly important in that aspect are:

- Harmonization of market design and rules.
- Coordinated expansion planning, particularly in the transmission grid.
- Coordinated security of supply plans and rules for how to deal with crisis situations.

The Norwegians are, to an increasing degree, dependent on import through Sweden. Security of supply in Norway is therefore partly dependent on how the transmission grid in Sweden is expanded. Dealing with this requires a supra-national solution. Another illustration of why cooperation across the borders is required is in the case of crisis management. Imagine that Norway had interrupted the export to Sweden during the Winter 2002/-03 under the excuse that the lack of water represented a crisis situation in Norway (although the export to Sweden actually was caused by an even tighter supply situation in Sweden than in Norway). This would interfere heavily with the market, and could possibly hamper the long term functioning of the market through lack of trust.

Another important aspect is increased harmonization between the countries, for instance of taxes, tariffs, congestion management and information requirement. A harmonization would contribute to a better functioning market through comparable conditions for the market participants.

Below the most important recommendation related to security of supply and an integrated market are presented:

- The electricity market should be integrated across borders due to the fact that this will contribute to a higher security of supply.
- An integrated electricity market requires integrated security of supply plans.
- An integrated electricity market requires harmonization of market conditions and rules.