

Appendix 1 Main working areas for 2010-2013

Initially, the Market Design programme was concentrated on national (Swedish) considerations. As the work progressed, the focus shifted from the national to the Nordic and, in certain cases, to the European level. This emphasis will continue in this new stage of the work, with the European perspective dominating.

The main working areas for this phase are:

- Integration of the Nordic electricity markets with those in the rest of Europe.
- The effects of various types of climate and energy policy measures on the function of the electricity markets, and the need for changes to the rules in order to maintain an effective market.
- The effects on the electricity market of new methods of metering, monitoring and control.
- The status of consumers on the electricity market.

Within these four areas, we have identified 18 areas of research on which the work to be carried out during the next stage should concentrate.

1. Integration with the rest of Europe

The regulatory structure of the electricity market in the Nordic countries has evolved over about fifteen years. Initially, development was based primarily on a national perspective, although (for example) the rules for entry to the common Nordpool spot market exchange were harmonised at an early stage. Gradually, the focus shifted to shared Nordic market problems, such as the need for investments in the backbone grids, changed methods for dealing with bottlenecks and a harmonised end user (consumer) market. The major challenge in coming years will be to accommodate greater harmonisation of the regulations with those in the rest of Europe, without having to sacrifice too many points that we regard as important in the Nordic countries.

Some elements of the Nordic regulations can probably be advantageously introduced in other European countries, but it is important that discussions should consider the different conditions between countries. The Nordic countries, for example, have much higher proportions of hydro power than have other European countries, and this affects the overall format of the regulations. If we are to succeed in communication with power companies and public authorities in Europe, it will be important not only that we can successfully support our own solutions, but also that we can understand the details of the particular circumstances and problems facing others.

An important part of the work is to acquire a thorough understanding of electricity market conditions in neighbouring countries, and to work with researchers established in these areas.

Questions

- 1.1 What are the consequences of a geographically expanded market area for those involved in the electricity markets, and for the public economy?

The Nordic electricity market will be integrated, in terms of market functions, with electricity markets on the continent, in the Baltic countries and, in the longer term, also in Russia.

The purpose of this project is to investigate the consequences of various integration scenarios between the Nordic countries and neighbouring areas. Which functions are strategically important if market integration is to deliver public benefits?

- 1.2 What is needed for successful integration of the Baltic countries in the Nordic electricity market?

The three Baltic countries have a clear and expressed aim to become part of the Nordic electricity market and to have their own trading area on the Nordpool spot trading market. A cable between Finland and Estonia is already in operation, and another is planned. There are also well-advanced plans for a cable between Lithuania and Sweden. High-voltage links between the Baltic countries are relatively strong. At the same time, the three countries are closely integrated with the Russian electricity market, both physically and through having had, and still having, a considerable commercial exchange of power. Opportunities for trading with Poland will probably also increase in the future.

It is preferable if this task could be carried out jointly by researchers in the Nordic countries and in the Baltic countries.

- 1.3 How are developments in Russia affecting the Nordic electricity market?

For many years, the Nordic electricity market has imported about 10 TWh per year from Russia. What is happening now is that the present trading link between Russia and Finland may be modified so that power can also be exported. Via the Baltic countries, we are indirectly affected by developments on the Russian electricity market. There has also been discussion of a new connection between Russia and Finland, or directly between Russia and Sweden.

1.4 What is happening in Germany, and how does it affect the Nordic countries?

Germany is the country with which Sweden has the greatest trade in electricity. There are direct links between Sweden and Germany and – by no means least important – between Germany and west Denmark. Further links are planned.

Although there are many similarities between the electricity markets of the Nordic countries and Germany, there are also many differences, ranging from the structure of the exchanges, assignments of responsibilities for systems, pricing of unbalanced conditions, metering, reporting and crediting, to incentive structures for new electricity production and network investments.

Both Germany and the Nordic countries are key elements in constructing a common northern European electricity market, so this is an area for which there is a major need for joint development and learning from experience.

1.5 What are the conditions for closer cooperation with Holland?

There has been a direct link between the Nordic electricity systems and Holland since April 2008, and further links are planned.

Holland is well to the fore in the evolution of electricity markets, and is working very deliberately to create an effective electricity market. For example, the country has recently decided on very extensive and ambitious reform in order to develop systems and methods of metering, settlement and billing end users: this, in a market that has already successfully assimilated demand flexibility.

1.6 What new insights do we gain from an integrated view of network pricing, handling of system bottlenecks, investment grants and the organisation of physical trading?

There is often a tendency, when attempting to integrate or merge organisations, systems or activities, to discuss the different parts of the whole separately, which can result in the various rules and regulations not working well together. A clear example of this is presented by the problems of network charges, surmounting of system bottlenecks, organisation of physical trading and inter TSO compensation mechanisms. Projects in this area should investigate how regulations in adjacent areas can be adjusted in order to complement, or work with, each other, and also what benefits could then accrue.

2. The effects of climate and energy policy, and the need for modifications of the rules governing the electricity market

An area of continued importance is that of how the various policy measures intended to counter climate change and to assist energy policy affect the electricity market. Examples of such policy measures include the EU Emissions Trading Scheme (ETS), support schemes for renewable electricity production, regulations and systems for trading renewable electricity, guarantees of origin and environmental labelling of electricity.

The introduction of the ETS, for example, has had a considerably greater effect on the price of electricity than had been expected by many. Another example is that of the consequences that would arise in the event of rapid introduction of wind power. A substantial expansion of wind power would create a considerable pressure for coordinated expansion of the grid, and also affect investments in standby power production plants.

Questions

2.1 What stabilising measures can be taken in order for an effective northern European electricity market to assimilate large quantities of intermittent production?

The purpose of this project is to investigate the need for stabilising actions on the northern European electricity market with the aim of assimilating large quantities of intermittent electricity production. If it is found that there is a need for further stabilising actions, the regulatory framework should favour development in that direction. Our contribution, from within Market Design, can be to explain how different types of regulatory framework influence development.

The first stage is to understand where development is heading, and what consequences can be expected with the present rules. A lot of information can be obtained from previous, current and planned investigations. When this is done we may be ready to formulate a number of concrete questions for further investigation.

2.2 How is the efficacy of climate policy measures affected by regulations governing the electricity market?

An important question is how the rules for the electricity market and climate policy measures can both best be built upon in order to retain the market incentives for emission reductions and improvement in the efficiency of energy use.

One particular discussion area has been that of how the costs of the EU Emissions Trading Scheme (ETS) affect the price of electricity. Up to now, electricity producers using fossil fuels have mostly received their emission rights cost-free from the state. Views have been

expressed that, as the producers receive them free, they should not affect the price of electricity. However, what this is overlooking is that an important point of the ETS is that the rights are transferable. Those rights that a producer does not need can be sold to another producer who has a greater willingness to pay. If there is to be any point in this, the electricity producers who have received their rights cost-free must regard them as having potential value, and must run their power plants only when the price of electricity is sufficiently high to cover – or exceed, rather - both the cost of the fuel and the potential revenue that could be obtained by selling the rights on the market. Investigation as part of the work of the Market Design programme has shown that, in this respect, market pricing of electricity is working exactly as can be expected.

However, the fact that the market is working effectively in this respect does not necessarily mean that the substantial increases in the price of electricity that have resulted from ETS have been desirable from a political point of view. In particular, many have been unhappy about the shift in the balance between producers and consumers, and about possible profitability problems for electrically-intensive industries in Europe. The suggestion has even been raised that the price-determining mechanisms on the electricity market must be changed in order to prevent high CO₂ prices from distorting the market as much as they do today. There are, for example, concrete proposals to change the way in which spot prices are set on Nordpool in order to prevent CO₂ prices from playing such a large part. On the other hand, there are those who claim that it would harm the effectiveness of climate policy to take steps to reduce the effects of CO₂ price on electricity prices.

These questions are naturally too extensive for this programme alone to tackle them, but we can doubtless make a contribution to so doing.

2.3 How are competitiveness and investment affected in various parts of Europe by climate policy measures?

Climate policy measures affect consumers and producers in different ways, depending on how the regulatory framework governing the electricity markets is structured. The extent of deregulation, or different types of price control, can for example have considerable effect on the willingness of companies to invest in climate-neutral production. This, in combination with an increasingly open electricity market, can give rise to substantial losses in market efficiency for the EU as a whole, and affect our common costs for achieving climate targets. Even if the climate policy measures are effectively designed, they may have undesirable effects on investments unless the regulatory framework of the electricity market is harmonised in an appropriate manner. Identifying market weaknesses and discussing possible solutions can thus lead to both a more efficient electricity market and more effective climate policies.

2.4 How do different types of subsidies for renewable electricity affect the electricity market?

Policies employed by the various European countries, and the EU's common policies, for increasing the proportion of renewable energy production in Europe mean that renewable electricity production today is heavily subsidised. The commonest method of subsidy is that of feed-in tariffs, with other methods including green certificates and investment grants. In addition to national support and incentives, there is some opportunity for trading green electricity between countries.

The structure of these rules has both direct and indirect effect on the function of the electricity market. High payment per unit of energy¹, for example, encourages the operators of these plants always to produce as much energy as possible, even if the market prices are very low or even negative. This can have serious effects on other types of market investments.

The form of policy measures for renewable electricity production also affects investors' risks, whether investing in green electricity or in conventional electricity production.

2.5 How is the pricing structure of electricity and the need for publicly financed reserves in the Nordic countries affected by large quantities of intermittent electricity production?

The introduction of large quantities of renewable electricity production can have major effects on the pricing structure of electricity on the Nordic electricity market. Today, fossil-fuelled power production determines the cost of marginal production, but could be displaced by electricity production having low or even negative marginal costs.

Up to now, the electricity market in the Nordic countries has been able to operate as an "energy-only market". Will this be possible with large quantities of intermittent power production? Will it be necessary to establish special capacity markets? Or will investment in wind power and new links to the continent actually improve market conditions for commercial peak load production?

2.6 Which regulatory frameworks should control network investments?

An important Market Design question is that relating to the regulations and principles controlling network investments. The greater volumes of international trade that have followed in the footsteps of the new regulations governing the electricity market have put the high-voltage grid operator companies under pressure to expand their infrastructures. The need for capacity increases will be accentuated over the next decades as a result of the EU's renewable energy policy. However, deciding on sensible investments in grid capacity is no easy matter, whether in the higher realms of theoretical consideration or in practice.

The profitability of any network investment depends on regional imbalance between supply and demand for power, which can be expected to vary widely over the life of an investment.

¹ Note: unit of energy (kWh), not unit of power (kW).

There is also some degree of dependence between investments in power plants and investments in networks. Although a given regional imbalance can be solved either by investing in a power line or by building new production capacity in the region, achieving an optimum result requires the two measures to be coordinated, which is often not possible. The Nordic grid operators have come a considerable way in the work of identifying common strategies for decision-making on, and financing of, central investments in networks, but this work needs to be pursued in greater depth. The next step is to coordinate their work in order to extend to continental Europe.

Another problem is that network investments affect the market pricing structure, and thus give rise to redistribution of asset holding values. The costs and benefits of an investment seldom affect the same individuals, or even individuals in the same country. It is therefore very much a matter of interest as to who will pay for investments in network infrastructure. Substantial expansion of wind power production, for example, will require major investments in the grid. Should these investments be charged to the owners of the wind power plants, or should the costs and risks be spread in some way over all parties on the electricity market?

A further question is that of who should be allowed to invest in networks. This question has been raised in many different contexts concerning what are known as “merchant links”, i.e. lines built and operated by others than the dominating network owners in the area.

3. The effects on the electricity market of new technology for metering, monitoring and control

Several projects in the Market Design programme have been looking into the opportunities presented by modern communications technology. We have, for example, conducted a number of field trials to test tariffs, technologies and business models for greater customer flexibility. We have also looked at the regulations governing hourly metering and hourly balance settlement, as well as at the question of who should be the contact point for the end user: the network owner, the electricity supplier or, as today, both of them. Development in this area is rapid, and discussions concerning smart grids, large-scale introduction of electric vehicles, plug-in hybrids and large quantities of wind power mean that these matters are becoming increasingly relevant and important. At the same time, this also means that they are being discussed in several different research environments, and that coordination with other working areas is important. The contribution that the Market Design programme can make is to look at the various areas from a market point of view, i.e. investigating how the regulations should be constructed in order to enable the electricity market to operate as efficiently as possible.

Some of the hopes for the new technology are that consumers should be able to play a part in power system control, that the efficiency of energy use should be improved, and that the network companies should be able to operate their systems more efficiently and with greater security of supply.

Questions

3.1 What do “smart grids” mean in a Market Design perspective?

“Smart grids” is an umbrella name for the development that has now started of integrating local production, customer flexibility and advanced IT systems in local networks. Although this has major potentials, it also presents challenges, not least as far as drafting the necessary regulations is concerned.

3.2 How is the full potential of customer flexibility to be realised?

The value of flexibility will increase as time goes on. This will be expressed in the market in the form of more volatile prices on the spot market and greater price differences between the spot market and the real time market.

The introduction of monthly meter readings paves the way for simpler billing and better information to help consumers to monitor their electricity use. The next steps will be to develop new types of tariffs and to apply the new metering and communications systems to help consumers to control their electricity demand. Several benefits will accrue if better use can be made of the potential flexibility in the consumer collective than is made today. Security of supply will improve, the risk of substantial price swings will recede, the risk of producers with dominant market positions abusing their power in order to control prices will decline, and acceptance of wind power will increase.

Previous Market Design projects have presented a number of actions to facilitate hourly metering. Ways in which the regulations should be designed in order to assist favourable development must be under constant review, particularly in the perspective of continued Nordic and northern European harmonisation.

3.3 What changes to the regulations are needed in order to permit micro-production?

Widespread introduction of local small-scale electricity production presupposes that the networks can physically handle the production, and also that it can be credited in an acceptable manner.

4. The status of consumers on the electricity market

An increasingly important question in step with evolution of the electricity market is that of the status of the end users of the electricity – the consumers. The overarching question is that of the situation of customers on a market of this type. Seeing the customer perspective is naturally vital to all activities within the framework of Market Design. The underlying purpose of the electricity market is not primarily for the benefit of producers, network owners or electricity suppliers, but to assure customers of reliable supplies, with minimum environmental impact, at reasonable prices. However, nothing is lost by paying particular attention to certain special customer aspects.

Questions

4.1 How can customers' positions on the electricity market be strengthened?

A lot is happening just now in the field of European cooperation. An example of such cooperation is that of the London Citizens' Forum (<http://www.sustainablelondon.org.uk/contents.htm>). Areas covered include protection of vulnerable customers, price comparisons, provision of information to which customers are entitled, one or two contact points with the market, and other aspects. A new directive, the Consumer Rights Directive, is on its way, and will be mandatory on member states. One of the requirements of the Directive may be to specify what information electricity bills must show, and how it must be presented.

4.2 What about the integrity aspects of AMM systems?

The new Advanced Metering Management (AMM) systems permit large quantities of information for each household to be collected, saved and distributed to various parties. Much of what can be done is probably in customers' interests, but there is a clear risk that the customers will regard some of it as an infringement of their privacy. It is therefore important that clear rules should be formulated at an early stage.

4.3 Should consumers have one or two contact points for their electricity supplies?

Electricity consumers in the Nordic countries have contacts with both their network company and their electricity supplier. This differs from the situation in the rest of Europe, where it is common for end-user consumers to have contact only with their electricity supplier. A feasibility study as part of the work in an earlier stage of the Market Design programme has



assessed the benefits and drawbacks of the Nordic model in comparison with those of the European model.