



Strategy Plan 2012

Introduction



Realisation of the objective to make Denmark independent of fossil fuels marks a paradigm shift for the entire energy system and thus also for the Danish society. The objective sets the direction of the development of the Danish energy sector in the coming decades.

The prevailing consensus in Denmark in the energy area among the parties of the Danish parliament, business sector and the green organisations is unique in Europe and is noticed in the countries surrounding us. The consensus creates a solid foundation for (the) changes in the years to come.

Denmark has quite considerable renewable energy resources at its disposal, particularly wind power and biomass. There are sufficient energy resources to cover Denmark's total energy consumption, especially if the biomass is used intelligently. However, the transition to an energy system based only on renewable energy holds many different challenges and will not be realised just by continuing the current development.

The primary focus on wind power and biomass requires a fundamental transition of the entire energy system. A transition which is initiated by the latest energy agreement and which Energinet.dk will support actively through the initiatives included in this Strategy Plan.

The transition facilitates new possibilities for development of the energy sector and for a green business development. The key to the transition can be expressed in one word, flexibility. The transition presupposes that we are able to move energy in

time, space and between systems, in order to meet the energy demand of the consumers and the business sector at any time.

Today, the energy consumption makes up approx. 20% of the total energy consumption; this figure is expected to increase in the coming decades to between 40 and 70%, dependent on how large a part of the transport sector's energy consumption is transformed to electricity. The majority of the Danish energy consumption is in the long term expected to be based on electricity from offshore wind farms. With the energy agreement, the share of wind power in the power consumption is expected to make up approx. 50% already by 2020.

In order to support incorporation of wind power in the energy system and thus increase the market value of wind power, greater flexibility in both production and consumption of energy is decisive. This is to be ensured by developing the markets where the energy is traded. At the same time, the increased amounts of wind power require alternative supply routes in the periods where the production from the wind power is low. In the short term, it must primarily be ensured by means of extension of international connections.

At the same time, Energinet.dk assesses that an increased cooperation between the heat, gas, power and transport sector can contribute with the necessary flexibility. In the long term, an efficient use of wind power will require storage of energy, and in this connection, the existing gas and district heating system holds a number of unique and interesting opportunities.

The flexibility must to an increasing degree be based on development of the European energy markets. The wholesale market for electricity and to an increasing extent also gas is well-developed and thus creates the setting for a socio-economically effective exchange of energy. Next step is development of a cross-border retail market, which can be very important to the development of Smart Grid solutions. Energinet.dk is at the same time working on facilitating cross-border trade of ancillary services. Energinet.dk needs these services in order to ensure balancing of the power system and to maintain high security of supply.

A precondition for a cost-effective transition is that the energy consumption starts responding to the prices. Therefore, it is vital that it is possible for the consumers to respond to the prices. The extension with wind power will create large amounts of fluctuating power production which also leads to more fluctuating prices. The consumers can take part in incorporating the wind power. In other words, Energinet.dk will look for solutions to the flexibility challenge in a European, market-based perspective.

Until 2020, one of the most important means will be to support the market development and security of supply through establishment of international connections. Concurrently with the increase in the share of fluctuating international production, the socio-economic rationale of integrating the heat, gas, power and transport systems and bringing the resources into play, as regards supplying the flexibility, is increased.

The Strategy Plan gives a number of overall suggestions as to how this cooperation is going to play out. However, the most considerable transition, which will be the result of the energy policy objectives, requires that new regulatory settings for the cooperation between the heat, gas, power and transport systems are developed. Several of the answers as to, how the future setting regarding regulation must be designed, will be found based on the wide number of analyses in the energy agreement.

It will be an important task to coordinate the analyses in order to form the settings for the further development of the energy system and to develop shared solutions in the business to the challenges of the energy sector. Therefore, it is one of Energinet.dk's most important tasks to contribute to both the processes initiated in connection with the energy agreement and to the future solutions. The analyses of the energy agreement should form the setting for how the future cooperation between the heat, gas, power and transport systems can support the need for a total market based flexible energy system.

The Strategy Plan describes the overall direction and Energinet.dk's contribution with development of the electricity and gas systems.

The Strategy Plan supports Energinet.dk's objectives of maintaining the security of supply. The electricity and gas markets are continuously developed in order to support the incorporation of renewable energy as well as contribute to making the transition of the energy system socio-economically cost-effective, all with an aim towards 2020.

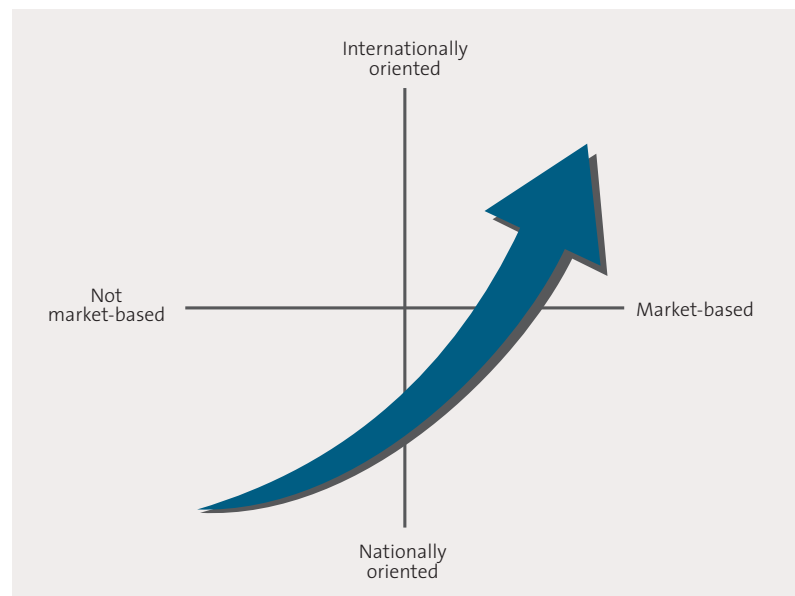


Figure 1. The movement of the Danish energy system towards international and market-based solutions.

Subsequently, the Strategy Plan gives a more overall description of how Energinet.dk in cooperation with authorities, market players and other stakeholders prepare the infrastructure and market design for the period after 2020. These initiatives must support an energy system in 2050, which is independent of fossil fuels. In order to ensure maintenance of the security of supply towards 2050, design and development of the electricity, gas and heat systems are considered, which also supports the 2050 objective in a socio-economically effective way. These are all conditions to be considered in the solutions chosen already in the near future.

Well-functioning international markets are a considerable element to ensure the security of supply. A precondition for well-functioning markets is that the infrastructure is sufficiently developed and that the market settings are in place. The last 10-15 years have been characterised by a gradual development of the power and gas markets in direction of internationalisation and market-based solutions. The wholesale market in north-western Europe is relatively well-functioning. The next step is to create international settings for the retail and trade market with ancillary services. Development from national and regulated to international and market-based solutions is illustrated in Figure 1.

Energinet.dk has the following objectives in Strategy Plan 2012

- Maintaining the security of supply
- Effective transition – socio-economic investments
- Effective transition – increased operational efficiency

- Effective transition – market-based solutions
- The consumers' contribution to flexibility through development of cross-border retail market
- The gas system must be developed to include RE gases
- Flexibility through new cooperation and business models
- RD&D which supports flexibility and intelligence.

Maintaining the security of supply

From an international perspective, Denmark has a very high security of supply of electricity and gas. Energinet.dk focuses its efforts on maintaining the present high level, although the present conditions are changed concurrently with transition of the energy supply. The system adequacy is ensured until 2020 primarily by a diversified extension of the electricity infrastructure towards the surrounding countries, so that Denmark will not become dependent on the capacity situation of a single country. A diversified extension of the international connections will together with the expected development in the domestic production maintain the security of supply until 2020. At the moment, Energinet.dk investigates the development of the electricity infrastructure towards Norway, Sweden, Holland, Germany and Great Britain as well as development of the gas infrastructure to Germany.

Effective transition

The regulation of Energinet.dk forms the settings for the optimisation criteria, which the company must follow. Within this setting, Energinet.dk's objective is to contribute to an efficient transition of the Danish energy system. The objective is realised in three areas:

1. Socio-economic investments

Traditionally, decisions about infrastructure investments in the energy area in Denmark are based on socio-economic analyses. Expanding the energy infrastructure is a prerequisite in order for Denmark to reap the socio-economic profits by developing the European energy market. Energinet.dk expects that Denmark's integration in the European energy markets will require further up to 2,000MW international connections within 2020.

2. Increased operational efficiency

It is Energinet.dk's objective to increase the efficiency in the operation of the electricity and gas systems. This will among other things take place by using economies of scale arising when Energinet.dk in the coming years will invest approx. DKK 30 billion in extension of the electricity and gas system towards 2020. It is Energinet.dk's objective to make the operating expenses more efficient in relation to the total assets by 5% per year. At the same time, it is Energinet.dk's objective to be among the best in relevant benchmarking analyses.

3. Market-based solutions

Finally, it is Energinet.dk's objective to ensure well-functioning international markets and is among other things through ENTSO-E and ENTSG working on creating the right settings. Effective competition contributes to private consumers, the public sector and the business sector getting energy at the lowest possible cost. Besides the work on improving the competition on the wholesale and retail market, Energinet.dk has set specific targets for marketing procure-

ment of ancillary services by creating cross-border competition on supply of the services. The expected effect is that the system tariffs paid by the consumers are reduced. The expectation is that the costs for purchase of ancillary services and other energy costs can be reduced by DKK 250 million in 2020. Similarly, the Danish producers will over time get access to larger markets and thus be able to compete with foreign producers.

The consumers' contribution to flexibility through development of cross-border retail market

The wholesale markets for electricity and gas are to an increasing extent internationally connected and generally well-functioning. Next step is to develop the retail market. In the coming decades, when there will be an increasing degree of electrification in the energy system and thus an increasing consumption of electricity as well as increased price fluctuations, it is important to develop the retail market for electricity. It must form the basis of the development of flexible electricity consumption through deployment of Smart Grid technologies. In the longer term, the retail market for gas must also be developed.

Energinet.dk cooperates with the market players on the electricity market in charge of developing DataHub. The expectation is that it may be an important contribution to the development of more efficient and in the longer term also more cross-border retail markets. Therefore it is an important building block for the foundation of the consumers' possibility to deliver flexibility.



The first version of DataHub will be commissioned in 2013 and will include consumption and structural data all electricity customers. By 2014, DataHub must support the so-called wholesale model, which among other things means that the consumers will only receive one electricity bill; also if they change power company.

It is Energinet.dk's ambition that the Danish DataHub solution and the related market design can function as role model for development of a North European retail market, in the same way as the Nordic day-ahead market has served as model for the European wholesale market.

The gas system must be developed to handle RE gases

In the last few years, the importance of the gas system has become more evident. Increasing attention has been paid to ensuring that the gas system can be used for transporting other gases based on renewable energy and thus not only for transportation of natural gas.

Energinet.dk is working on the development of the settings for including RE gases in the transmission grid, nationally as well as internationally.

The gas system is a central bridge builder on the road towards the renewable energy system. In the fossil fuel-free energy system with large quantities of fluctuating energy production, the role of the RE gas, and thus the role of the gas system, is assessed to be of great importance in relation to ensuring cost-effective seasonal storage and flexibility. Furthermore, the gas

today is an economic alternative in several situations, eg for individual heating.

The transition from the present gas system to a more RE-based gas system must be based on detailed analyses and planning to ensure that the gas system can contribute to the long-term socio-economic solutions. The possibility for this is created with the analysis of the future role of gas, which is included in the energy agreement.

Flexibility through new cooperation and business models

The significant need for flexibility in the system must be created by developing new business models. With the coming amounts of fluctuating production and the appurtenant fluctuating prices, it will become valuable to be flexible. Energinet.dk will, as responsible for the security of supply in the electricity and gas area, naturally be responsible for providing the information needed by the market players within power, district heating and the gas sector to develop new business models, which can facilitate the flexibility. The value of flexibility must be clarified and thereby be further marketed.

The flexibility of the future must be created through efficient interaction between the heat, gas, power and transport sector. The district heating sector and the gas sector hold very significant possibilities to function as storage for wind power. Similarly, it will be possible to develop the future transport solutions in cooperation with the power and gas sector.

Energinet.dk will in cooperation with the market players on the energy market form the solutions of the future. Energinet.dk already has well-functioning forums for cooperation with the market players within the electricity and gas sector, a cooperation which Energinet.dk will take the initiative to extend further.

Energinet.dk also has a continuous cooperation with the Danish municipalities, a cooperation which with advantage can be extended.

The municipalities play an important role in relation uniting the sectors within gas, heat, transport and power. In this connection, Energinet.dk develops a new model with the purpose of identifying the socio-economic consequences of different energy-related measures. The tool must be able to illustrate the economic aspects of among other things increased use of flexibility in the gas and district heating system. Thereby, it can contribute to illustrating how the municipalities and the national strategic energy planning play together in the best possible way as regards ensuring long-term holistic and economically effective solutions.

RD&D supporting flexibility and intelligence

The transition of the energy system which to a far greater extent must be based on renewable energy requires development of new technologies, regulatory and market-related solutions. It should be done within energy efficiency improvement, increased electrification of the energy system, Smart Grid and automation of the energy system, transport solutions and

within the heat sector. It is important that the solutions developed through the RD&D effort support this development of the energy system. This may among other things be solutions which to a greater extent can support the interconnected energy system and the power system's need for increased flexibility and intelligence (Smart Grid). Therefore, Energinet.dk takes an active part in RD&D initiatives, both in the form of supporting external energy research through PSO financed programmes and through Energinet.dk's own RD&D activities. Energinet.dk's RD&D activities are carried out in broad cooperation with external market players and research institutions, both nationally and internationally. The international cooperation opens up the possibility for finding solutions that are not only adapted to the Danish infrastructure, but also can be used in a European interconnected energy system.



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