New Report:

Future-proof Control of the Danish Electricity Sector

A patchwork of enterprises operate the Danish electricity supply business. The enterprises are owned by the state, by municipalities and by cooperatives. The common framework is the legislation on electricity, heating and environment.

There is political consensus on the energy policy in Denmark. The long-term goal is phasing out fossil fuel before 2050.

The enterprises in the electricity supply business are loyally supporting the political targets. Nevertheless, a political energy agreement from 2012 includes a decision on an in-depth examination of the regulation of the Danish electricity sector. The new 196 pages report in Danish[1] is the result of the examination.

The purpose

According to the political agreement, the purpose of the examination is to create incentives for green transition, cost efficiency, competition and consumer protection. These goals are not new. The committee should address

- the performance of the electricity market,
- the commission of the grid companies
- the commission of the Danish TSO[2],
- the duty to supply electricity,
- concession rules,
- barriers to efficient transition to renewable energy,
- the organisation of energy saving.

The essential considerations are:

- predictability for investors,
- competition and consumer protection,
- manageability, and
- robustness

So far, the Danish state has also been very eager to maintain its yield from energy taxes. This implicit consideration may conflict with cost efficiency compared with other countries.

The need for the examination suggests that the present regulation is unsuited for an appropriate support of the green transition.

This note will address only security of supply (main recommendations 11 and 12).

[1] Udvalg for el-reguleringseftersynet: En fremtidssikret regulering af elsektoren, Afsluttende rapport – december 2014

[2] Transmission System Operator (Energinet.dk)

Main recommendation no 11:

A stronger framework for monitoring security of supply

The report recognizes that thermal power plants are facing increasing economic problems. It has become obvious that the valleys in the fluctuating renewable power output are insufficient as demand for the thermal power stations. The transition from fossil fuels into expensive biomass will further weaken the competitiveness of thermal power plants.

Decreasing amount of dispatchable capacity will be a challenge to security of supply. The planning of measures for maintaining the present security of supply will require a clarification of the meaning of security of supply. The traditional definitions will not be sufficient for a systematic approach.

The average interruption time for supply nodes at 1-25 kV level in Denmark was:

Origin	2002-2012	Energinet.dk target
	Minutes per year	Minutes per year
400 kV or system faults	13.0	20
Transmission	3.6	
1-25 kV	32.5	
Sum	49.1	

Only two events in 2002 and 2003 caused the interruptions at 400 kV level.

The report stresses that the present regulation does not clearly indicate the distribution of responsibility for security of supply.

The recommendations include:

- The law on electricity supply should define security of supply for electricity.
- Energinet.dk should prepare and publish annual statistics on the development of security of supply.
- Energinet.dk should prepare an annual report on security of supply for the minister.
- It should be the responsibility of Energinet.dk to maintain reliable fault and interruption statistics.
- The distribution of responsibility for security of supply should be clearly defines by law.

The report specifies seven items, which should be included in the report for the minister such as historic data, current capacity situation, adequacy and reliability of the transmission system, system security in East and West Denmark, estimated interrupted minutes the next ten years, anticipated development beyond 10 years and recommended possible measures for changed security of supply.

These initiatives will probably improve the future reliability of electricity supply and certainly improve the public understanding of the challenges. The need for information on present and future security of supply is so obvious that Energinet.dk could have made it on its own initiative long time ago.

Main recommendation no 12:

Clear rules for providing capacity

The energy only-markets will not provide sufficient dispatchable capacity in the future for maintaining security of supply at the present level. The report mentions three other sources of capacity:

- Interconnections
- Paid reserves/capacity mechanisms
- Flexible electricity demand

Interconnections are important, particularly for small countries. The access to capacity from neighbouring countries at reasonable prices depends on an evaluation for each case. Neighbours with high wind power penetration will have shortage and surplus of power at the same time as Denmark.

The flexible electricity demand will be developed, but the implementation will be slow, and the effect will be insignificant for several years.

The capacity mechanisms have recently attracted considerable attention in Europe. A capacity mechanism is another source of income to owners of dispatchable power plants (or other types of resources) and an additional cost to electricity consumers. The report explains three different capacity mechanisms:

- Strategic reserves: A reliability ensuring body, usually the TSO, pays capacity owners for having a certain capacity available, when needed.
- Capacity market: Different models for capacity trade.
- Capacity payment: Centrally managed payment to owners of power plants and interruptible demand.

Recommendations (translated):

- Energinet.dk and the Danish energy Agency can decide to provide sufficient capacity for maintaining security of supply by keeping power plants in the market. Criteria and procedures for such actions must be determined. The procedures must include rules for setting a compensation to owners of this capacity.
- Framework and criteria must be established for the implementation of a capacity mechanism in order to guarantee a sufficient production capacity, if this at any time should be considered necessary.

In my view, these measures are self-evident, but they will not necessarily lead the way to clear rules.

It will probably take further careful analyses and considerations to find the optimal replacement of the present generation of dispatchable power plants. Therefore, there will be good reasons for thorough information and public debate on the future capacity problems.

The real challenges of the green transition must be highlighted

Good intentions were driving forces behind the Danish transition of the power system away from the use of fossil fuel, but the planning has been insufficient. It was easy to define 50% wind energy as a target for 2020, but there has been only little attention on the other 50%.

It seems to be surprising that thermal power plants are closing down long before anticipated, because they cannot operate profitable by filling the valleys of the fluctuating wind power profile.

Once combined heat and power (CHP) was a carrying element of Danish energy policy. Now the closure of power plants before the end of their technical and economic lifetime will force district heating systems to find other energy sources.

So far, the technical and economic challenges have been played down. There has been an expectation that the strong interconnections would guarantee the security of supply and that somehow the other problems would be solved.

The new report indicates a recognition of the magnitude of the challenges. Therefore the report can be useful and maybe inspire a more thorough planning and particularly much better public information.

The need for capacity mechanisms and new interconnections indicates additional costs, which the electricity consumers must pay.

An interesting report from the Rockwool Foundation[3] has analysed the additional cost of producing wind energy in Denmark during the years 1998-2011. According to the report, the average difference was 12%. This may be a reasonable cost for the reduced carbon emission.

It should be rather easy to calculate the reduction in carbon emission from the Danish electricity sector in order to find a reduction cost per ton CO2. The result could be useful, not only for public information, but also for comparing new measures for carbon reduction in order to optimize the efforts.

Hopefully, a new regulation can contribute to a more transparent planning and lead to rational solutions without too much sunk cost.

[3] The Cost of Producing Electricity in Denmark, November 2014, http://en.rff.dk/publications/external+research/publication?id=1944