

Single-track political ambitions:

## New Danish wind and solar projects abandoned in 2024

All political parties are green. Most believe that building more wind turbines and solar cells will benefit both the climate, security of supply and Danish businesses. But more is needed. Investors have discovered that there are no buyers for the irregular electricity production, and now they are hesitant about investing.

This was evident in 2024 by financial problems for solar energy developers and by the fact that no bids were received in the state tender for 3 GW of wind power in the North Sea.

This should lead to a complete reassessment of Danish energy planning, but neither authorities nor politicians seem to be considering this option. People are reluctant to face reality and apparently hope that the problems are temporary. However, there is a chain of causes that must be understood and acknowledged in order to avoid excessively large economic losses.

### **The electricity market warned of supply problems in Denmark**

There have long been clear signs that the Danish electricity market was out of balance. Electricity market prices reveal this if you look at the development over a number of years.

One of the clearest signs of an unfortunate development is that the average price for electricity imports since 2010 has grown steadily, while the value of electricity exports has fallen correspondingly. The uneven Danish production of wind and solar power has been smoothed out by the import and export of electricity. Around 2010, import and export prices were at the same level. In 2024, the price for electricity imports was twice as high as the export price per kWh. It has become expensive for Denmark to have to buy smoothing for wind and solar power abroad.

This is because neighbouring countries have also installed wind and solar power to a significant extent. There is a high concurrency for wind and solar power in Northern Europe. As a result, the price of maintaining the balance between production and consumption is increasing in line with the overall growth in weather-dependent production.

The problems in 2024 apparently came as a surprise to authorities and companies. The electricity market's warnings came from 2023 in the form of a sudden increase in the number of hours when the price in the spot market for electricity became zero or negative. The number in Western Denmark has grown from 47 hours in 2022 to 424 hours in 2024 and in Eastern Denmark to 320 hours. For Germany, the number was 521 hours in 2024.

In Denmark, the specific reason was that solar cell capacity grew by 75% in 2022. In contrast to wind power, solar cells only deliver energy in the middle of the day, when electricity consumption is highest. This has resulted in good average prices until the summer of 2023, as the sum of wind and solar power often resulted in a surplus of electricity and thus low prices in the middle of the day.

In Denmark, the market value of solar energy fell from 102% of the value of electricity consumption in 2022 to 80% in 2023 and 66% in 2024. The loss of a third of the commercial

value of production in just two years worried investors, and they canceled new projects where possible.

The excuse is that Denmark's electrification has been slower than expected, but there is also a reason for this.

### **The idea of energy islands was not investigated well enough**

The first thoughts about an energy island in the North Sea were launched half a dozen years ago by a consortium of Energinet from Denmark, TenneT from the Netherlands/Germany and Gasunie from the Netherlands/Germany. The vision was that an artificial island on Dogger Bank should be a joint project for the nations around the North Sea. The island should be a collection point for the production from a large number of wind turbines in the area on and around Dogger Bank.

Most of Dogger Bank is located in the British part of the North Sea, but since the British were not involved and have not shown interest in the concept, it was moved to the Danish part of the North Sea. Here the water depth is somewhat greater than on Dogger Bank, which weakened the whole idea accordingly.

In June 2020, it was decided that two Danish energy islands should be built in the North Sea and the Baltic Sea, respectively. In January 2021, Cowi presented "Cost benefit analysis and climate footprint of energy islands in the North Sea and the Baltic Sea". For the North Sea, Cowi examined two concepts: a caisson solution and a platform solution.

Casings are placed as an outer boundary of an island, where the inner area is filled with sand, which is sourced locally. Cowi estimated the cost of both concepts for wind turbines and infrastructure in the North Sea to be DKK 60 billion for 3 GW and DKK 210 billion for a 10 GW caisson solution and DKK 220 billion for a 10 GW platform solution. Cowi estimated that the price differences between the two concepts and between central and decentralised structures are smaller than the uncertainties. The price for a 2 GW solution at Bornholm was estimated at DKK 40 billion.

Preparations for a central energy island in the North Sea were started without investigating the alternatives in more detail.

Recent assessments have shown significant cost overruns, both in the North Sea and on Bornholm. In December 2024, the Danish Economic Council recommended that the Bornholm Energy Island be abandoned due to poor economics.

In June 2023, the Ministry of Climate, Energy and Utilities announced that the project in the North Sea would be postponed and that the study of platform solutions, which was initially neglected, would be taken up. In light of the current attention to the vulnerability of infrastructure at sea, the study should also assess the benefits of more decentralized solutions.

It is a democratic problem that the publicly available material on the energy islands consists of generalities and very few facts. Some material has been deleted, including the aforementioned report from Cowi.

## **Danish electricity supply is more dependent on foreign countries than ever**

One of the arguments for more wind and solar power has been that it would reduce Danish dependence on foreign countries, but this is far from reality, as the possibilities of letting neighbouring countries be responsible for balancing electricity production and electricity consumption are deteriorating in line with the growth of weather-dependent production in Europe.

Without support from abroad, Danish electricity production cannot cover Danish electricity consumption under all conditions. This makes it a question of definition whether security of supply is satisfactory. Formally, all of Western Europe is a pool of resources, where operations are organized by connecting regional market areas so that the international electricity market distributes production according to willingness to pay and the transmission network's transmission capacity.

The question is whether this principle can be maintained during an international crisis. In an actual supply crisis, one could fear that other countries would limit aid to Denmark in order to secure their own electricity supply.

Danish policy can be perceived as being in trouble because we call ourselves a green pioneer country at the expense of others. Most European countries will be dependent on natural gas for a long time to come. The supply of natural gas has become expensive and uncertain in Europe.

It will be necessary to build more flexibility into the Danish electricity supply. The Power-to-X plants that were supposed to provide flexible consumption will in any case come much too late.

Denmark should openly consider whether it wants to be able to base its electricity supply on its own resources to a greater extent in the event of a serious international crisis. In the short term, new gas-fired electricity production can be built. We can perhaps use biogas as a more climate-neutral solution.

It has long been considered a fact that wind and solar power are the cheapest forms of electricity production in Denmark. When infrastructure costs now appear to be running rampant, there is good reason to reassess this thesis, including allowing nuclear power to once again become part of the solution space being investigated. New wind and solar power should be put on hold until the corresponding flexible demand is in place.

## **Danish energy policy lacks coherent planning**

Political decisions in Denmark have been concentrated on increasing the production of wind and solar power. It is ignored that transmission lines require much longer construction time than wind turbines and solar cells. The necessary flexible plants for converting electricity to hydrogen and other fuels are still far from being commercially mature.

There are three important elements in energy planning: demand, supply and transmission. In planning, the coherence between these three elements is crucial. When the establishment of these elements gets out of step, development runs off track, as happened in Denmark in 2024.

Patchwork solutions cannot ensure the implementation of ambitious political goals. A coherent planning process that encompasses the entire energy system is the only way forward.