New Dispute about Profitability of Viking Cable

I have questioned the profitability of the Viking Cable between Denmark and England in October 2016[1] and again in November 2017[2]. The publication of ENTSO-E's TYNDP 2018 "Connecting Europe: Electricity 2025 - 2030 – 2040"[3] has reopened the Danish debate.

ENTSO-E has found average annual benefits of the Viking Cable between 35 and 62 million Euro for three scenarios at the 2030 stage. This is less than half the revenue, which has been considered necessary for the profitability of the link.

It is a saying from the past that new interconnections always prove better than expected. The trees do not grow up to the sky, and the marginal benefit of each new interconnector at the same border will often be lower than for previous links. However, Europe is still far from the tipping point.

Bottlenecks in power grids cause price differences

There are remarkable differences between electricity spot prices in European countries (fig. 1).

Grid bottlenecks and electricity market deficiencies create electricity price differences. Apparently, stronger grids and better markets can reduce price differences and create additional wealth in most European countries.

Interconnections also have the important purpose of reducing consequences of unexpected events, such as missing fuel supply, drought, missing power plants and political instability. Such events are never planned, and they always occur somewhere.

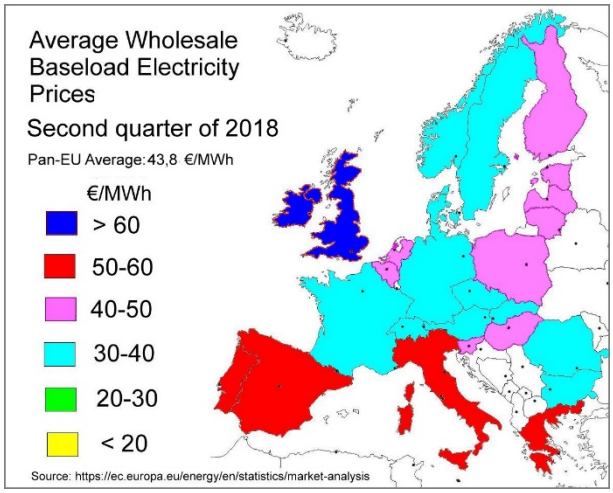

Fig. 1 - Average European electricity spot prices - 2nd quarter of 2018

The problem is that it is difficult to quantify all potential benefits in normal profitability calculations for new interconnectors. The necessary tools and data do not exist.

Besides, dominant shares of wind and solar power have given the transmission and distribution systems new challenges, which are not yet completely understood.

Usual profitability calculations cannot stand alone

Therefore, traditional profitability calculations should not be the only yardstick for the evaluation of new interconnectors.

[1] http://pfbach.dk/firma_pfb/references/pfb_viking_cable_2016_10_14.pdf
[2] http://pfbach.dk/firma_pfb/references/pfb_viking_link_will_need_volatile_spot_markets_2017_11_14.pdf
[3] https://tyndp.entsoe.eu/tyndp2018/

The technical lifetime of elements in the transmission systems is several decades. New lines and cables should therefore be designed to meet possible future challenges. Forecasts decades ahead must necessarily imply considerable uncertainties.

Smart solutions are not yet available

The current transition from traditional electricity production into fluctuating production creates balancing problems. So far, the wind power variations have been caught by remaining traditional power plants, but this resource is decreasing. Several alternative methods have been suggested. Flexible electricity demand and battery systems are popular concepts, but comprehensive research efforts did not provide convincing results so far.

If new and smart solutions cannot guarantee system balance, a number of traditional power plants must be maintained or developed. In a realistic prediction, most of the balancing work will be secured by a combination of specialized regulating power plants, stronger interconnectors and improved international markets.

This reality may have inspired an intuitive strategic thinking at the Danish Transmission System Operator (TSO), Energinet. Denmark has interconnections with Norway, Sweden and Germany. The Cobra link to the Netherlands is under construction. The output of Danish wind energy already exceeds 40% of the national electricity consumption, and much more wind power will be installed within the next few years.

Danish electricity supply depends on access to foreign markets

In the absence of flexible electricity demand, Denmark must export or curtail the wind power peaks. Operational experience has showed that wind power peaks cannot be exported to Sweden and Germany. The Skagerrak link to Norway will not be sufficient.

The relative market values in fig. 2 demonstrate the decreasing value of Danish electricity export, while import prices are increasing.

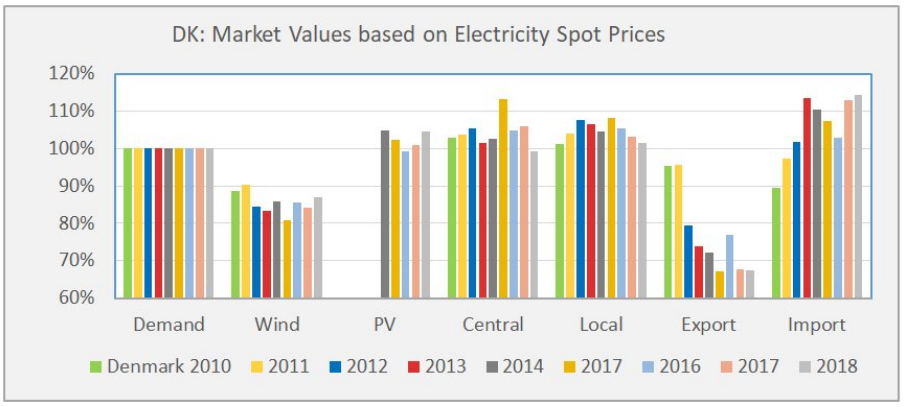

Fig. 2 - Relative market values 2010-2018. Hourly PV data were not available before 2014. "Central" and "Local" are large and small dispatchable power plants.

A 1400 MW link to the southern part of England looks like a very attractive contribution.

A link to England will continue the West Danish policy of developing an electricity transport corridor through Denmark. This policy has proven useful when unexpected events have created electricity supply problems in Denmark or in its neighbouring countries. Looking back, there is no doubt about the profitability of these investments.

The Danish state has taken over the TSO and the primary electricity grid. It is a Danish tradition that public investments must be based on positive business cases. Because of this rule,

business cases are sometimes selected with regard to the profitability. In such cases, alternative assumptions may give rather different results. This is the case for Viking Cable. Energinet has published a profitable business case; ENTSO-E has subsequently presented three less profitable scenarios.

The new Danish debate has a narrow focus on the calculated profitability. It diverts attention from possible long-term non-quantifiable properties of the project.

Be honest

I have argued above, that the probable future method for balancing wind power variations will be a combination of specialized regulating power plants, stronger interconnections and better international markets. The problem is that nobody knows the future combination of these three measures. This uncertainty and several others make a reliable feasibility analysis impossible.

The green energy transition implies very large investments and considerable risks. The risks could justify an insurance. For Denmark, the Viking Cable could be seen as an insurance, which could add benefits to the traditional profitability calculation. It is uncertain if this is sufficient for a satisfactory business case.

The green transition has a cost. More wind power will require more electricity transport, which is the same as more and larger power lines. Unfortunately, it takes more time to install a power line that it takes to build a wind farm. Delayed power lines add to the operational problems.

The public deserves honest information about the uncertainties of the process instead of the usual biased arguments. Fair information about purposes, risks and cost of new projects could take the sting out of bad news, which may appear from time to time. The Danish tradition for examining profitability calculations without understanding possible further implications of a project seems to be a barrier for an open information policy.