

The role of aggregators in bringing district heating and electricity networks together: integrated supply maximising the value of energy assets

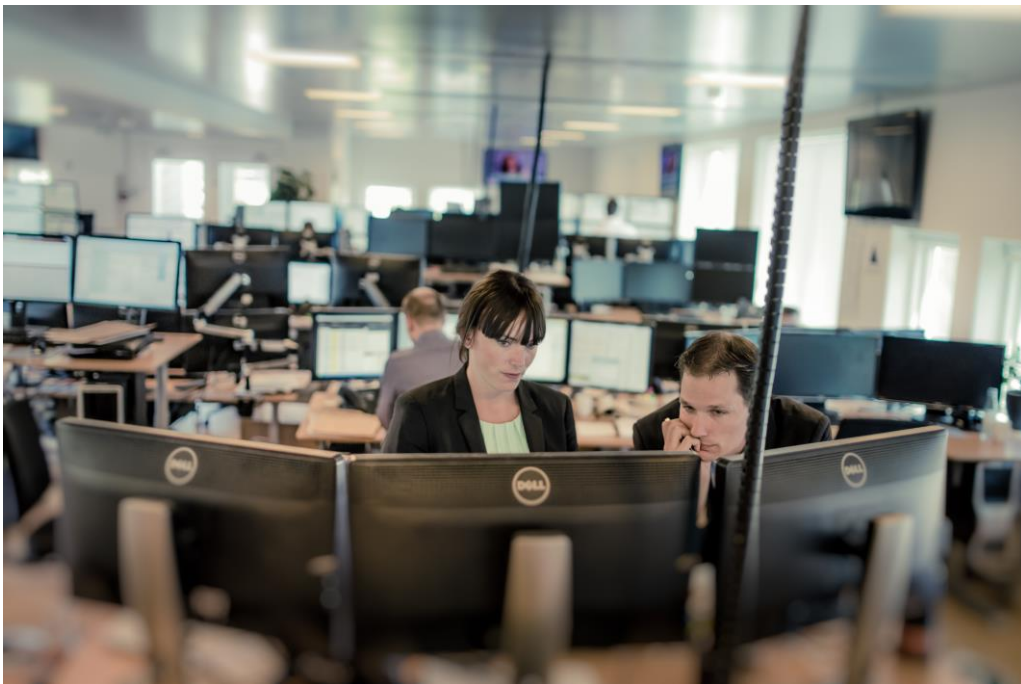
Case Study

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Introduction:

Neas Energy (Denmark) is an electricity aggregator headquartered in Aalborg in northern Denmark. Its turnover was 750 million euros (2013) and it has about 200 employees across various geographies.

Neas Energy¹ is an independent international energy trading company (and Balance Responsible Party) operating in power, gas and certificate markets across Europe. Privately owned, it was established in 1998 in Aalborg, Denmark by four local public supply companies to purchase electricity in the newly liberalised energy market. Neas Energy manages electricity assets for wholesale market partners in the energy sector including: utilities, supply companies, combined heat and power (CHP) plants, renewables (wind, hydro and solar PV).



¹ Neas has been a Member of the UN Global Compact since 2009.

European Electricity Markets:

The Nordpool market covers Norway, Sweden, Denmark, Finland, Estonia, Latvia and Lithuania. The Transmission System Operator (TSO) is responsible for balancing the supply and demand of electricity at all times. The markets achieve this balance at the best price by negotiating prices and volumes of electricity over different timescales to meet projected demand and actual demand on a given day. The markets are structured to have electricity ready for the predicted demand of a particular period and then by attracting bids for out-of-balance positions to bring more or less electricity onto the network to meet the real demand in real time. Neas Energy operates on the Nordpool market where it trades electricity in a range of different time frames.

Neas Energy

Neas Energy has around 200 power producers in its portfolio whose individual electricity generation capacity ranges from 1MW to more than 300 MW. Many of these suppliers are district heating companies which incorporate CHP. The main customers are heat consumers and the secondary customer is the external electricity network. All these companies use the electricity markets to plan their electricity production, while meeting their commitment to their heat customers. For Neas Energy this means remotely controlling some 500 generating units. Each of Neas Energy's generating partners is equipped with remote control units and their electrical generation is controlled over the Internet in real time as necessary in order to deliver supply according to their committed generation plan and the market conditions.

NEAS Energy's portfolio includes:



Combined Heat & Power: 1,660 MW installed capacity.



Renewables: 3,520 MW installed capacity. Largest independent wind power trader in Europe.



Supply & large-scale consumption: 2.3 TWh.



Natural gas trading: 36,000 MWh turnover daily (avg.)



Renewable energy certificates: (GoO, EECS, CERs, VERs, Elcerts, LECs).

Joining the electricity market as a participant comes at a significant cost. Aggregators who are 'balancing responsible parties' such as Neas Energy make it possible for smaller generators to take part and work with generators on a fee basis to sell their electricity on the market.

On a daily basis district heating companies put their electricity supply forecast for the next day into a dedicated IT tool and send it to Neas Energy, where it is aggregated with those of the other partners. Based on this aggregated generation Neas Energy sells to the electricity market the following day.

In the world of electricity supply and demand, each day opens with a perfectly balanced forecast and supply. As the day progresses things happen: faults, or more production than forecast or considerably less. When this results in an imbalance, the TSO responsible orders units handled by the Balance Responsible Parties to trigger additional supply or reduce supply according to demand at the time.

How the CHP operates with Neas Energy:

- ✓ Every CHP plant plans their day-ahead production considering both the electricity markets and the district heating system. The BRP trades the electricity.
- ✓ Over the course of the day they deliver different balancing services.
- ✓ Can participate in all electricity markets:
 - Spot market
 - Intra-day (Elbas) market
 - Regulating power market (tertiary reserves)
 - Manual reserves
 - Primary reserves (frequency reserves): both up and down regulation
 - Capacity markets
 - Secondary reserves (LFC-FRRA) (not relevant at the moment)
 - Supply the electricity market with capacity when shortage (up regulation)
- ✓ Remove capacity from the market when there is surplus (down regulation): electric boilers and large heat pumps.
- ✓ CHP has flexibility via storage in hot water accumulation tanks and district heating systems.

Nordpool is a liquid market with prices reflecting production and demand. The possibility of trading on this market and the balancing markets through aggregators has encouraged the inclusion of storage in district heating designs, which in turn allows the district heating plant to maintain high levels of efficiency while decoupling their electricity and heat generation over certain time periods. As a result the CHP units embedded in the district heating networks can play an active role in the electricity balancing and wider services market.

Multi handling of energy producers Heavy setup, but a must !

