Regional flexibility markets demonstrated in Sweden sthlmflex & CoordiNet

Yvonne Ruwaida, Business strategist, Vattenfall Distribution
Power System Flexibility Campaign & 3DEN
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Vattenfall Distribution

Leading owner and operator of electricity distribution networks in Sweden and Berlin, Germany

- Largest operator of regional electricity distribution networks in Sweden and top-3 position in local networks
- Enabler of the energy transition by connecting renewable production to the grid
- Demand set to grow – Vattenfall grids are located in areas with population growth and strong demand for industrial electrification
- High operational efficiency compared to industry average
- Our positioning across the whole energy value chain enables us to take advantage of our networks using both demand and supply side flexibility

3.3 million household and business customers

>155,000 km of electricity grids

SEK 7.2 billion in investments 2019

SEK 64 billion RAB

Vattenfall Distribution is a part of Vattenfall
- Vattenfall is a leading European energy company
- We want to make fossil-free living possible within one generation
- We are driving the transition to a more sustainable energy system
100 per cent owned by the Swedish State
Short facts about the Swedish energy system

Sweden has 4 electricity trading areas that are connected to trading areas in Norway, Finland, Denmark, Germany, Poland and the Baltic countries.

In 2020 Sweden exported 37 TWh and imported 12 TWh electricity. Sweden’s total energy use was 134 TWh.

Energy production in Sweden: hydro 41%, nuclear 40%, wind 10% and CHP 9%.

Swedish TSO maintains a balancing energy market together with the other Nordic transmission system operators.

TSO and DSO:s are unbundled from other energy actors.
Swedish 2nd electrification wave

Electricity demand set to grow due to electrification and new electricity intensive businesses

Installed wind capacity continues to grow

Existing network assets are increasingly in need of reinvestments
The capacity challenge in Sweden

The power level is limited by subscription levels between the local DSO and regional DSO and between the regional DSO and TSO.

Violations of subscription limits subject to cost, and may be denied.

The DSO utilizes flexibility services to lower peak demand in the grid during the winter season November to March.

A grid state forecast makes it possible to call for flexibility day-ahead working proactively to alleviate grid congestion that has strong correlation with temperature.
2 regional flexibility markets CoordiNet & sthlmflex

- Peer to peer marknad
- Uppland
- Gotland
- Skåne

EU-financed Horizon 2020-project
DSO Vattenfall Eldistribution, DSO EON Energidistribution, TSO Svenska Kraftnät, Expektra, Uppsala kommun och Energiforsk
Market platform and flextool: EON Energidistribution

R&D project sthlmflex (Stockholm)
TSO Svenska Kraftnät in cooperation with DSO:s Vattenfall Eldistribution och Ellevio
Market operator: NODES
Flextool operator: EON Energidistribution
Flexibility resources in Uppsala

- Industries
- Battery Storage 20 MWh
- Aggregated commercial and residential buildings
- District heating
- Reserve gensets
- Hydropower

Confidentiality: C1 - Public
Market data 20210125 - 20210224

CoordiNet
Uppland

Senaste 30 dagarna
2021-01-25 - 2021-02-24

Day ahead
Tot. erbjuden volym: 11 930,35 MWh
Tot. såld volym: 4 030,61 MWh
Högsta clearingpris: 2 500 kr
Lägsta clearingpris: 150 kr
Genomsnittspris: 242 kr

Intraday
Tot. erbjuden volym: 5 856,5 MWh
Tot. såld volym: 574,8 MWh
Högsta clearingpris: 5 000 kr
Lägsta clearingpris: 242 kr
Genomsnittspris: 713 kr

sthlmflex North

Senaste 30 dagarna
2021-01-25 - 2021-02-24

Intraday
Tot. erbjuden volym: 18 854,8 MWh
Tot. såld volym: 1 441,4 MWh
Högsta clearingpris: 2 000 kr
Lägsta clearingpris: 200 kr
Genomsnittspris: 570 kr

sthlmflex South
Market design: time coordination

- Very important to put the DSO/TSO markets in the timeframes of the current energy markets without interference
- The coordination scheme with cascading market closing times worked well
- But to fully unlock the potential of flexibility the day-ahead market needs to be complemented with an intraday market
- An additional benefit during the project was that the dialogue between DSO and TSO created new values in understanding how better coordination can lead to a more efficient grid use
Coordination with other markets:

Existing markets in Sweden:

Day-ahead wholesale market: At 10:00 CET available capacities on interconnectors and in the grid are published - buyers and sellers have until 12:00 CET day-ahead to submit their final bids (Source: Nordpool spot).

Intraday wholesale market: Opening time of 15:00 CET D-1 continuous market, with trading taking place every day around the clock until one hour before delivery.

Balancing (frequency markets): mFRR: voluntary energy bids and can be submitted until 45 minutes before the operational period.

Coordination with other markets:

Coordinet day-ahead should close before 10:30 a.m. so as to not interfere with national day ahead market.

Coordinet Intraday should open at 15:00 to be in line with national day-ahead market.

Coordinet Intraday closes two hours before delivery, to allow for BRP to balance themselves on national market.

If prequalified with TSO for mFRR, remaining bids are forwarded to TSO an hour before delivery hour.
Most important take-aways

Time coordination with other markets works

The lead time for becoming an flexibility service provider varied between a few weeks and an entire year, depending on the type of flexibility resource.

The business case for FSPs must as well be predictable as covering the FSPs expenses. A conclusion is that a business case alone will not be enough to attract FSPs.

Local flexibility markets → important with bidding functions as set time, maximum delivery time, block bid and recovery time for an efficient use of flexibility resources.

Standards for communication and power of attorney are key.

Drivers for flexibility service providers:
- good for the city
- benefit for community
- solving problems
- environmental benefits
- reducing grid constraint
- learning business models
- technology interest
- resource efficiency
- societal benefits
- efficiency
- earning money
- future business
- capacity limit own growth
- innovation
- affect local development
- self-education
- efficiency
- climate
- good for job

26-02-2021
For more information

**Project homepages**

**CoordiNet**
EU financed Horizon 2020 project CoordiNet

**sthlmflex**
FoU-projektet sthlmflex

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**Contact Svenska kraftnät**
Magnus Lindén magnus.linden@svk.se
Linda Schumacher linda.schumacher@svk.se

CoordiNet – Svenska Kraftnät

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**Contact Vattenfall Eldistribution**
Yvonne Ruwaida (Workpackage leader The Swedish demo CoordiNet and project lead sthlmflex)
yvonne.ruwaida@vattenfall.com

Björn Godring (for FSP:s)
bjorn.godring@vattenfall.com

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**Contact DSO E:ON Energidistribution**
Christoffer Isendahl (flextool and market platform CoordiNet)
Karin Hansson (flextool sthlmflex) karin.hansson@eon.se

SWITCH | En lösning på kapacitetsbristen - E.ON

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**Contact DSO Ellevio**
Bengt Johansson (project lead sthlmflex)
bengt.i.johansson@ellevio.se

Stefan Lindbom (for FSP:s)
stefan.lindbom@ellevio.se

Kapacitetsbrist elnät | Ellevio

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**Contact NODES market**
Market operator sthlmflex
Sofia Eng (project leader)
sofia.eng@NODESmarket.com

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