

Capacity challenge & capacity solutions

2020-12-01

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The changing capacity demand



Battery factory
300 MW



Electrical cars -
Fast charging
0,4-1,5 MW



Data halls
15-600 MW



Electrical busses
3-6 MW



Green houses
5-20 MW



Electrical cars at
home and work
2-10 kW



Changes for the transmission net

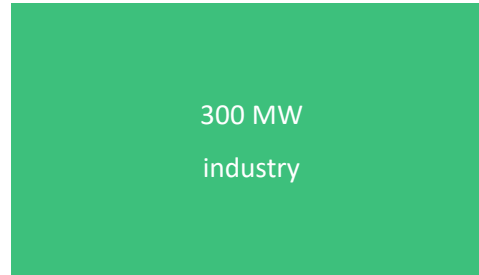


What is 300 MW?

300 MW is comparable with:

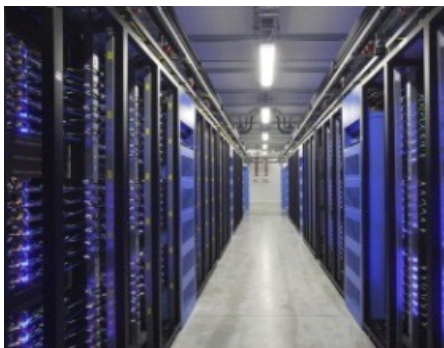


Battery industry

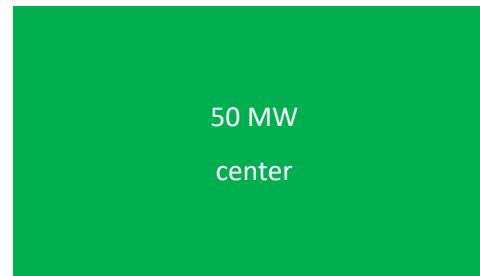


Uppsala region

50 MW is comparable with:



Data center



Enköping region



50 % transmission line (70 kV) capacity

Change is needed



Operating flexibility

Analyse understand and develop routines, culture and systems with regard to flexibility



TSO/DSO-coordination

Rationale and scalable coordination between TSO and DSO:s



Interfaces

API:s and interfaces to customer and DSO/TSO legacy systems at (SAP, SCADA etc)



Real time metering

Software to read smart meters every 15 sec, enabling real time products



Flexibility product development

Product and contract model development, regulatory and aggregator role



Flexibility planning

Analyse, understand and develop routines, culture and systems with regard to flexibility



Grid forecasting

Machine learning and AI to forecast grid state and load impact necessary for flexibility



Marketplace

A digital site to match supply and demand of local flexibility, and execute trades



Load forecasting

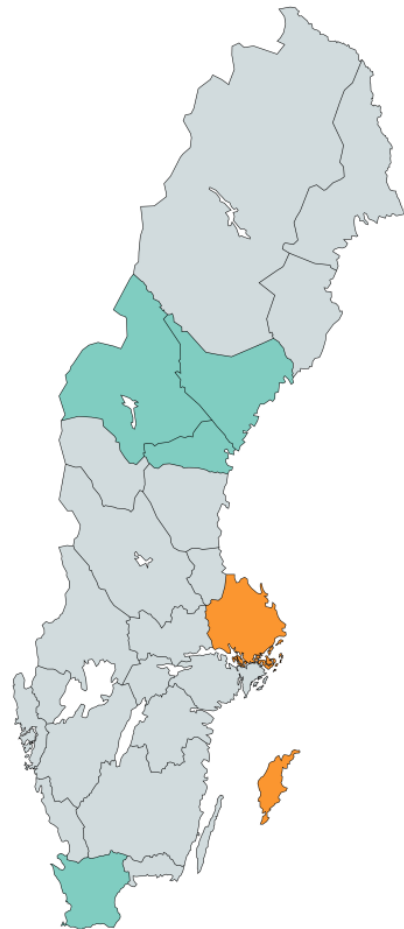
Machine learning and AI to forecast available flexibility



Customer engagement

Identify and recruit and empower customers, and analyze customer needs and conditions to offer flexibility

The Swedish demo



Västerbotten



Uppland



Gotland



Skåne

**Congestion management
Capacity – dayahead
Multilevel market**

Quote size: ≥ 1 MW (pilots 0,1MW)
 Gate closure: D-1
 Endurance: 60 min
 Supplier: Aggregator, Producer, Consumer
 Buyer: DSO
 Financial reimbursement:

- Free bids (pas as cleared)
- Bilateral agreement
- Tarif

Winter 19/20

**mFRR Balancing
Multilevel market**

Quote size: ≥ 1 MW
 Gate closure: T-0
 Activation: Manually
 Supplier: Customer or Aggregator
 Buyer: TSO
 Financial reimbursement:

- Spot market

**Congestion management
Capacity – intraday
Multilevel market**

Quote size: ≥ 1 MW (pilots 0,1MW)
 Gate closure: T-2
 Endurance: 60 min
 Supplier: Aggregator, Producer, Consumer
 Buyer: DSO
 Financial reimbursement:

- Free bids (pay as bid)
- Bilateral agreement
- Tarif

Winter 20/21 and 21/22
(Nov-March)

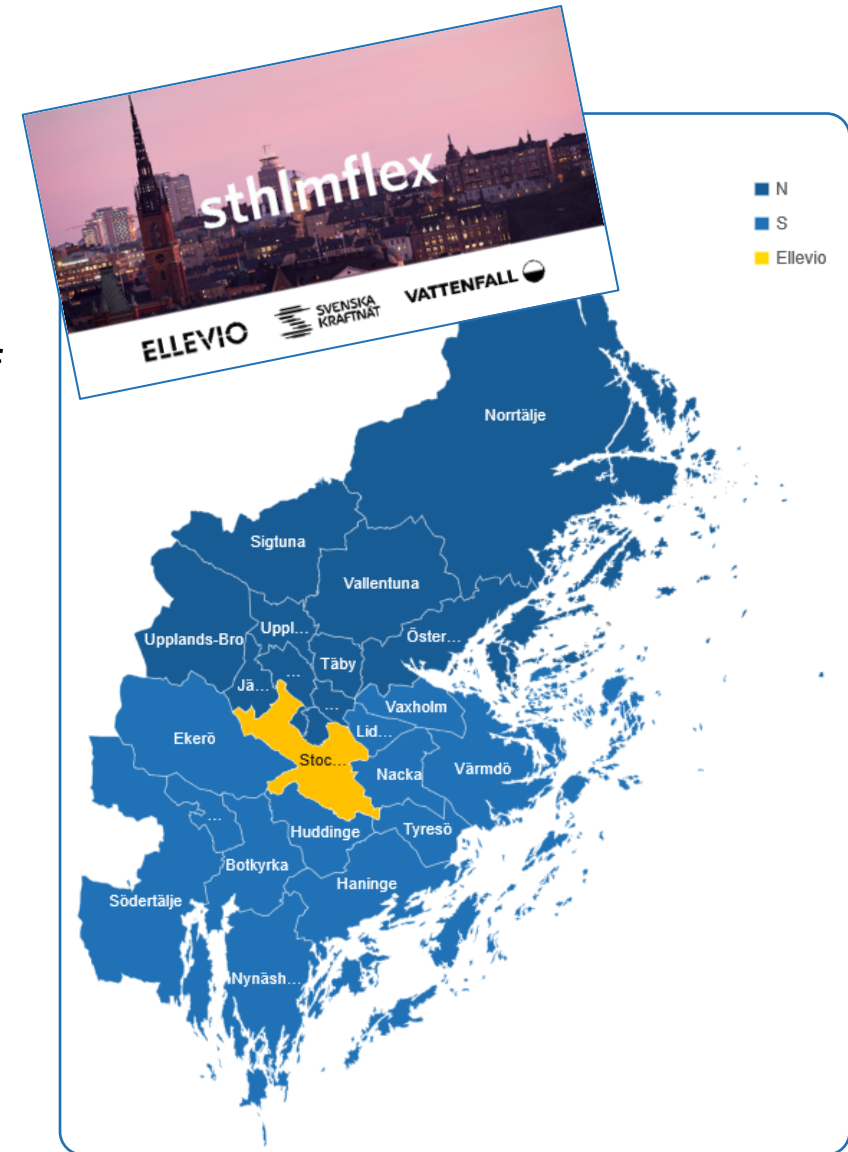
**Congestion management
Distributed Peer to peer
market with Blockchain**

Quote size: ≥ 1 MW
 Gate closure: T-15 min
 Endurance: 60 min
 Supplier: Prod. or Cons.
 Buyer: Producer
 Financial reimbursement:
 Pay as bid

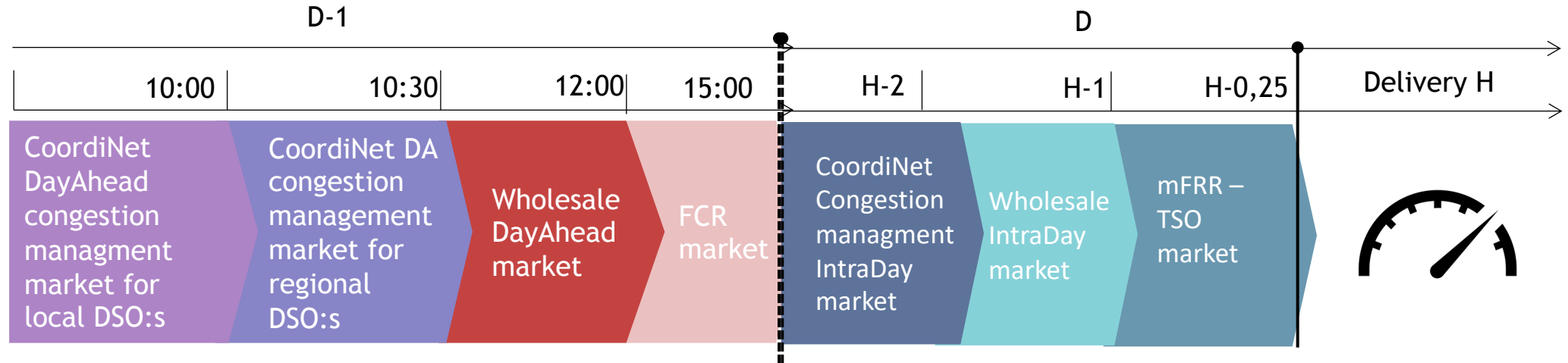
Maintenance
Fall 2020, Spring 2021

sthlmflex

- The project goal is to create a power market for flexibility in the Stockholm region, in order to manage bottlenecks in the grid
- In the short-term perspective, enable continued development of the Stockholm region and relieve the existing grid congestion.
- Release capacity with the help of new tools and processes, as well as through collaboration between TSO & DSO and between DSO & DSO
- mFRR pilot with lower bid size requirement than in today's mFRR market – increasing the interest in the local flexibility market through increased chance of cleared flexibility bid
- In the long-term perspective, create conditions for cost-effective electricity distribution (mitigating need for grid enforcement that are only required under transition phase before other investments are finalized).

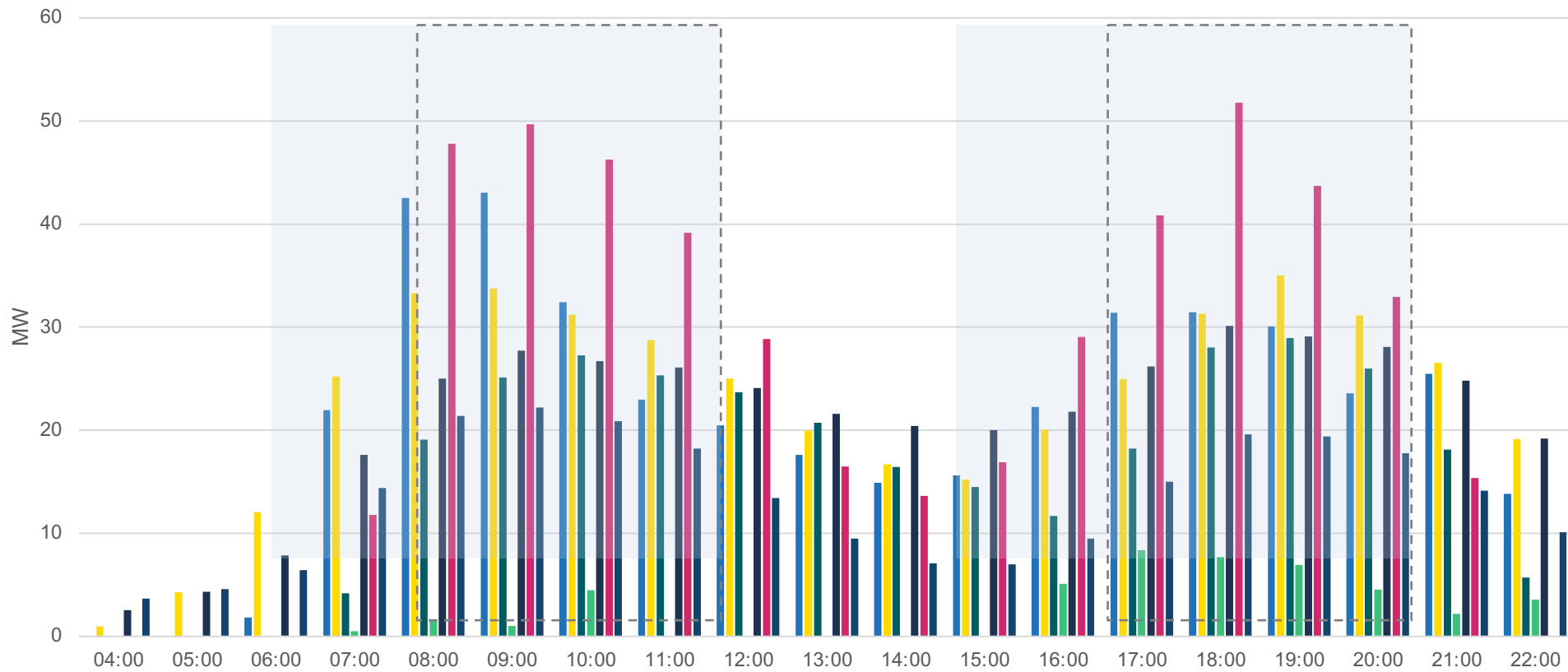


Coordination with other markets



- 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

When is flex needed?



Tack!

Relevant links

<https://coordinet-project.eu/>

<https://twitter.com/CoordinetS>

<https://www.svk.se/sthlmflex>

<https://www.linkedin.com/company/sthlmflex/>

[https://www.vattenfalleldistribution.se/vart-](https://www.vattenfalleldistribution.se/vart-arbete/kapacitetsutmaningen/)

[arbete/kapacitetsutmaningen/](https://www.vattenfalleldistribution.se/vart-arbete/kapacitetsutmaningen/)

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