

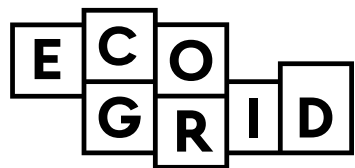


Demonstration of EcoGrid 2.0's Market for Demand Response

January 2017

EcoGrid 2.0 is a research and demonstration project funded by EUDP (Energiteknologisk Udviklings- og Demonstrationsprogram).
The 9 partners in the project are:





Demonstrations

EcoGrid 2.0 will demonstrate a market for flexible power consumption.

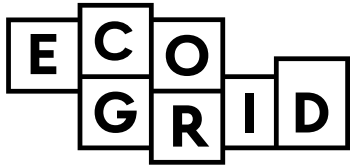
The flexibility is provided by heat pumps and electric heaters in 1000 homes.



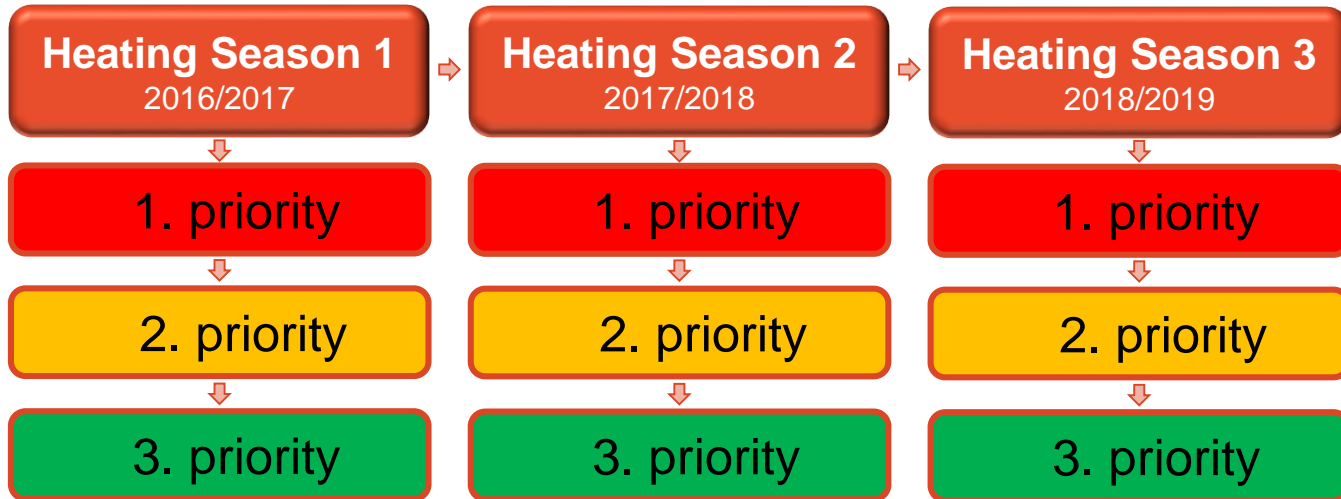
The purpose of this presentation is to outline what we plan to demonstrate during the 3½ year project.

Background information about the EcoGrid 2.0 project can be found here:

http://www.ecogrid.dk/en/home_uk



Demonstrations – Year by Year

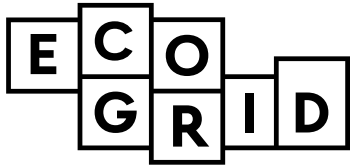


In each heating season, we have prioritized the demonstrations according to how important they are for fulfilling the project goals:

1. Red Priority = Most Important.

2. Yellow Priority = Less important. Demonstrated only after the red priority demos are completed.

3. Green Priority = Nice to have. Demonstrated after the yellow priority demos are completed, if time allows.

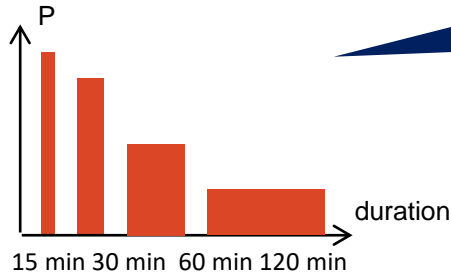


Heating Season 1 2016/2017

1. priority

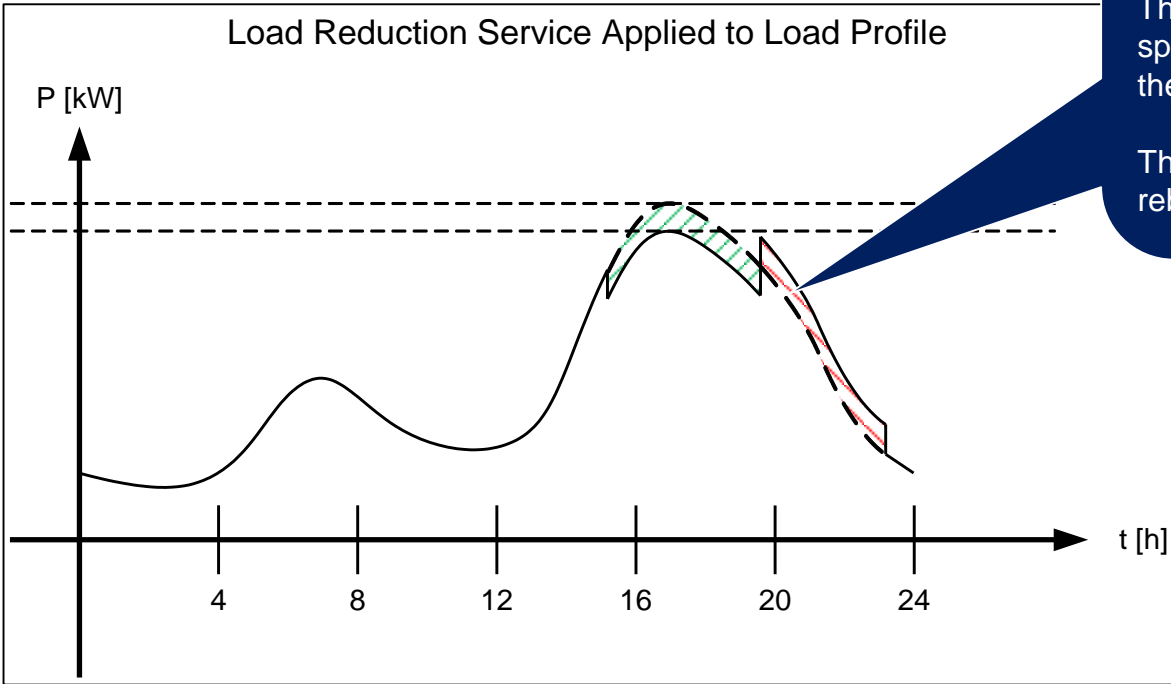
Demonstrations:

- Size of flexibility
- Rebound effect

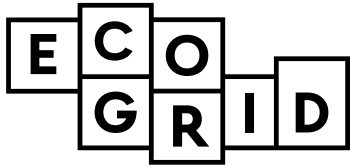


How much flexibility can 1000 homes with electric heating provide?
When is flexibility available, and for how long?

Rebound:
After flexibility has been delivered, there will be a period of time before the heater recovers its normal operating state. The EcoGrid market allows the DSO to specify duration of this time period, and the size of the rebound power.
The demonstration will quantify the rebound properties of the home heaters.



Demonstration of EcoGrid 2.0s market for demand response

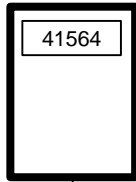
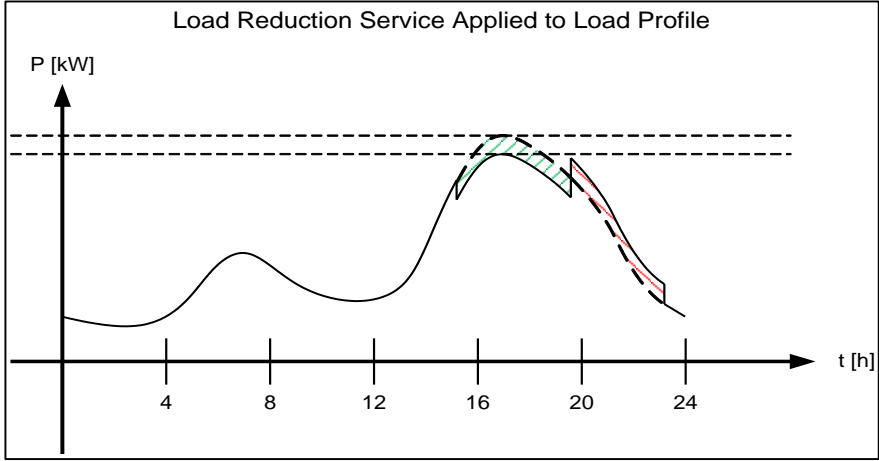


Heating Season 2
2017/2018

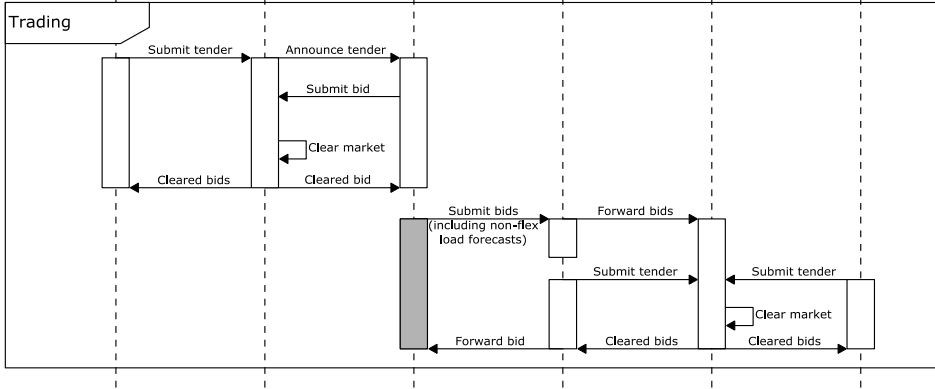
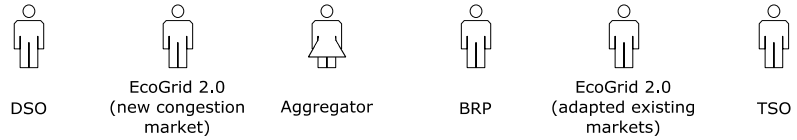
1. priority

Demonstrations:

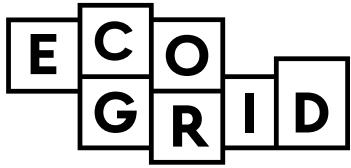
- Scheduled Load Reduction/Increase
- Balancing services
- Trading on EcoGrid 2.0's market platform
- Verification of flexibility using smart meters



Consumption data with 15 min. resolution will be used to verify the delivery of services



Demonstration of EcoGrid 2.0s market for demand response



Heating Season 2
2017/2018

2. priority

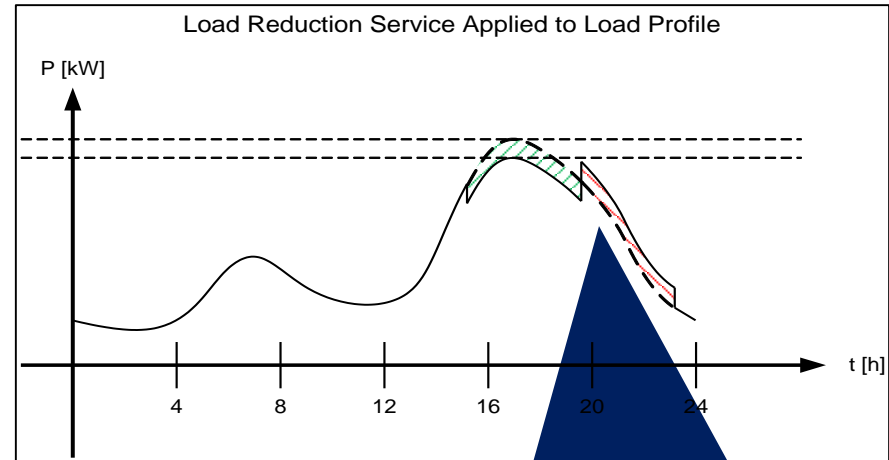
Demonstrations:

- Generic protocol for communication to consumers
- Conditional Load Reduction/Increasing
- Customer Satisfaction

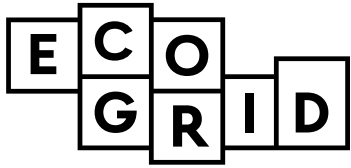
All types of heaters should be controllable for all aggregators.



It is important that the aggregators don't cause unacceptable discomfort for the customers when providing flexibility to the market.



Flexibility depending on local conditions:
Flexibility is requested by the DSO, activating a previously agreed upon demand response. (I.e.: Reserve a 100 kW reduction in consumption between 18:00-22:00 during the winter)
In contrast, **planned services**, are activated on a pre-determined schedule.

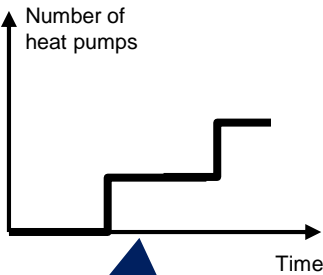


Heating Season 2
2017/2018

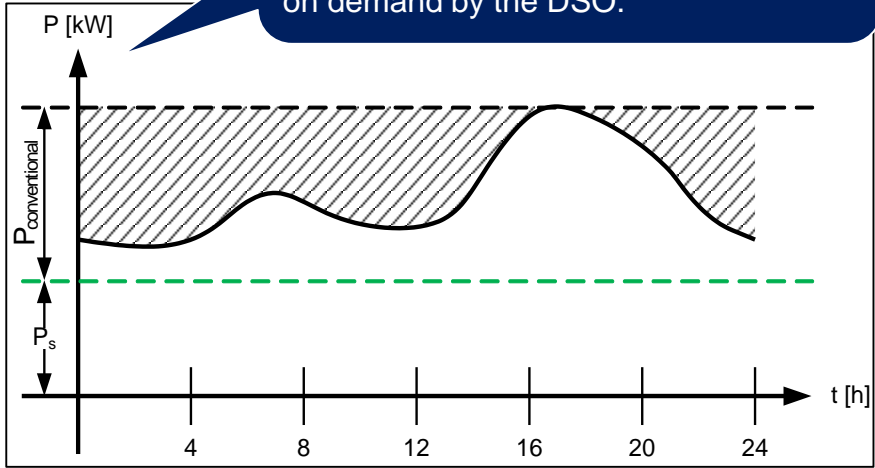
3. priority

Demonstrations:

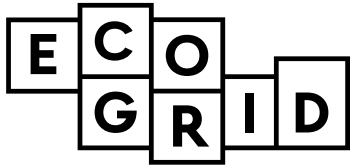
- Scheduled Power Limitation
- Conditional Power Limitation
- Conditional Disconnection of Customers
- Cold Load Pickup / Resupplying after Power Outage



After a blackout, the DSO may need to control the gradual reconnection of the heaters, so the network does not become overloaded.



If the power system has problems, some customers may be disconnected, provided that they are compensated for the inconvenience.



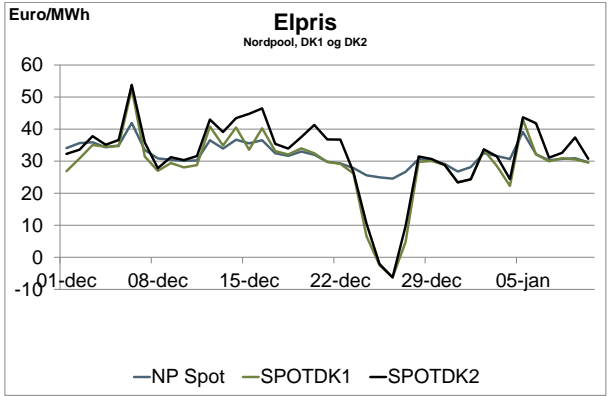
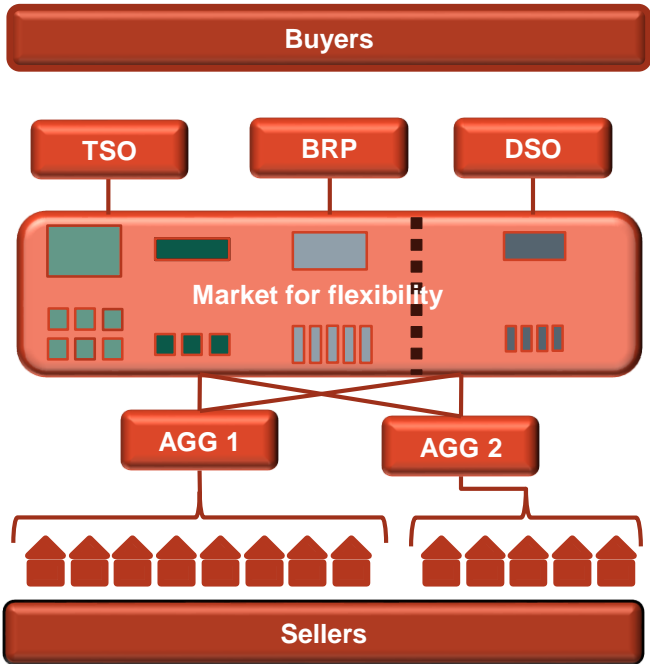
Heating Season 3
2018/2019

1. priority

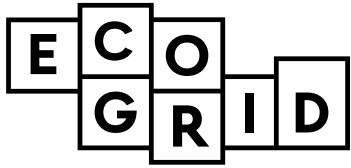
Demonstration:

- Customers Are Willing to Offer Flexibility
- Flexibility Services for Medium Voltage Grids
- Social Welfare of Flexibility Market
- Entire EcoGrid 2.0 Setup Running

The aggregators will offer customers different products which motivate customers to participate.



Demonstration of EcoGrid 2.0s market for demand response

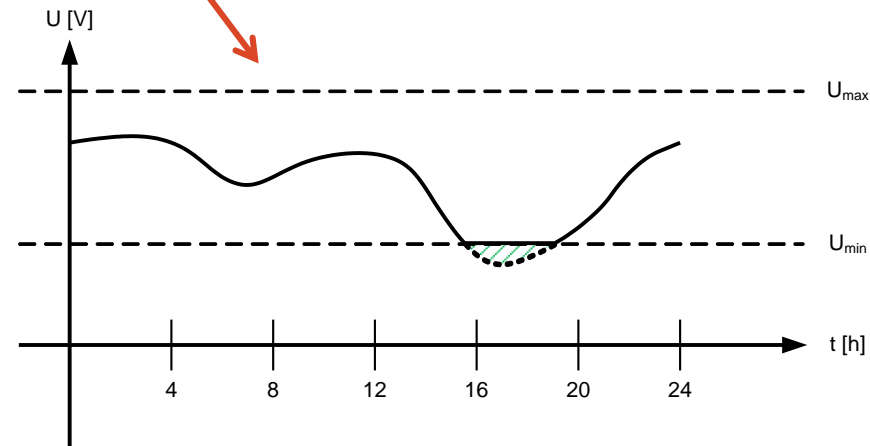
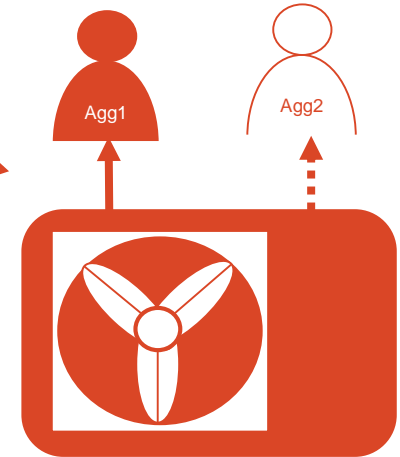


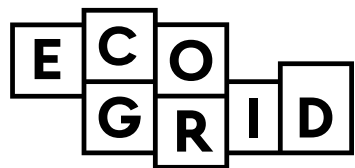
Heating Season 3
2018/2019

2. & 3. priority

Demonstration:

- Customers Can Freely Choose Their Aggregator
- Service – Voltage Control
- Flexibility Services for Low Voltage Grids
- Imbalances Generated by Services for DSOs





Key Figures for EcoGrid 2.0

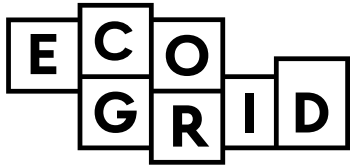
Duration: 3½ years (January 2016 to June 2019)

Budget: 98 million DKK.

Project Leader: The Danish Energy Association (Dansk Energi)

Project partners (9 in total):





Want to know more?



Links:

EcoGrid 2.0: <http://ecogrid.dk/>

LinkedIn: [EcoGrid 2.0](#)

Dansk Energi:

<http://www.danskenergi.dk/AndreSider/Forskning/EcoGrid%20,-d-,0.aspx>

