EcoGrid EU
A Prototype for European Smart Grids

Experience with energy management systems and customers

Presentation by:
Maja Felicia Bendtsen
Østkraft Holding
EcoGrid EU
A Prototype for European Smart Grids

- Co-funded by FP7
- Smart Grid demonstration project
- 16 European partners
- Total budget 20,5 mio. €
- Project period 2011-2015
Flexibility in the household comes from electric heating and heat pumps.

<table>
<thead>
<tr>
<th>Appliances</th>
<th>Load in kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>0,15</td>
</tr>
<tr>
<td>Stereo</td>
<td>0,25</td>
</tr>
<tr>
<td>PC + printer</td>
<td>0,10</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>0,09</td>
</tr>
<tr>
<td>Freezer</td>
<td>0,09</td>
</tr>
<tr>
<td>Dish washer</td>
<td>1,50</td>
</tr>
<tr>
<td>Stove</td>
<td>7,00</td>
</tr>
<tr>
<td>Oven</td>
<td>2,60</td>
</tr>
<tr>
<td>Small appliances*</td>
<td>0,01-2,00</td>
</tr>
<tr>
<td>Washing machine</td>
<td>1,50</td>
</tr>
<tr>
<td>Heat pump</td>
<td>2,30</td>
</tr>
<tr>
<td>Electric vehicle</td>
<td>3,00</td>
</tr>
<tr>
<td>Total</td>
<td>&gt;18,6</td>
</tr>
</tbody>
</table>

* Consuming on demand. Example coffee machine, vacuumer, cell phone.

![Graph showing energy consumption by type of appliance and household type.](image-url)
The EcoGrid EU participants

- 350 customers in the reference group
- 500 ordinary households. Will be equipped with smart meter. Price prognosis send daily. Price warnings when price exceed certain levels
- 650 IBM/PowerMatcher households. Get smart meter and home automation system. Primarily electric heated or heat pump households
- 450 Siemens households. Get smart meter and home automation system. Primarily electric heated or heat pump households
- 20 businesses with smart meter and energy management system
Basic requirements and info

- We only regulate load if it possible to get a data feed back, i.e. temperature or consumption measurement

- The EMS can only regulate load by switching power on or off
  - We don’t regulate appliances, which are not compatible with on/off regulation, i.e. we will not regulate air condition

- Heat pumps controlled by ripple signal relay
  - 95% of regular models are prepared for ripple signal control
  - Delays in response
  - Can only turn it off, not on

- Regulation happens on fuse box level, no regulation of individual panels
  - Wiring have to be dedicated for heating
  - IBM/Greenwave houses with electric heating works a one zone
  - Siemens houses can be divided in to more heating zone depending on the wiring in the house and size of panels
Challenges to realise the full DR potential

- Installation of Greenwave began in August 2012 and Siemens in March 2013, we have more than two years running experience with ~1100 installations
- Robustness of systems needs to be increased
  - 25% of systems are constantly unavailable
  - Primarily caused by technical failure
    - No connection to the house, no temp. measurements, units loose contact
- Customer choice are limited
  - Greenwave, only lower boundary and flexibility degree
  - The aggregators/agent utilize the full temp. interval on daily basis → the customers narrow temp. interval to reduce discomfort → reduced potential for special incidents
- Heat pumps
  - Delay in response, slow responding, no forced start
  - Cannot integrate air condition (air/air heat pumps)
Is it all bad??

Off course not

We can find the solutions, we just need more time...
EcoGrid 2.0

- New project
  - Existing participants
  - Prototype of new more advanced EMS
    - Utilising more of DR potential
  - Robustness of systems
  - Interoperability
    - Aggregators can aggregate independent on installed EMS
    - Customer choice not limited by EMS UI design
  - Services for both DSO and TSO from same portfolio
  - Customers can change aggregators
  - January 2016-June 2019

- Keep your fingers crossed 15th of June
Thank you for your Attention