Demo Gotland (Smart Customer Gotland)
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Agenda

Vattenfall at a glance

Project overview and setup

Customer analysis
Vattenfall, at a glance

• One of Europe’s largest generator of electricity and one of the largest producers of heat

• Approx. 6.2 million electricity customers, 3.2 million electricity network customer and 1.9 million gas customers

• 100% owned by the Swedish state

• Operations mainly in the Nordic countries, Germany, Netherlands and UK

• Main products: Electricity, heat, gas, energy services

• Business operations: Production, Trading, Distribution, Sales and energy services
Project overview - Smart Grid Gotland (2012-2016)

**Redevelopment** of an existing distribution network into a smart grid, to meet the challenges associated with an increased proportion of renewable electricity generation.

**Integration of Wind Power** - Cost-effective increase in the maximum acceptable wind power production in existing power lines (5 MW of wind power on Gotland)

**Reliability and efficiency** - Show that modern technology can help to increase power quality in rural networks with large amounts of installed renewable generation (20% lower SAIDI)

**Active customer participation** – **Smart Customer Gotland**. Enables active customer involvement with the intent to displace 10% grid load (attracting a large number of customers to participate in market test)
Essential questions...

- To what extent will the customer **adopt** and use new technology to become more active?
- How **active** is the customer and in what areas? Dependent on customer profile?
- Is **remote steering** of i.e. heating a need for a sustainable change in behavior or can this be achieved from other activities?
- Can provided technology and/or pricing models **impact** consumption, energy cost and load peaks?
- Will a possible change in customer behavior be **sustainable over time**?
Participating customers – 2 groups

Customers with remote steering
- Special price model and wind component price reduction
- Time of use tariff
- Remote steering of heating, boiler
- 214 customers – recruitment Q4 2013 – Q2 2014

Customers without remote steering:
- Customers with regular spot price
- Time of use tariff optional
- EnergyWatch, smartplug and temperature sensor but no remote steering
- 50 customers - recruitment Q3/Q4 2014
Selection of technical set-up...

**REQUIREMENTS**
- Move load 10%
- Many customers
- Existing heating systems
- Active customers
- Commercial product(s)
- Price info to customers
- Comfort & control

**SOLUTION**
- Add-on to the Vattenfall product EnergyWatch
- Control heating - generic
- Daily price signals
- Real time app with many features
The engine: Control system configuration

- **Next-day forecast**
  - Spot-price
  - Temp prognosis
  - Wind prod prognosis

- **Desired comfort level**
  - Economy +
  - Economy
  - Normal
  - Comfort

- **Type of heating system**
  - Hot water boiler
  - Direct electric heating
  - Heat Pump (Water)
  - Floor heating (electrical)
  - Electric boilers

- **"Over-ride" control**
  - Temp guard
  - Customer controls on/off
  - Temp guard or lost contact

**Daily price signal**

**Real time**

Smart Grid Gotland
Analysis
Preliminary intermediate results based on 1st year pilot.
Analysis areas

Load shift
• To what extent will customers change behavior and move consumptions to less expensive hours?
• Possible load shift of 10%?

Activity – steering
• How active is the customer, what activities are the most common ones, what is the main reason for these activities?

Behavior and attitude – surveys
• Customer satisfaction, behavior and awareness

Economic benefit
• Impact from pricing models and price information
Customer motivation

**Smart Saving**
Strive to reduce their costs

**Smart Technology**
Interested in new technologies

**Smart Environment**
Protect the future environment

Smart Grid Gotland
Typical day (total of all customers who participated)

Peak at 9am: Heating hot water is turned on after being turned off from 6-9am.

Peak at 11pm: Low price heating switched on.

Effektuttag just nu: 298,6 kW
Antal enheter: 217
Consumption during peak hours...

Load shift–automatic remote steering

- Comparison of the 5 most expensive hours each day.
- Next step: include general price levels, weather conditions, energy consumption in total

2013 before test: 22.6%
2014 during test: 18.9%
2015 during test: 20.4%

> 10% shift achieved
Change in energy behaviour (Consciousness)

- Both manual and automatic changed behaviour
Manual control/Override

How active is the customer in modification of price signals?

- 70% of the customers with automatic control have made a manual change, at least once. It’s decreasing over time (Why? Lower interest or better understanding?)
- They plan ahead: Increase off hours for next day.
- Remove off hours during weekends
- More reduction of off hours for water boilers than heating products
- Very few changes in the hour in progress
Customer satisfaction

- High satisfaction (6.8), same level on both survey 1 and 2.

Medelvärde: Auto 6,8 (6,8) / EW 5,8 (6,8)
Support

- Auto customers needed most support
- All very satisfied with the support
  - Local experts
  - House calls
Recommendation to friend?

- Most of them would recommend the solution to a friend

Average: Auto 7.9 / Manual 6.5
Project status – next steps

- About half pilot period (ending April 2016)
- First preliminary analysis done, final results autumn 2016.
- Planning started about customer offer after pilot
More information?

www.smartgridgotland.com (Swedish+English)
www.gotlandsenergi.se/smartkundgotland.pab (Swedish)
www.vattenfall.com

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