



# 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...

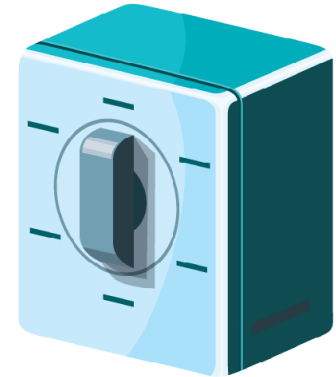
- To what extent will the customer **adopt** and use new technology to become more active?
- How **active** is the customer and in what areas?  
Dependent on customer profile?
- Is **remote steering** of i.e. heating a need for a sustainable change in behavior or can this be achieved from other activities?
- 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



Automatic remote

## 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



Manual control

# Selection of technical set-up...

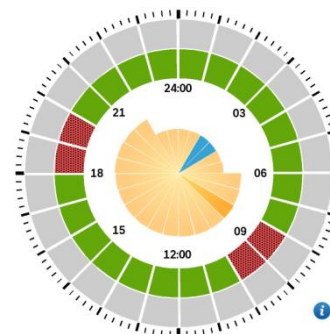
## REQUIREMENTS

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

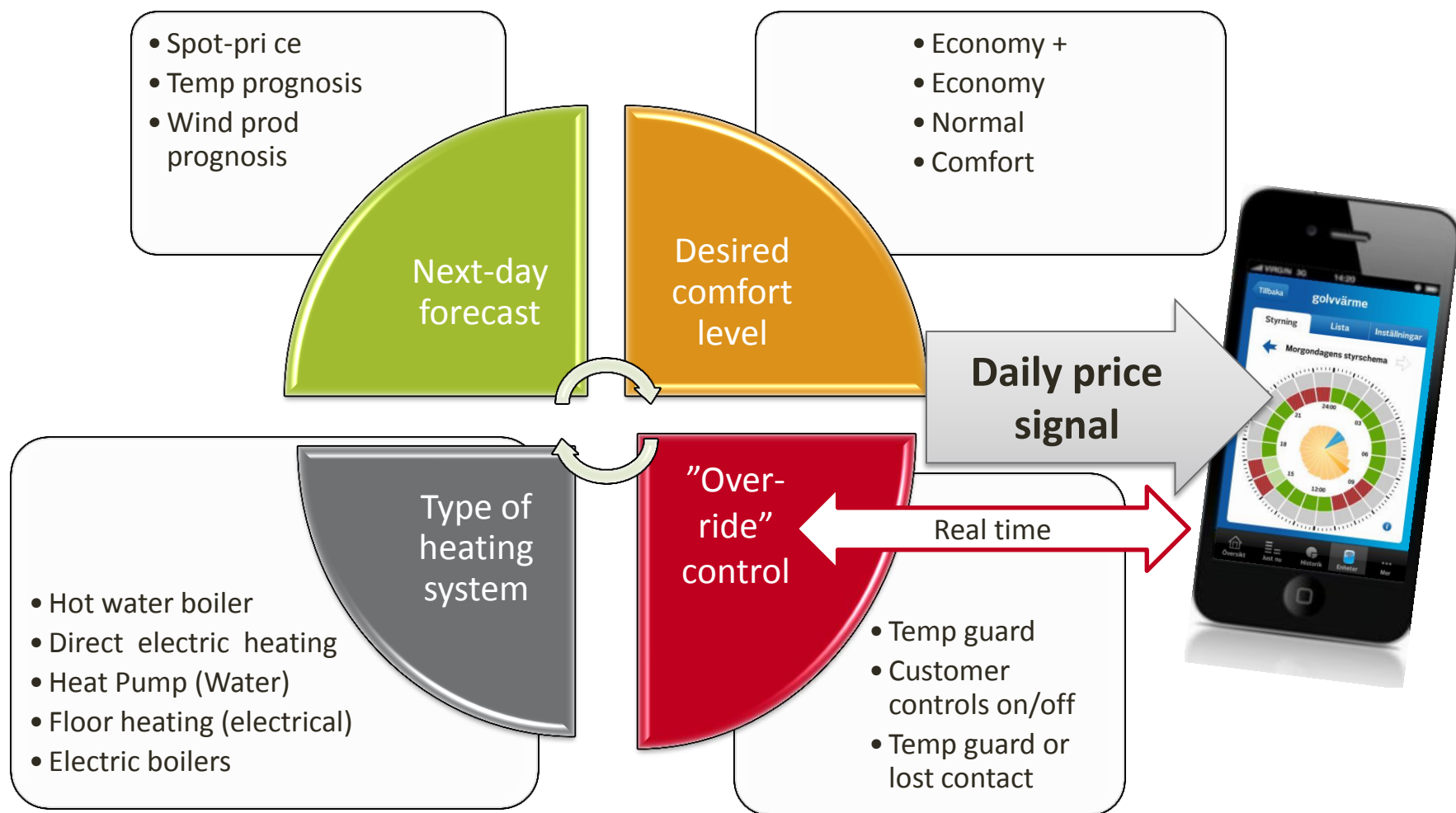


## SOLUTION

- Add-on to the Vattenfall product EnergyWatch
- Control heating - generic
- Daily price signals
- Real time app with many features



# The engine: Control system configuration



# Analysis

Preliminary intermediate results based on 1<sup>st</sup> 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

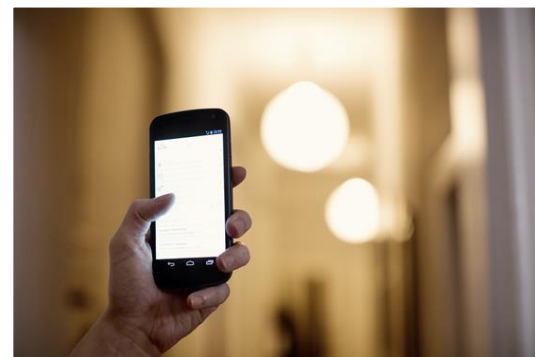
- How active is the customer, what activities are the most common ones, what is the main reason for these activities?

## 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



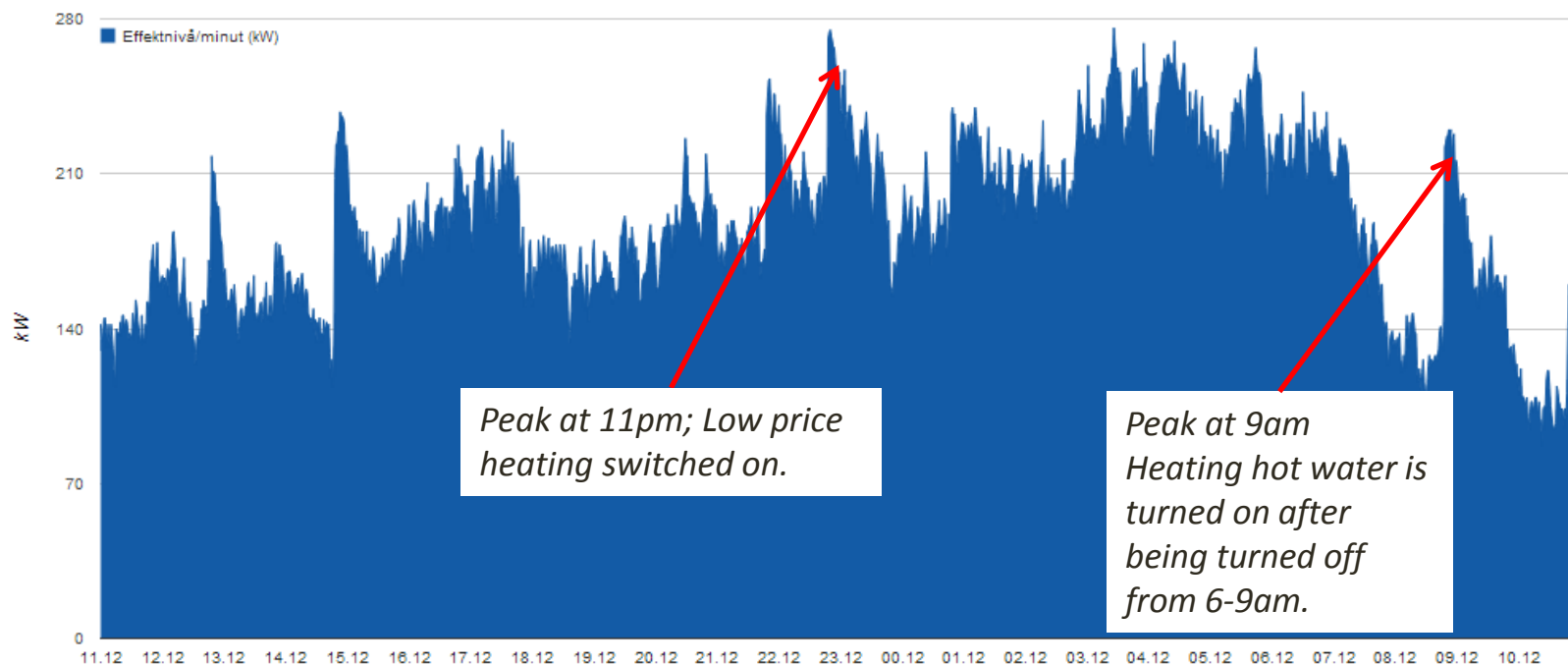
# Typical day (total of all customers who participated)



[sgg.energywatch.se/TotalChart](http://sgg.energywatch.se/TotalChart)

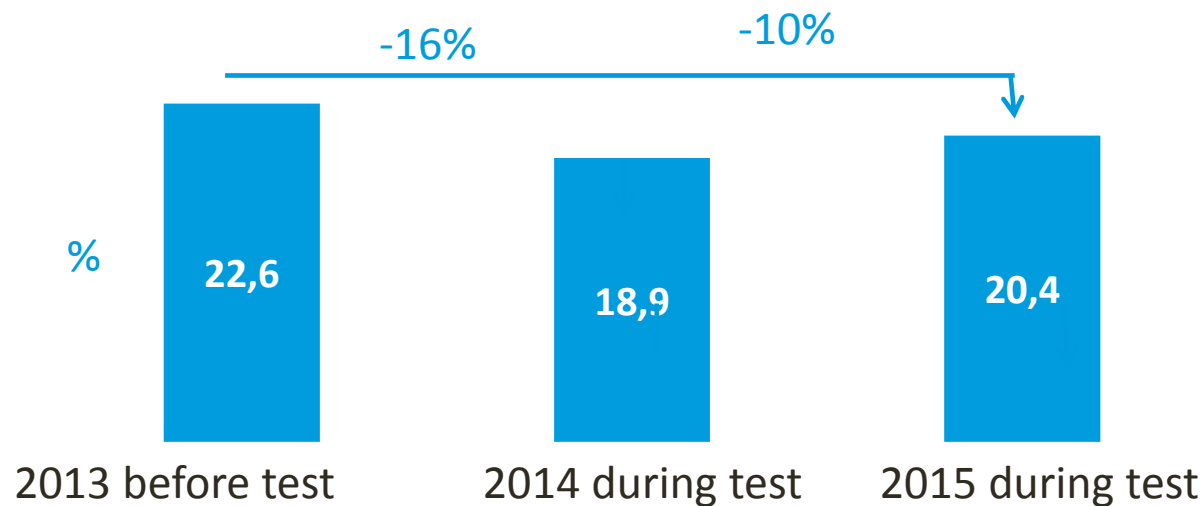
Effektuttag just nu: 298,6 kW

Antal enheter: 217



# Consumption during peak hours...

## Load shift–automatic remote steering

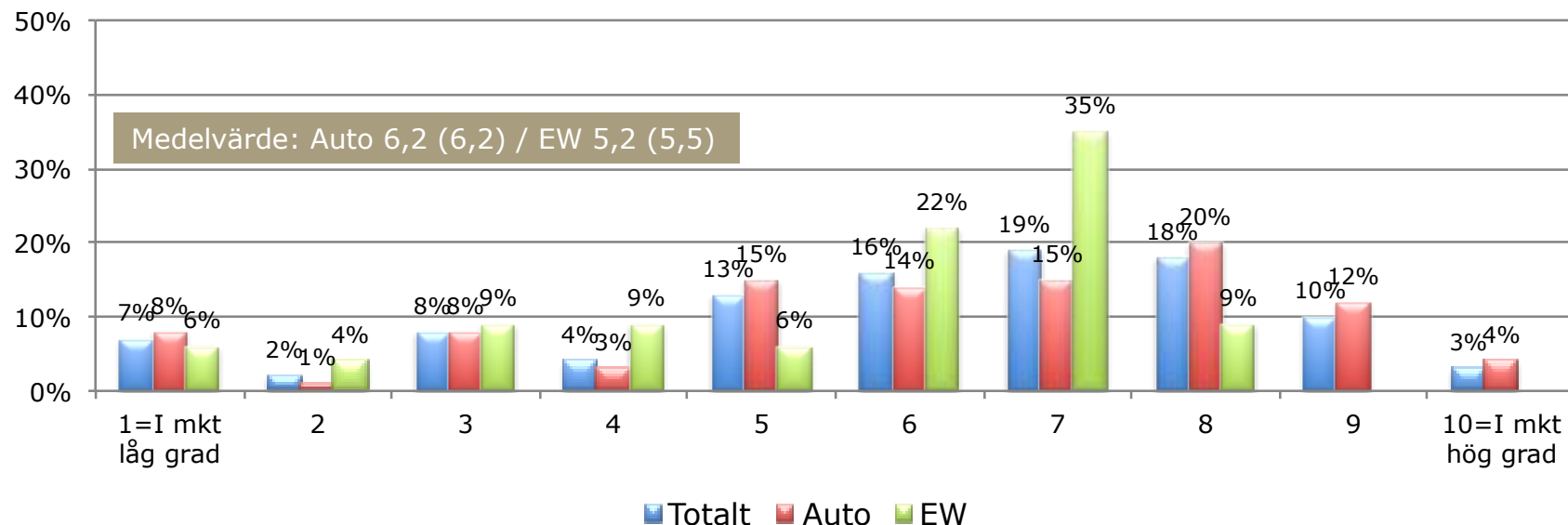


**> 10% shift  
achieved**

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

# Change in energy behaviour (Consciousness)

- Both manual and automatic changed behaviour



*I vilken grad har du förändrat ditt generella energibeteende efter det att utrustningen installerats och projektet kommit igång? Här avser vi din medvetenhet om energieffektivisering i stort och inte endast dina ev manuella ändringar i styrschemat. (skala 1-10)*

# Manual control/Override

## How active is the customer in modification of price signals?

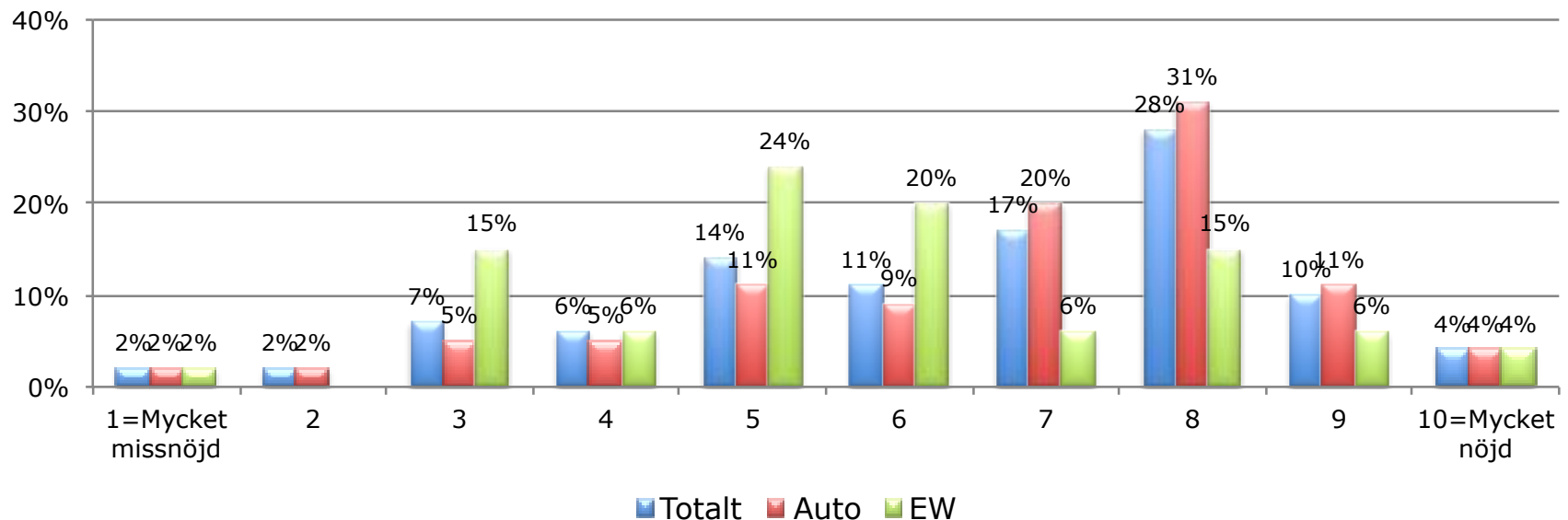
- 70 % of the customers with automatic control have made a manual change, at least once. It's decreasing over time (Why? Lower interest or better understanding?)
- They plan ahead: Increase off hours for next day.
- Remove off hours during weekends
- More reduction of off hours for water boilers than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



# Customer satisfaction

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

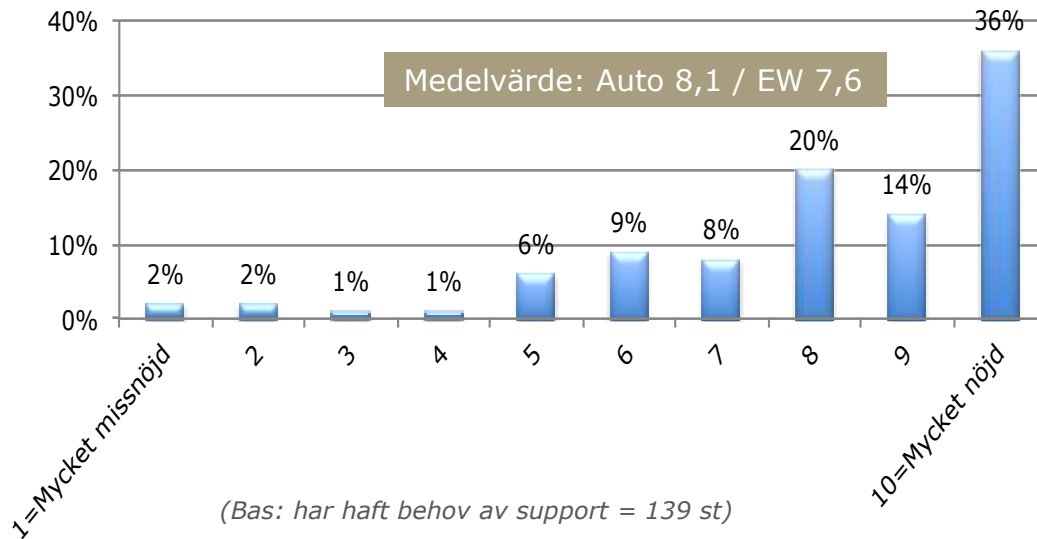
Medelvärde: Auto 6,8 (6,8) / EW 5,8 (6,8)



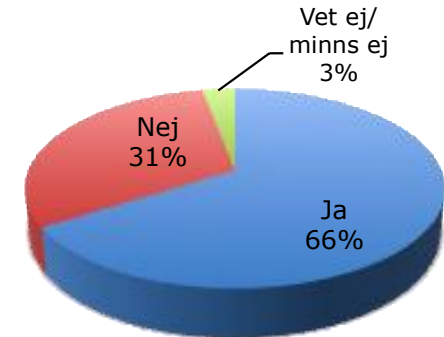
*Tänk på din samlade erfarenhet av projektet Smart Kund Gotland så här långt. Hur nöjd är du med den erfarenheten? (skala 1-10)*

# Support

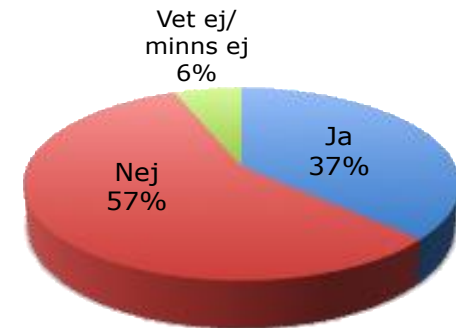
- Auto customers needed most support
- All very satisfied with the support
  - Local experts
  - House calls



(Bas: automatstyrda = 185 st)



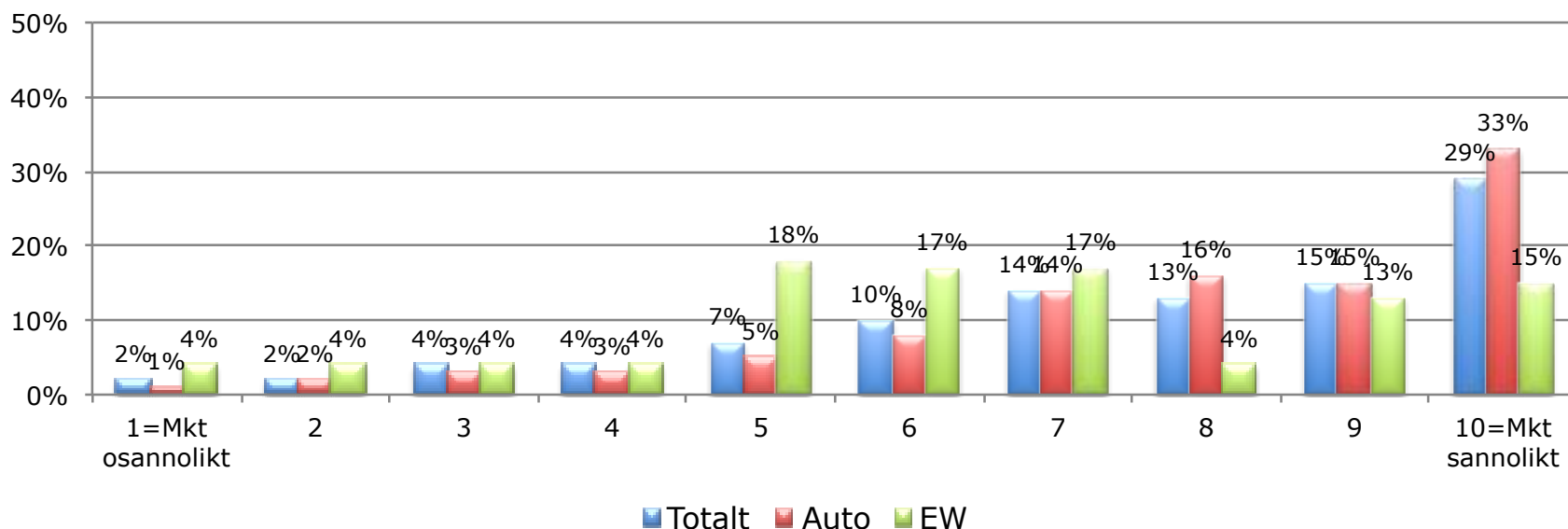
(Bas: EW-kunder = 46 st)



# Recommendation to friend?

- Most of them would recommend the solution to a friend

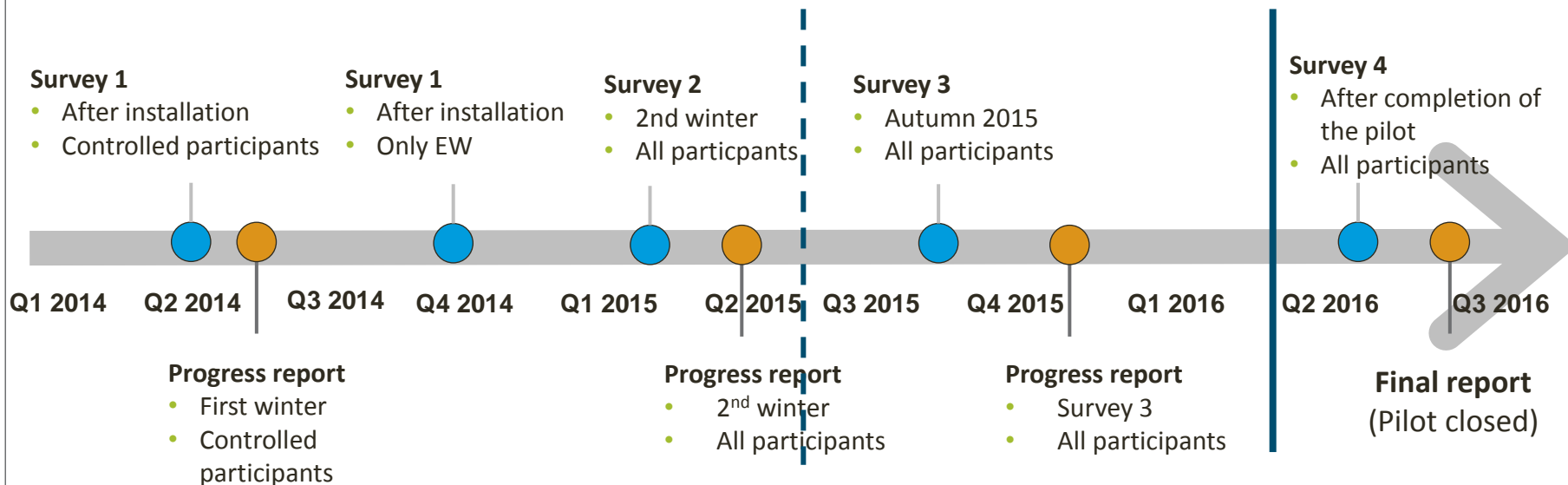
Average: Auto 7,9 / Manual 6,5



*Hur sannolikt är det att du skulle rekommendera en vän eller kollega att delta som testpilot i Smart Kund Gotland? (skala 1-10)*

# 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](http://www.smartgridgotland.com) (Swedish+English)

[www.gotlandsenergi.se/smarkundgotland.pab](http://www.gotlandsenergi.se/smarkundgotland.pab) (Swedish)

[www.vattenfall.com](http://www.vattenfall.com)

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