Energy@home

Energy@home trial: washing machine functionalities and results

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Energy@home system

Trial kit composition

Energy Box

- Connects to ADSL modem via Ethernet cable
- Java run-time + OSGi
- Energy Box Application + GUI
- Connects to cloud platform for data storage and aggregation
- LED + Buzzer

5 Smart Plugs

- Consumption information (power + energy)
- On/Off

Smart Info

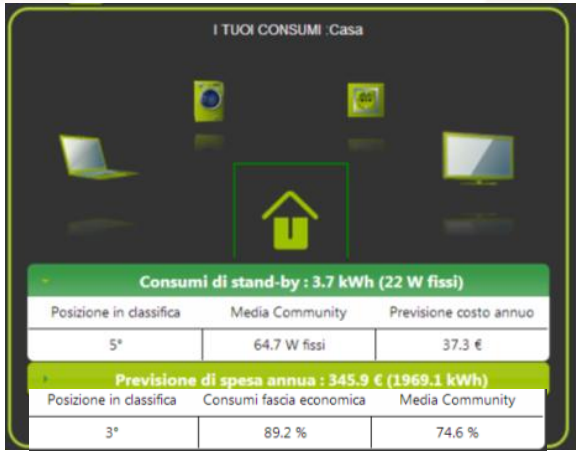
- Consumption + Generation Data
- Contractual information
- Push + Pull (on-demand)
- 1 Smart Info per Meter

Connected WM

- Instantaneous consumption data
- Per-phase schedulable
- Visualize cost and consumption
- Overload warning buzzer

Functionalities

- ✓Energy awareness (kWh, €)
  - ✓Total House, per-device, stand-by
- ✓PV Production: forecast & comparison with actual
  - ✓Real-time visualization of buy/sell/self energy
- ✓Scheduling (PV + time of use pricing)
- ✓Overload warning
- ✓Weekly summary per-device usage reports (includes also stand-by report)
- ✓Consumer's Behaviour Social comparison
- ✓Energy efficiency suggestions



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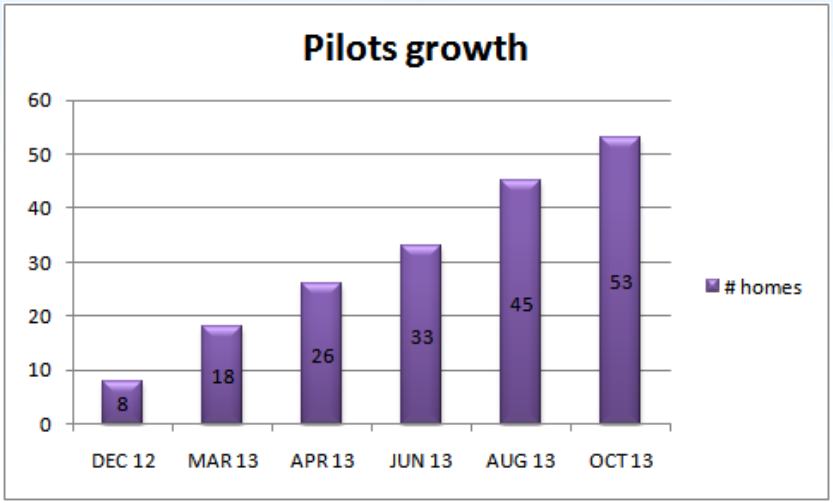
Scouting and deploying

Users selection considered different type of homes, family numerosity, geographic area, technology inclination.



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Main quantitative results from the trial

- *Limited statistical value (sample size)*
- *Users with PV installation not included yet*

Consumption reduced by 9%	If extended to full country (Italy) – means reduction of 5.6 TWh, avoiding emission of ~ 3 M tons of CO2 with average saving of ~ 40 €/user/year
Opportunity to limit installed power to 3 kW	From 8 users with installed power above 3 kW, only one actually uses it
	With current prices, at same level of consumption, a 3kW contract saves more than 180 €/year (vs. 4.5 kW contract)
Moving ~5% of consumption to off-peak periods	Impact is bigger than the mere night/day tariff scheme
Reduction of stand-by consumption by ~15%	For many users, just a simple and free way to save on electricity Biggest saving: 80W reduction, i.e. 700 kWh/year = ~130 €/year

Indesit Smart Appliance: Smart Aqualtis

Smart Aqualtis is the first Indesit washing machine designed to be integrated in "Smart" ecosystems, covering a wide range of use cases

Energy & Cost Awareness

- Estimated power consumption and cost for the washing cycle
- Real time energy and power consumption
- Smart Meter Mirroring on the display

Coaching

- Visualization of generic text messages

Energy Mgmt

- Per-phase schedulable to optimize power consumption and avoid power overload
- Safe mode in case of emergency
- Early overload warning when selecting cycle

Optimal Start

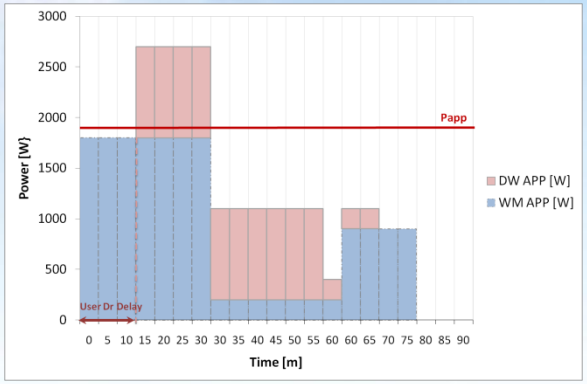
- Scheduling of the starting time to ensure the cheapest or the greenest cycle, always respecting the users constraints

Functionalities: Energy and cost awareness

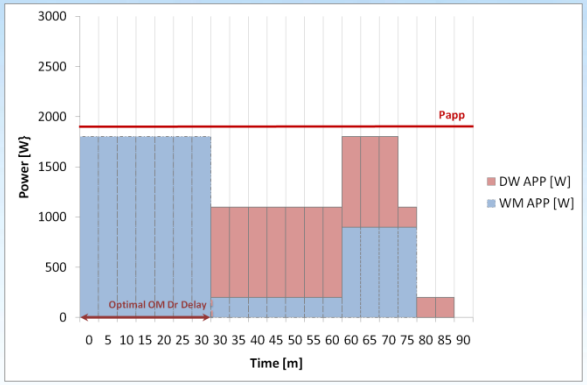
Washing machine User Interface

Functionalities: Overload control and warning

- Scheduling of the appliance to avoid the overload



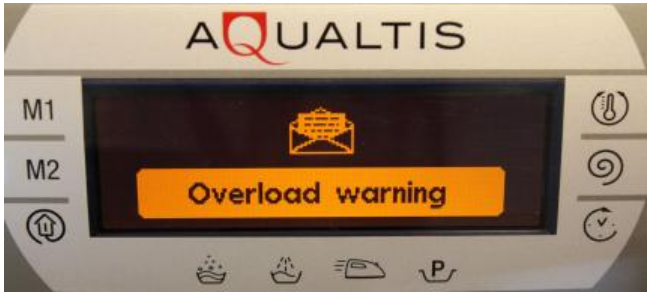
before scheduling



After scheduling

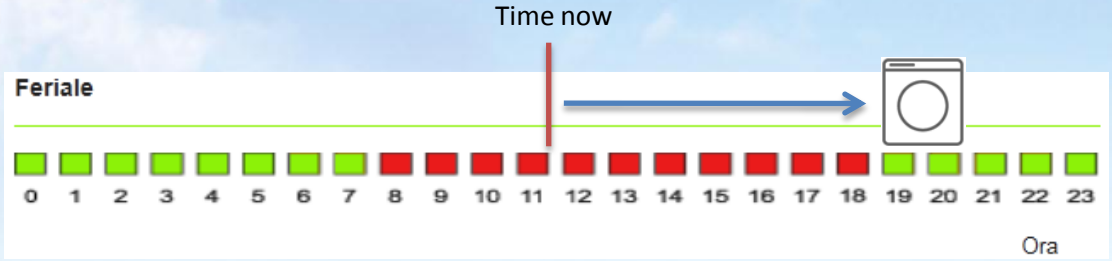
- Warning if available total power is not sufficient to run a cycle

- Notification of Home Domain Overload

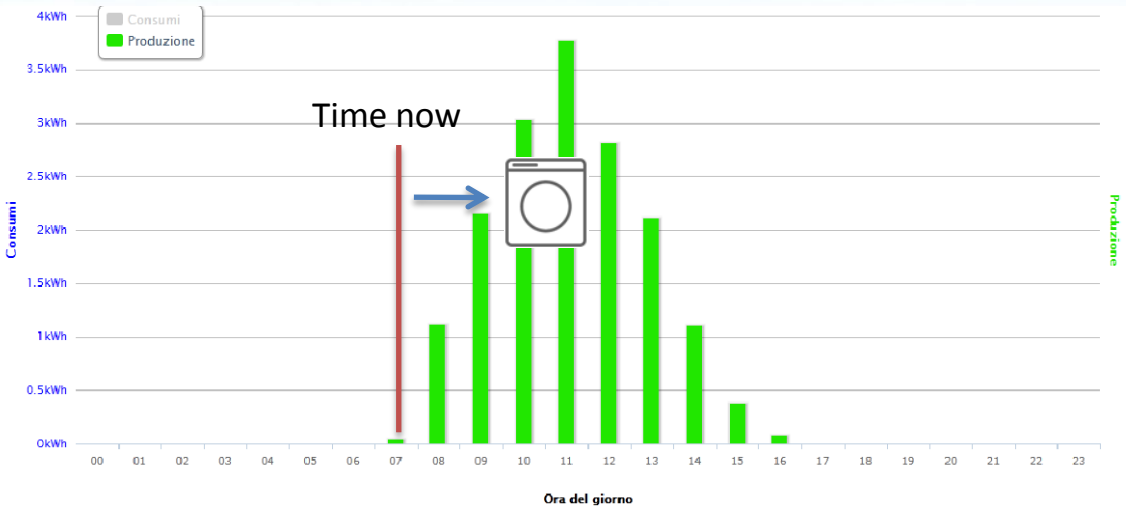


Functionalities: Scheduling

- Scheduling of the appliance when the energy is cheaper



- Scheduling of the appliance when the energy is greener



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Collecting washing machine data

Energy data from Telecom Italia DataBase

Every 2 minutes:

- WM energy consumption
- WM power consumption

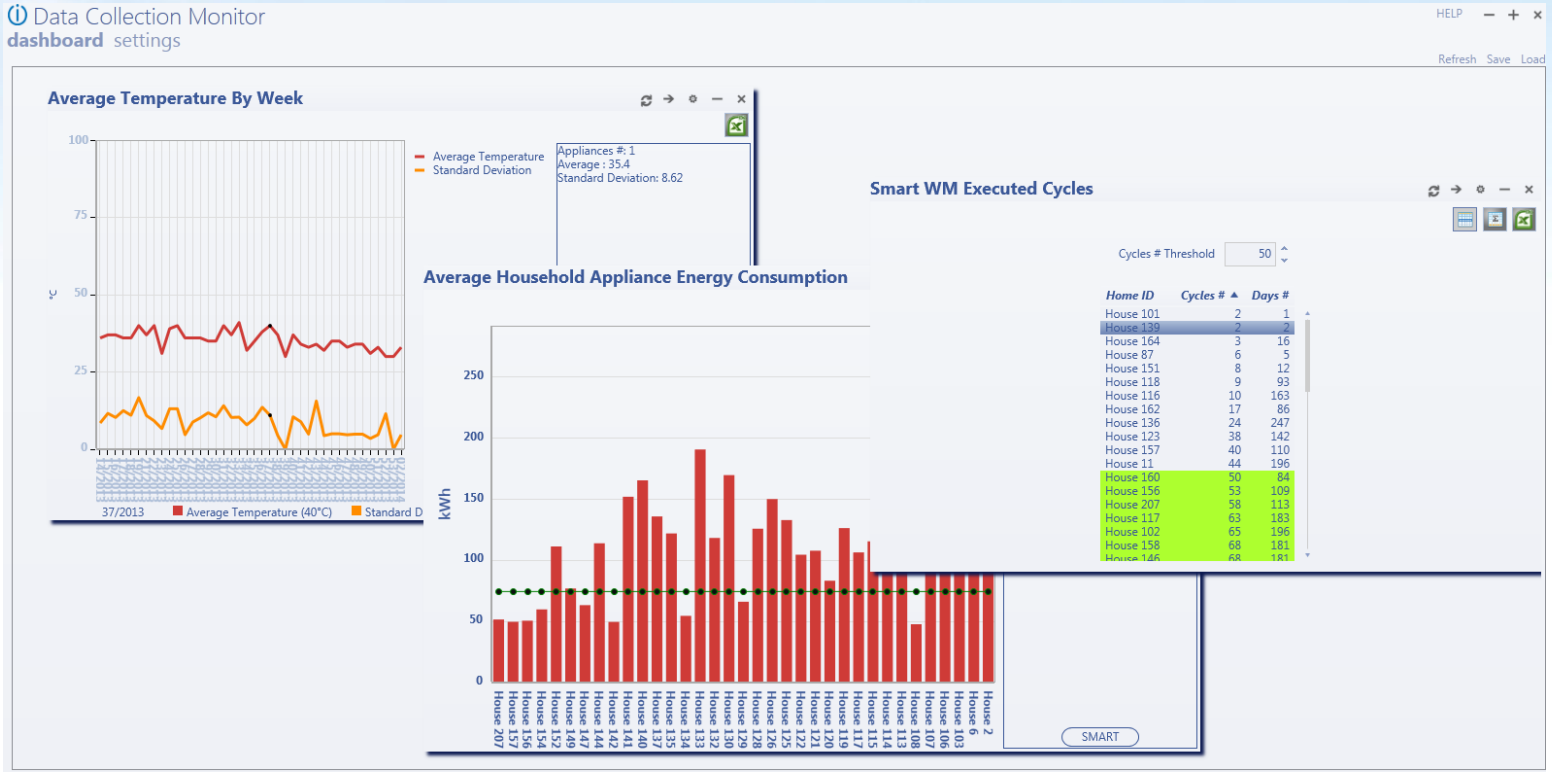
Washing data directly sent by the washing machine to Indesit data base

For every cycle executed:

- type of cycle
- selected temperature, spin, options
- day/hour of execution
- duration of the cycle
- …

Washing data analysis

More than **4000** cycles data collected and available to analyze user habit and appliance performance.



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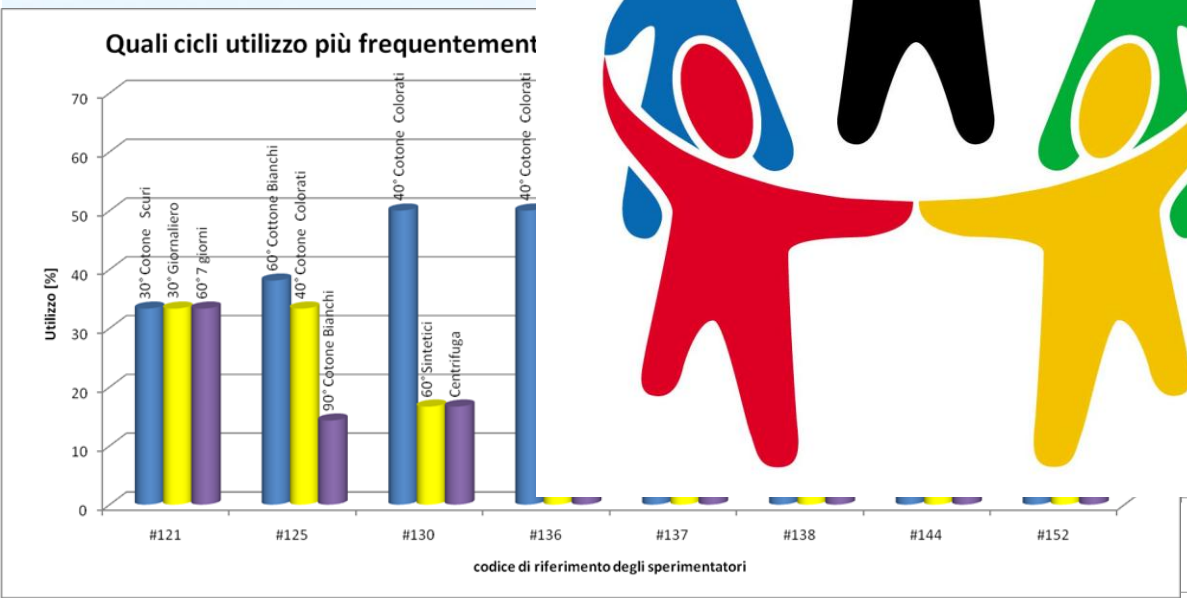
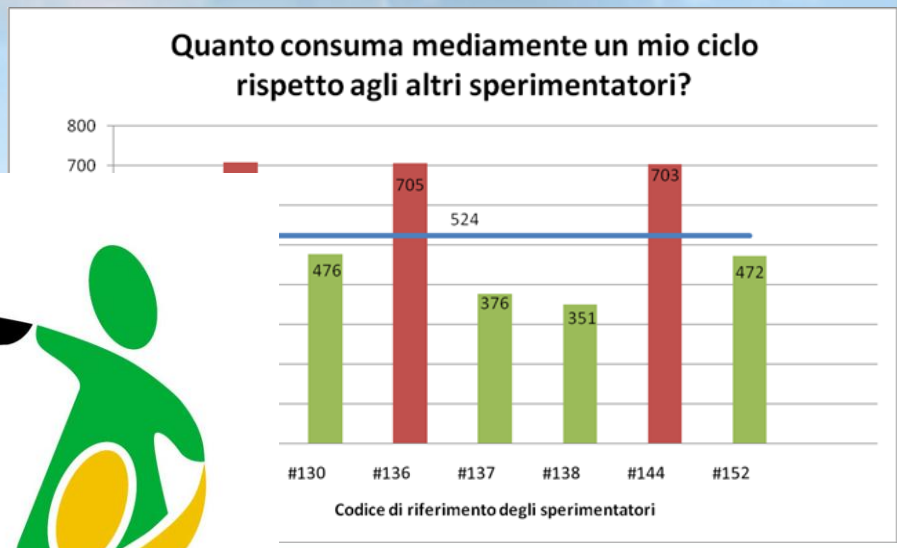
Washing data analysis

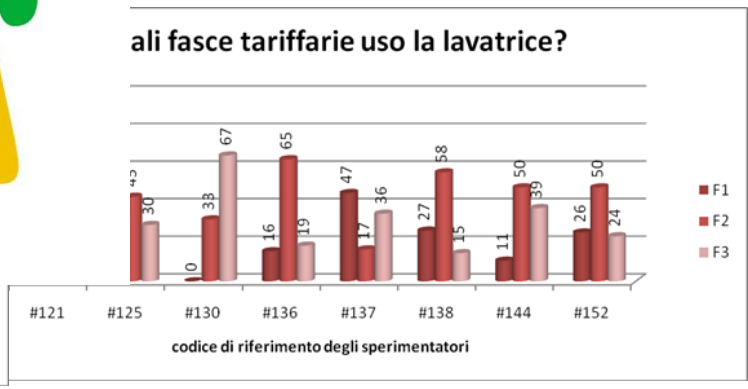
Washing data results

General habit and preferences of the users have been collected

Habit changes are also
web portal and wm disp
the **newsletter**







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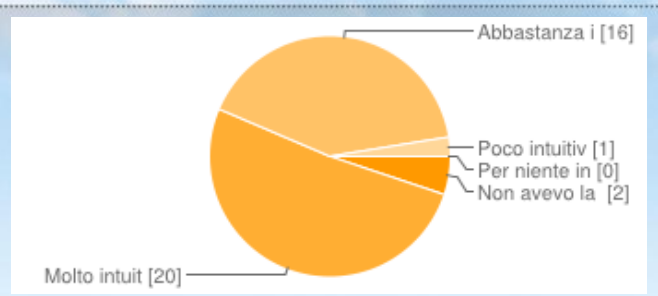
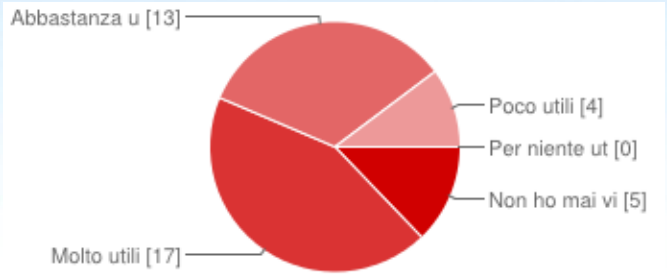
Focus group and Questionnaire results

Main Insights

Washing machine usage is INTUITIVE



Information on the washing machine display is USEFUL

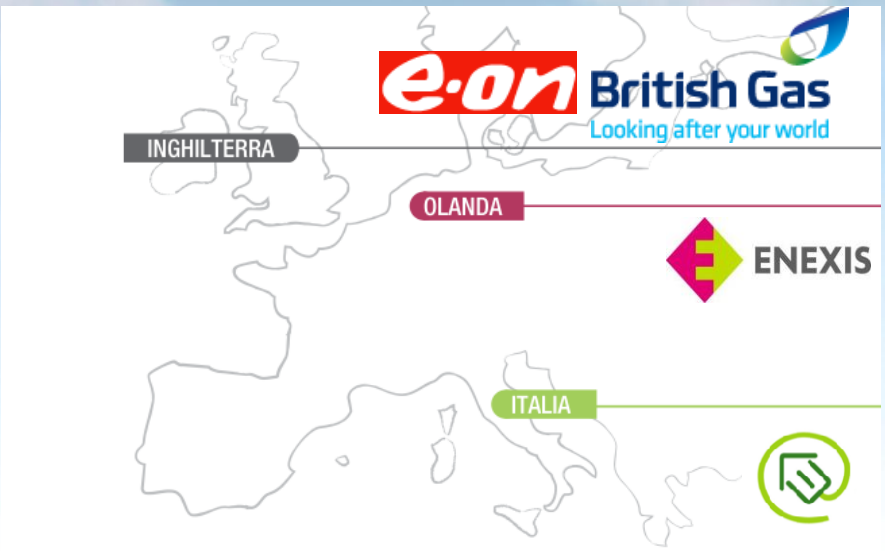


Washing machine consumption: looking for the best cost changing cycle and temperature

Active overload management , defining user priorities on the devices

Automatic energy cost negotiation with the smart grid

Interoperability



Smart Aqualtis is a key element in several european trials related to the smart home and to the smart grid:

- disseminating the E@h specifications and protocol
- proving the effectiveness of the use cases
- paving the road for an ecosystem

British Gas Trial (UK)

British Gas
Looking after your world

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Customer-Led Network Revolution

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Smart WM EOI

register your interest to participate in our smart washing machine trial

The Customer-Led Network Revolution has been formed to help understand current energy usage and how to best meet future energy needs. We will achieve this by monitoring the energy use in a large number of homes, and by introducing innovative ways in which customers can play a part in reducing peak electricity demand and keeping energy prices stable.

As part of this trial we will be supplying a limited number of a new 'smart' version of the Hotpoint AQUALTIS washing machine to selected customers, which will allow us to monitor how you use the appliance via an internet connection, and enable some advanced features concerning the timing of selected machine cycles which we would like you to test throughout the trial period.

Technical Specification

Loading Capacity: 11Kg
Energy Class: A+++
Spin Speed: 1600rpm
Display: LCD

Special Features:
- Super Silent system
- 10 years warranty on motor

rid-integrated washing machine aims to make UK greener

eptember 2013 By Tereza Pultarova

Share

50 households will be equipped with Indesit's super-smart washing machine in the framework of the Customer-Led Network

desit's Aqualtis washing machine, considered the smartest in the ropean market, will be installed in 150 UK homes to facilitate a ift towards low-carbon economy.

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Related news

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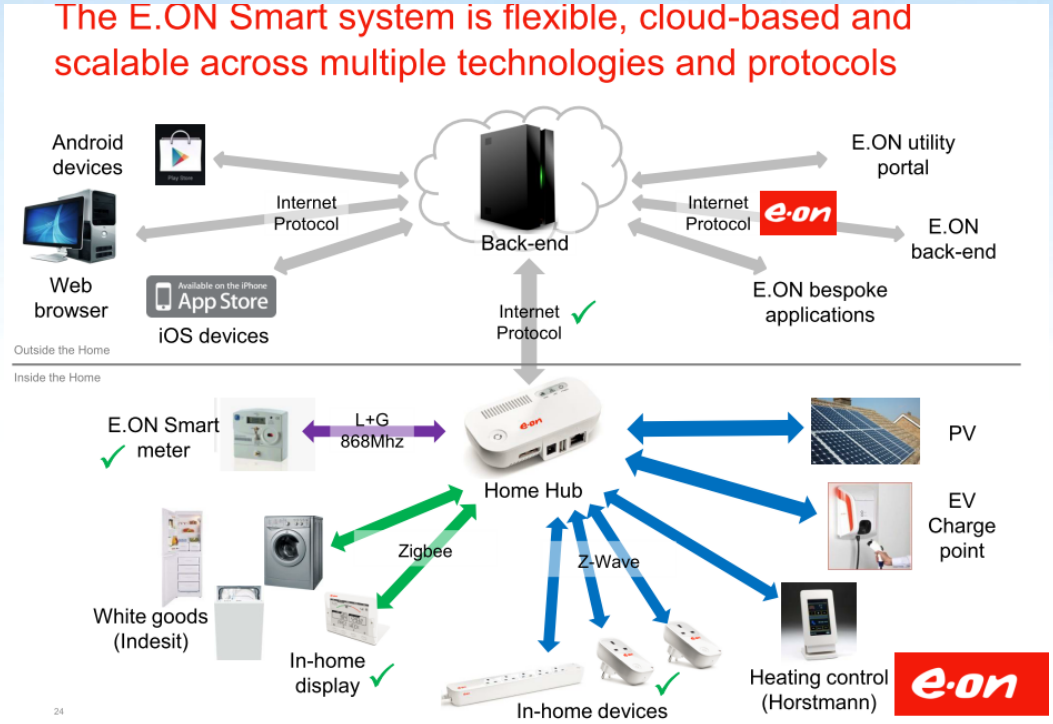
E-ON trial (UK)

E.On Thinking Energy program: 3 complementary trials in Sweden, UK and Germany

- Indesit Company will be involved in the UK trial where up to 75 users in Milton Keynes will use in an incremental way smart services and devices (heating, washing machine, heat pump, electric car)

- Trial target (30 E@h WM, May 2013 – Dec 2014): identify any changes on the cost, confort and carbon benefit for the trialist



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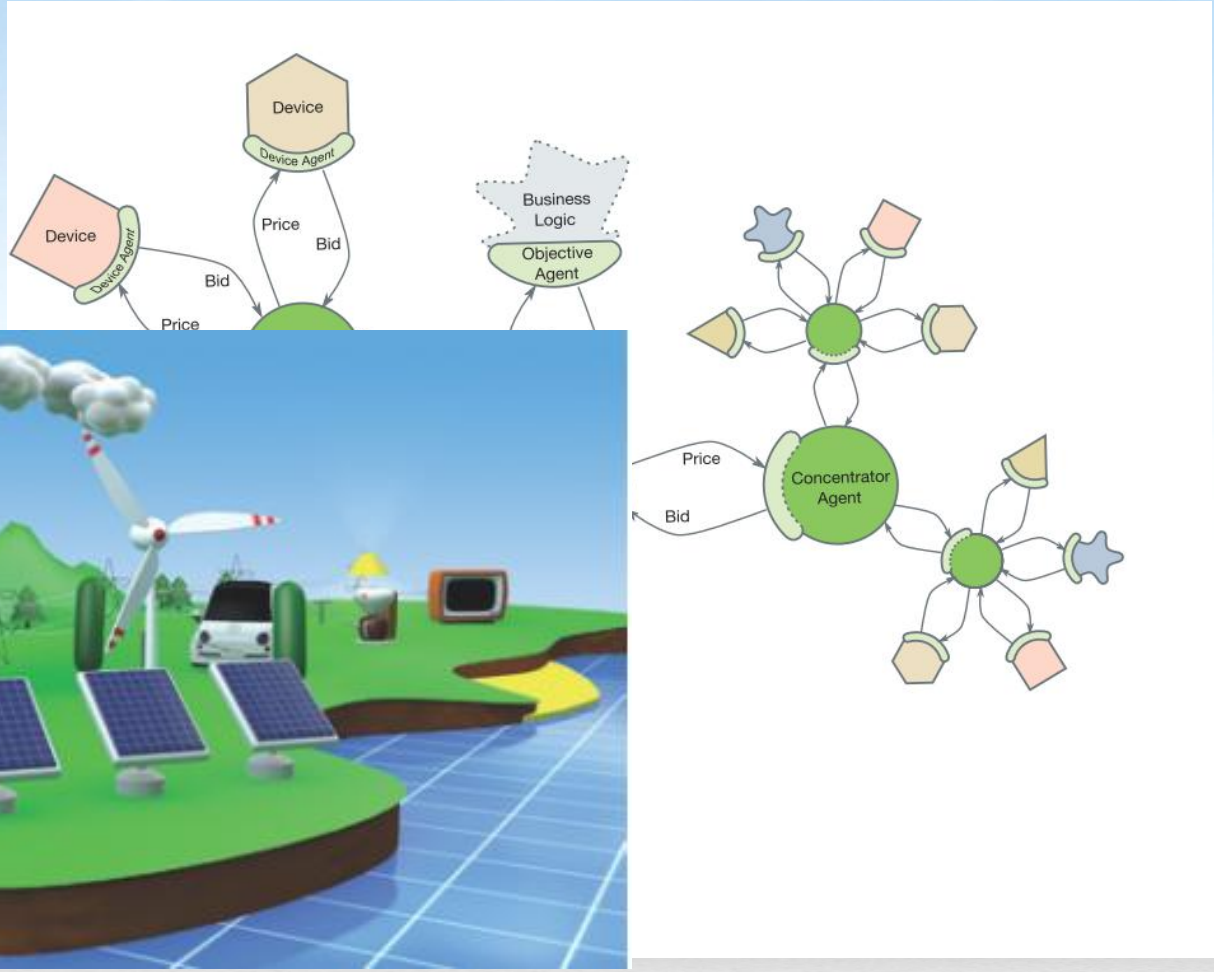
Power Matcher trial (NL)

http://www.youtube.com/watch?v=Zz4OpVwYWYE



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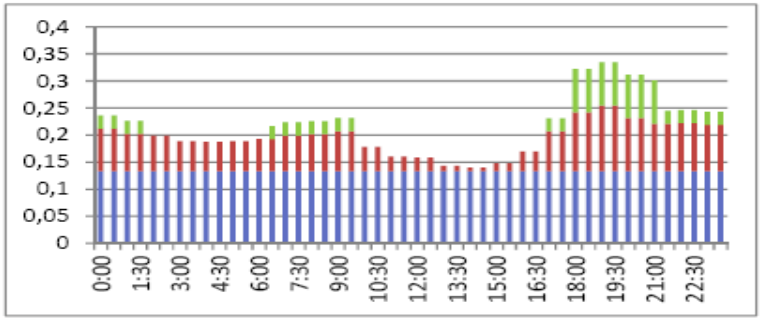
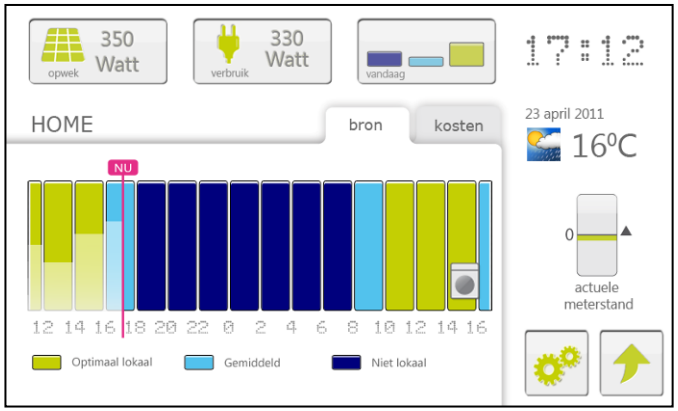
ENEXIS trial (NL) 1/2

Understand the customer reaction to a flexible usage of energy, based on economic incentive through time to use tariffs and the usage of micro generation (PV) inside the house.

Where: The Netherland (Breda and Zwolle)
What: 300 Smart Aqualtis
When: from August 2012 -> December 2015



Time to Use Tariffs (example)



Demand Side Management

- Promote energy efficiency and cost saving through time to use tariffs (cheap mode)
- Promote eco-behavior and cost saving through PV generated energy (green mode)
- Integration with the thermal control of the house

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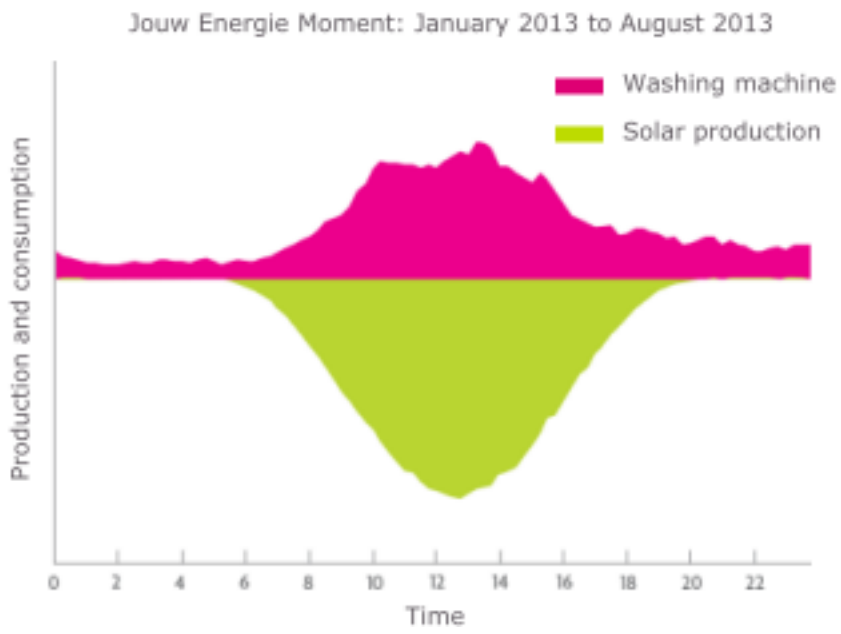
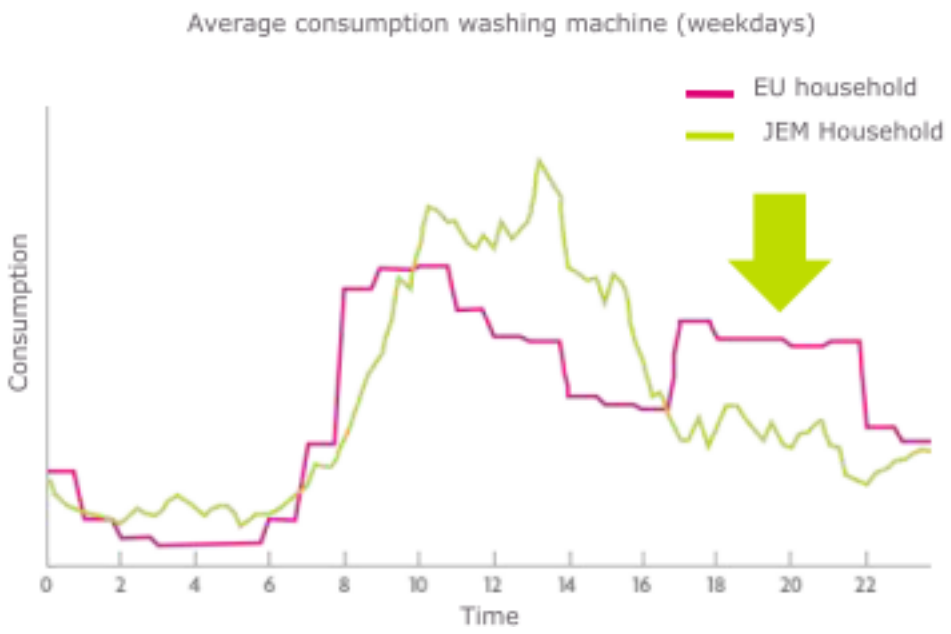
ENEXIS trial (NL) 2/2

1. Big investments can be avoided
2. Acceptability is there
3. Consumption shifts
4. Important motivation is money





Thank you!