Energy@home Association

a smart home eco-system

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28th Oct 2014

Outline

- Vision
- Main achievements
- Results of the trial
- What's next
- Smart Home Hackathon

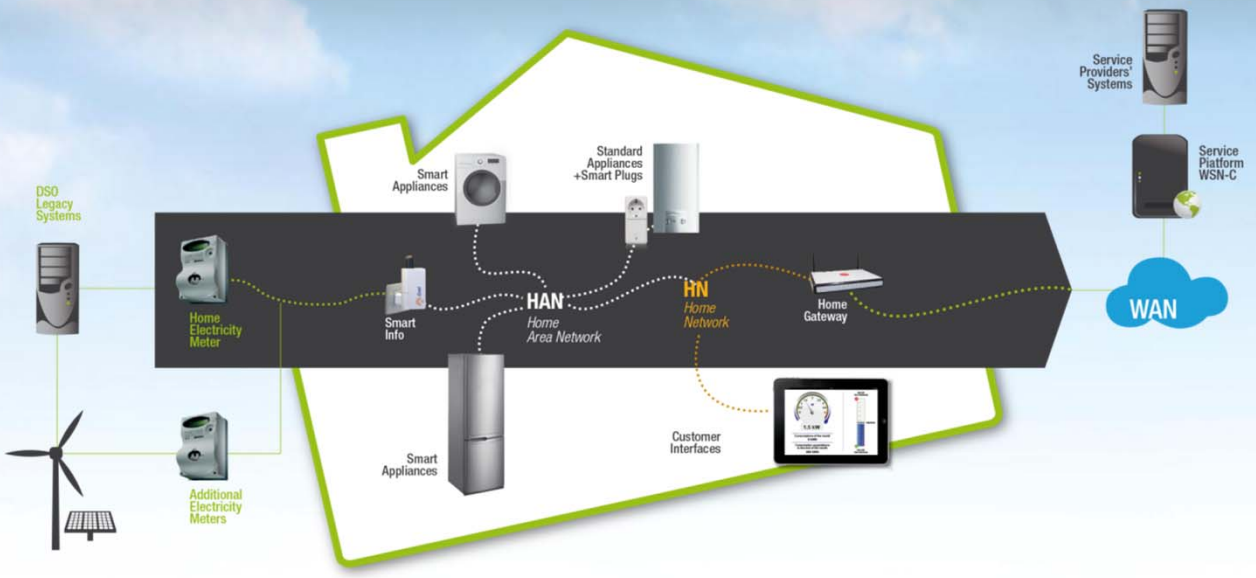
Energy@home vision: Smart Home Eco-system

Eco-system:

- A single service provisioning architecture
- Interoperable devices
  - Standards (protocols + data models + use cases)
  - The future is in *integration!*
- Single Box
- A unified homogenous user experience

In the longer term a cross-services partnership-oriented horizontal solution will win versus vertical independent silos solutions

Vision: consumer's flexibility can be managed and valued



All customers have a degree of demand side flexibility

- in time, in power, in energy

Flexibility can be managed to adapt & locally optimise the demand

- Pricing (time of use, critical peak, real time), contractual power, self-consumption

Flexibility enables also Customer 2 Grid Value Added Services

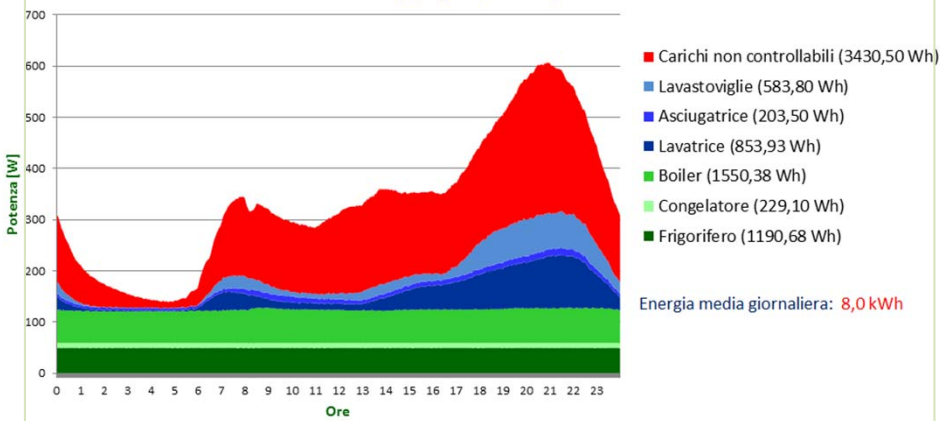
- to increase grid quality and grid reliability and to reduce balancing costs

Home Energy Management can exploit the Smart Home service provisioning infrastructure

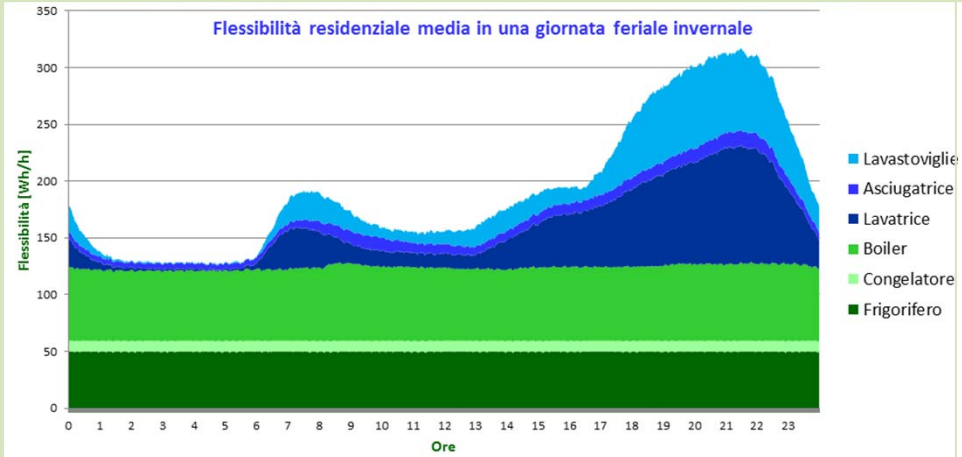
Analysis of the demand flexibility of an Italian residential customer

Bellifemine, Bella (Telecom Italia) – Gallanti, Maggiore (RSE), to appear on: L'Energia Elettrica, August 2014

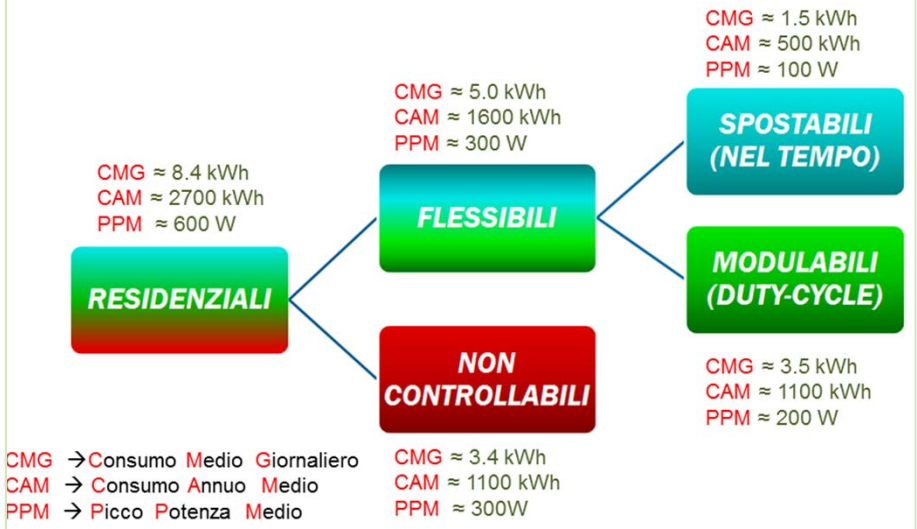
Disaggregated Load Profile (data from 1000 customers)



Demand Side Flexibility



60% of the energy demand is flexible!



What if 20 Million customers…

- 6 GW of flexibility between 19:00 and 21:00
- 2.4 GW of flexibility over all 24 hours
- 100 GWh/day of flexibility
- … as a comparison:
  - The peak in Italy is ~56 GW
  - The cost of interrompibility service in 2012 was 600 M€ for 4.3 GW of power

gator

Energy@home Association

Non-profit Association founded on July ’12.
Networking tool: competitors collaborate to create a market

Scope: smart home & demand side management, not limited to the italian market

Goal: create a market for new Value Added Services based upon device-to-device communication and demand side management

Approach:
Open and International Standards, trials & regulations

Main achievements so far

ZigBee Home Automation 1.2

- Energy@home is an acknowledged main contributor
- Integrates Energy@home use cases and technical specifications
- Energy is just 1 of the services of the Smart Home

Prototype system

- Integrates 11 different devices and systems from E@h partners/off-the shelf products
- Presented at EU Utility Week, M2MForum, Designing with Freescale
- Permanent demo at ISMB and Telecom Italia premises

Open Source

- ZigBee Gateway
- Sw of the client side
- Java for OSGi

Trials

- 5 trials in Europe, one is in Italy

Regulations

- acknowledged contributor to CERRE report on Smart Metering (Centre on Regulation in Europe)
- acknowledged in DCO 232 of Italian Authority on user awareness
- Contributor to Confindustria cost-benefit analysis

The devices: Smart Home Gateway

Multi-function Smart Home Hub

- OSGi Service Execution Environment

Single box in the near future

- Dual box before the market takes off

ZigBee Coordinator

- Certified implementation of ZigBee Gateway Device
- ZigBee Trust Center
- May host multiple network interfaces

Smart Home Cloud Platform

- Data base of users, devices, data

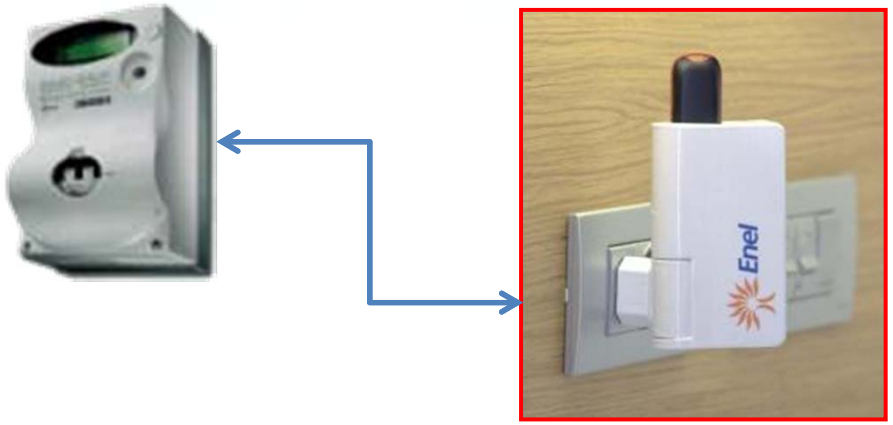
Bank of customer data

- Protect data & privacy
- Increment value of data

The devices: ENEL Smart Info

Enel Smart Info has been designed to provide end users with the certified information on electricity consumptions managed by the electronic smart meter.

It can be plugged in every domestic socket to start data collection from the smart meter through powerline.



Metering Data	
Metering data	Active and negative energy in current billing period and in different tariff intervals.
	Active and negative energy in previous billing period and in different tariff intervals.
	Maximum power of active and negative energy in current billing period and in different tariff intervals
	Maximum power of active and negative energy in previous billing period and in different tariff intervals
	Average positive and negative power (different integration periods)
	Reactive Energy in different billing periods and tariff intervals
	Instantaneous power
	Active and reactive energy of current day and previous one.
Contractual and configuration information	Contractual power and power thresholds.
	Customer ID
	POD (Point of delivery) code
	Tariff intervals
	Credit left (for pre-paid contracts)
	Date and time (from the Smart Meter)
	Last alarm with type and timestamp
	Meter device details
	Bidirectional transmission of custom data.

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

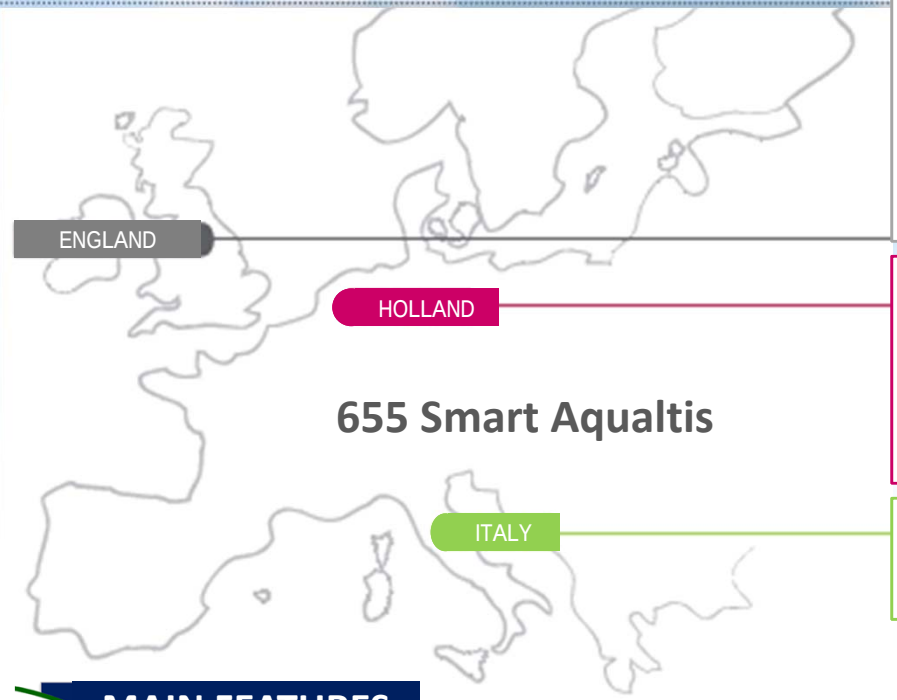
Energy Mgmt

- 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

Energy@home trials



ENGLAND

HOLLAND

655 Smart Aqualtis

ITALY

British Gas
Looking after your world

165 Smart Aqualtis
Ongoing …

e·on

30 Smart Aqualtis Ongoing..

ENEXIS

380 Smart Aqualtis
Ongoing …

PowerMatching City

25 Smart Aqualtis
Ongoing …

Enel Distribuzione

TELECOM ITALIA

50 Smart Aqualtis
Ongoing …

MAIN FEATURES

Energy & Cost Awareness

Coaching

Coordinated Energy Management

Optimal Start

Energy@home Italian trial

56 users in Italy (20 have a PV plant)

User functionalities:

- Awareness:
  - monitoring (kWh, stand-by, €)
  - aggregated reports
  - social comparison
- Automatic scheduling
- Overload warning

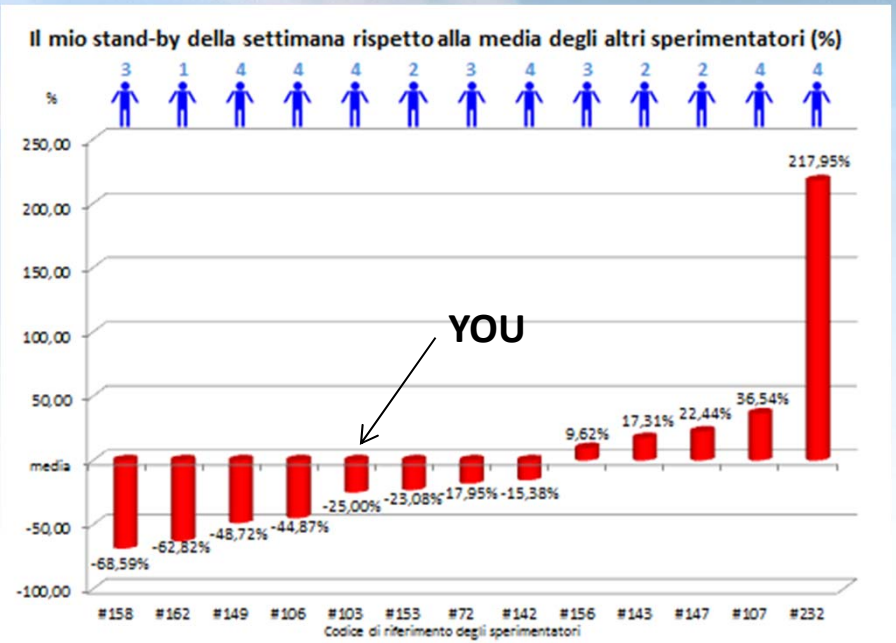
LIKE

- 9% avg energy saving
  - at country level means 5.6 TWh, ~ 3 M tons CO2
- 5% energy shifted to off-peak hours
- 15% reduction stand-by consumption
- Social comparison as a benchmark
- Smart Info, Smart Appliance, Smart Gateway

DISLIKE

- Automatic decision systems are required!
- Smart Plugs
- More smart home services are expected

Analysis of Occupant Behaviour: Data & Gamification



«the verdict was very cruel to me given that **only a family with four members has consumed more than me**, […] and all the other trialists have consumed much less than me»

«**I am satisfied when seeing the other participants' consumption because I am in the middle of the ranking**, of course I would be pleased to further improve my position»

«**I am very satisfied that my fridge has the least consumption**: it is an A+ class and I bought it very recently»

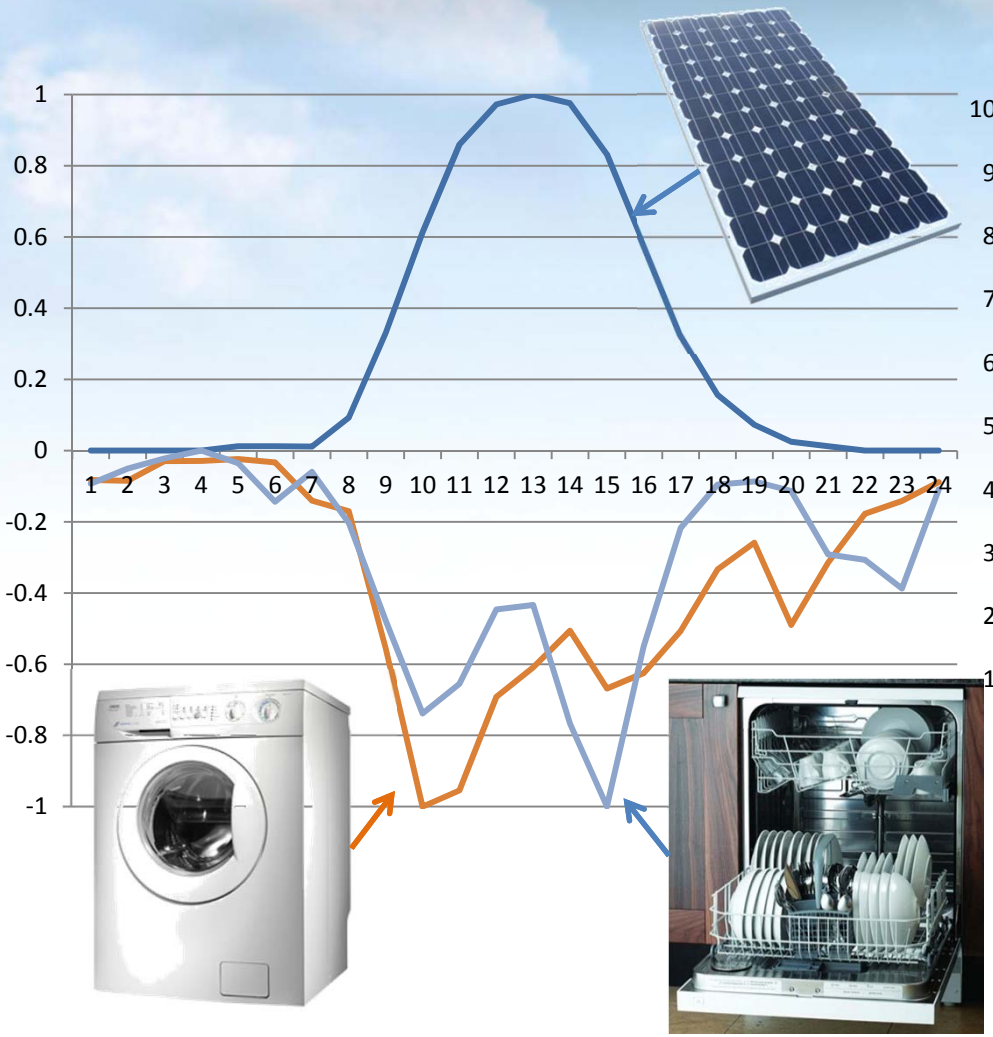
«I understood that I could use the quick program of the dishwasher every 2 days and save 25€»

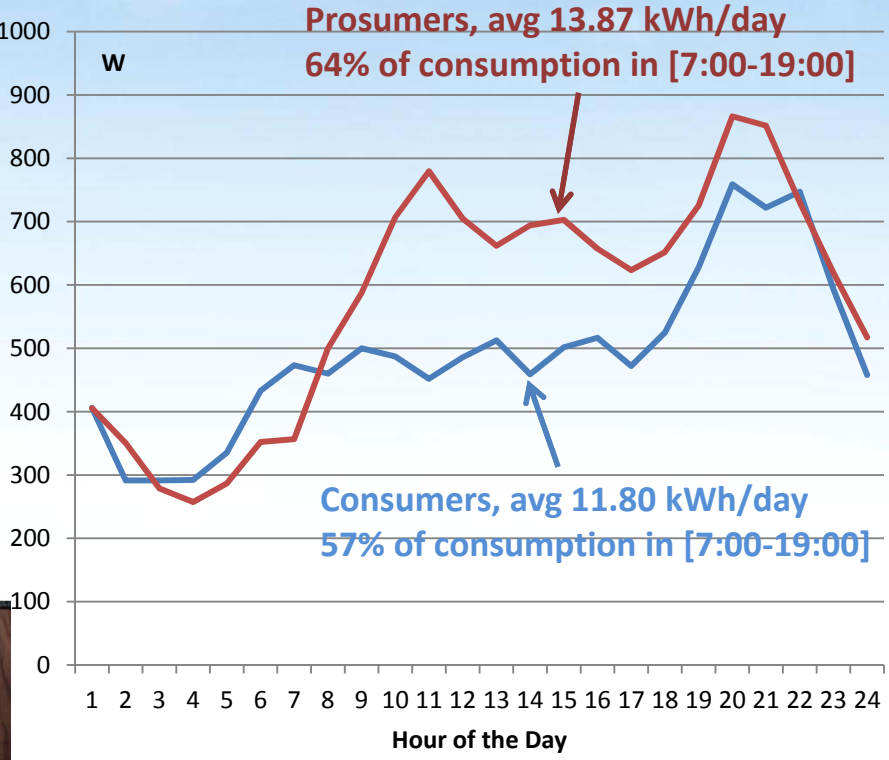
«I'm pleased this week I saved 3.84 KW/h in respect to last week: a small quantity but it's a good start»

«I discovered where I have a large consumption: it is the fridge!»

«Thank you for the info. I suspected stand-by consumption impacted but I had no idea how much»

Prosumers synchronize main loads with the generation curve

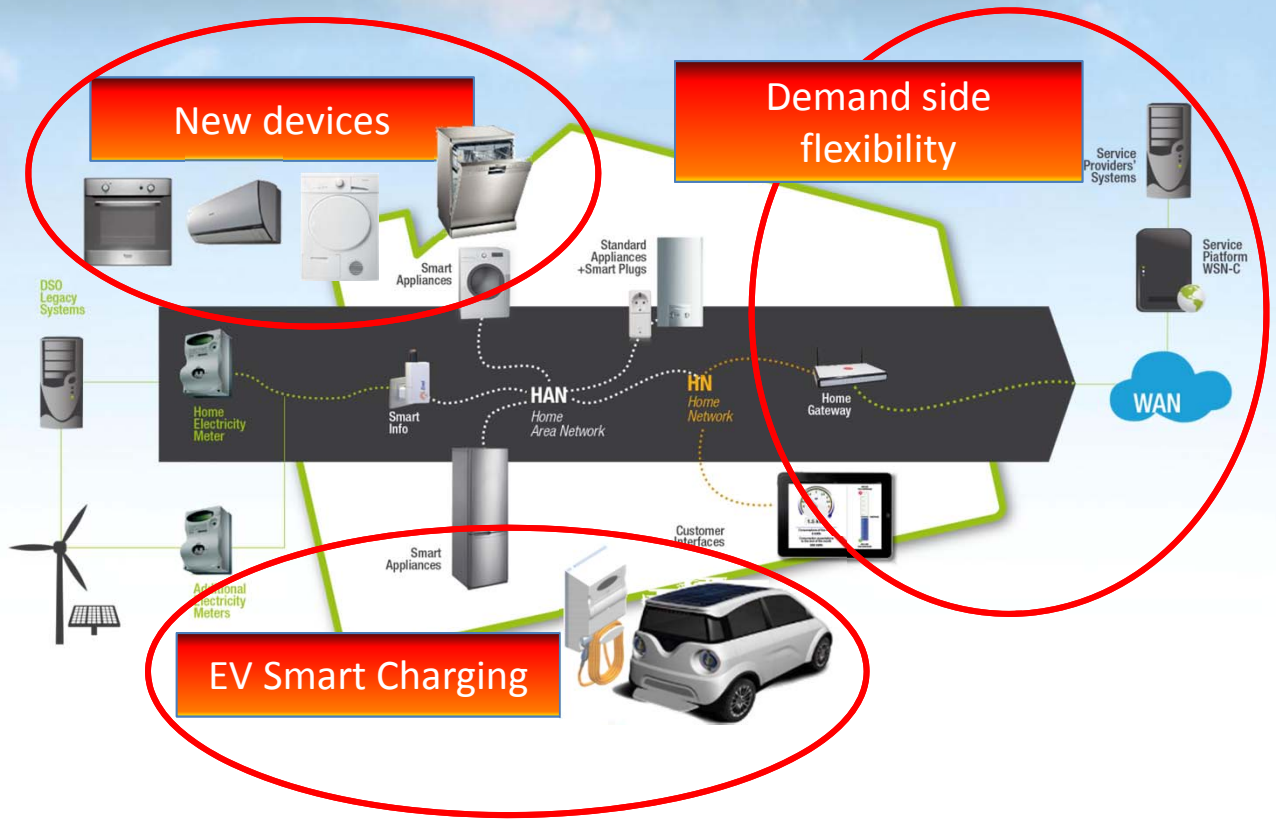




PV: data averaged over 20 users
No-PV: data averaged over 30 users

Energy@home: what's next

- Smart Home Ontology (IEEE P2030.5, ETSI)
- new devices (storage, heating pumps, …) & EV Smart Charging
- Harmonization with French Linky Meter Initiative



- Real Time Energy Pricing schemes under the Italian/EU regulation context
- Active Demand & Demand side flexibility

Energy@home Hackathon, 21-23 Nov 2014

What:

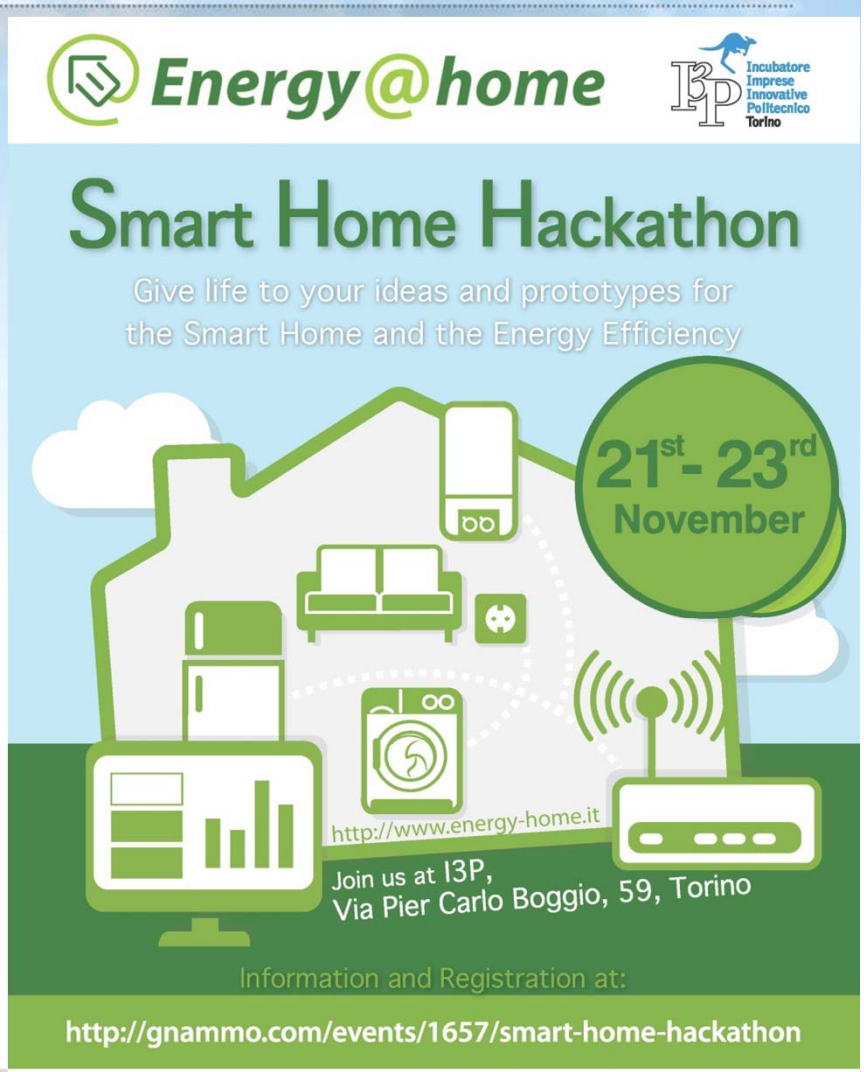
- A competition of ideas and fast prototyping
- Subject: Smart Home
- Award to the best 3 projects
- Eco-system & JEMMA integration

Where & When

- Torino, hosted by i3P startup Incubator
- 21-23 November 2014

Target Participants:

- Start-ups & Small Enterprises
- Software developers
- Students & Research Groups

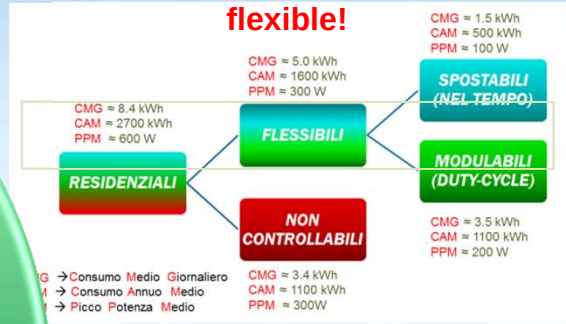


Conclusions & Take aways

Smart Home as an eco-system

Consumers' Flexibility can be managed

60% of the energy demand is flexible!



Devices and Trials

Hackathon, 21-23 Nov


Grazie