Energy@home

Energy@home Association

valuing the demand side flexibility through a Smart Home eco-system

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TELECOM ITALIA

Outline of the talk

- Energy@home Association
- Main achievements
- Open and International Standards
- Energy flexibility of residential customers
- What is next
- Conclusions

Energy@home Association

- **Non-profit Association founded on July ‘12**
- **22 members from very different industrial sectors**
- **Scope: demand side management & home energy efficiency, 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**

Founding Members:

Electrolux, Enel Distribuzione, Indesit company, Telecom Italia

Ordinary Members:

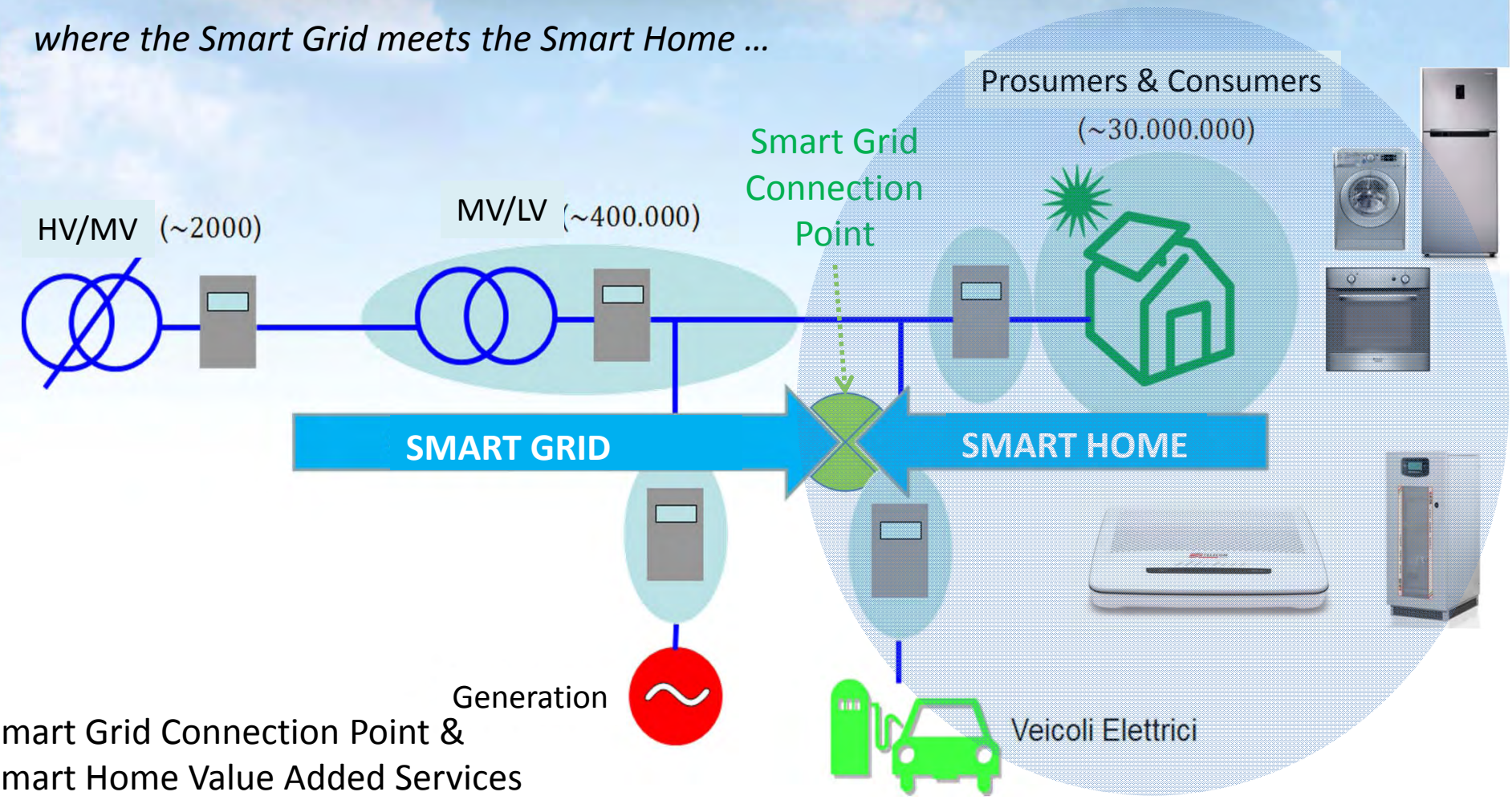
Edison, Vodafone, Whirlpool EMEA, Ariston Thermo Group

Aggregate Members:

eurotherm, MAC, FlexGrid, Reply flash, i-EM, freescale, intecs, ST, Gemino, ISMB, power-one, Renesas, URMET GROUP, altran

Scope of the Association

where the Smart Grid meets the Smart Home …



Smart Grid Connection Point &
Smart Home Value Added Services

(courtesy of G. Mauri, RSE)

Main achievements

Standard ZigBee Home Automation 1.2

- acknowledges Energy@home in standard, press release & public webinar
- Integrates Energy@home use cases and technical specifications

Prototype system

- Integrates 11 different devices and systems from E@h partners & off-the shelf products
- Presented at EU Utility Week in Amsterdam, soon at M2M Forum
- Permanent demo at ISMB and Telecom Italia premises

Trials

- 5 trials in Europe, one is in Italy

Open Source

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

Cost Benefit Analysis

- Submitted to Confindustria
- Available as public document
- Main Contributors Enel, TI, CECED
- For some classes of users PP in 3 years is possible under some conditions

Energy@home *adapts and adopts* International Standards

On Jul. 2011 Energy@home and ZigBee Alliance signed a collaboration agreement that resulted on July 2013 with the ZigBee Home Automation 1.2 standard

ZigBee Alliance:

- 400+ member companies (40% Americas, 30% EMEA, 30% Asia)
- 800+ certified products

Market leader with most deployed low power wireless mesh standard

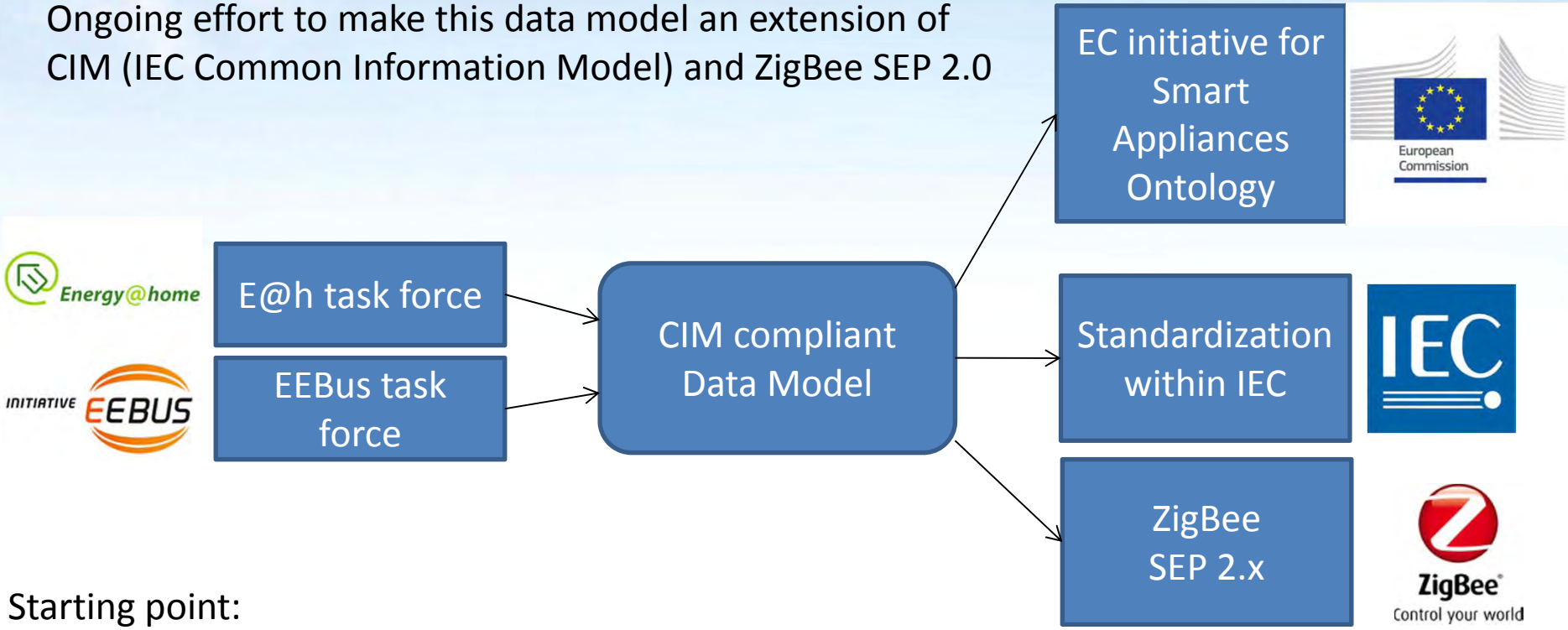
A plethora of services can be based upon the same service provisioning infrastructure: communication standard + home gateway + cloud

Energy@home data model activities

Under discussion with EEBus

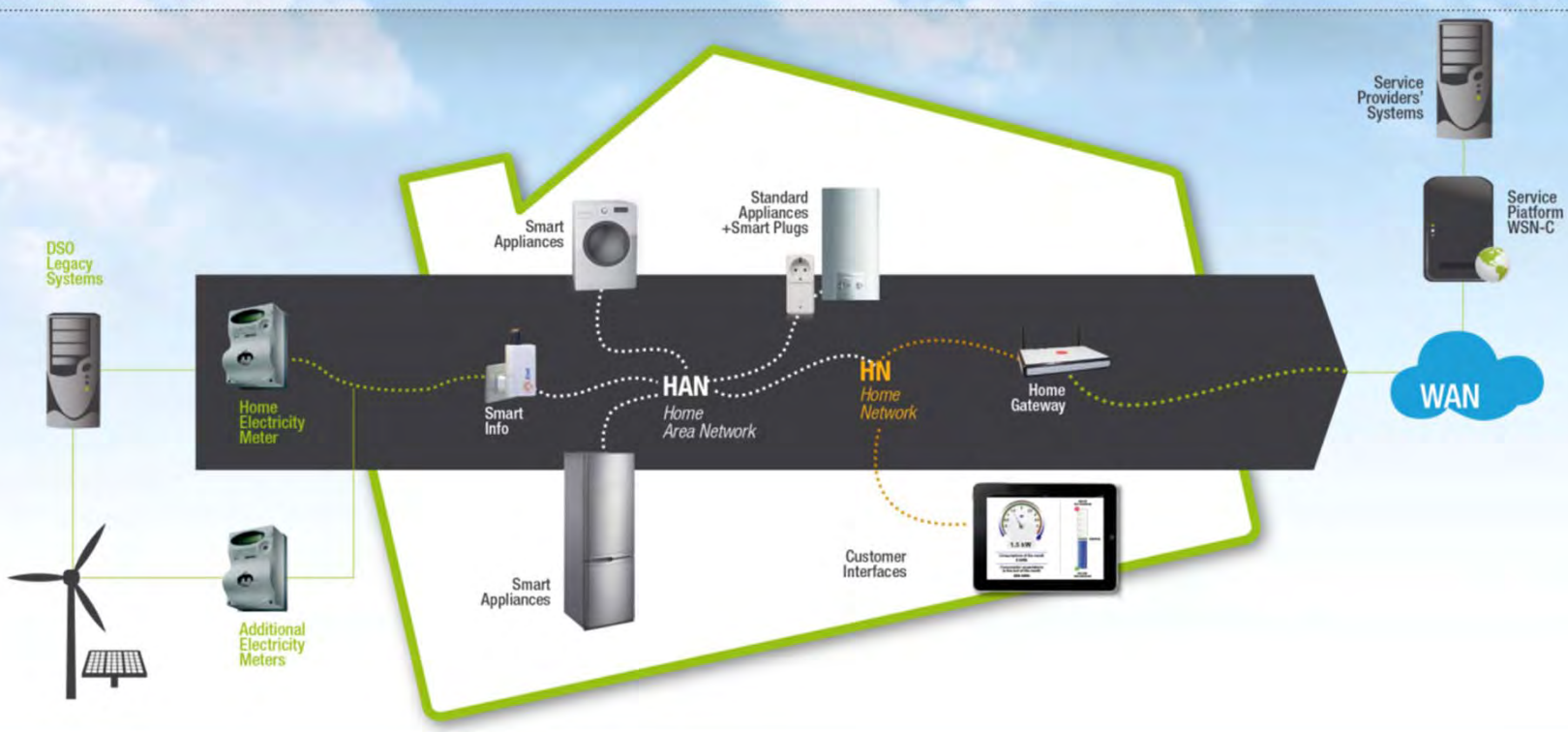
Energy@home Data Model 1.0 available on the web site

Ongoing effort to make this data model an extension of CIM (IEC Common Information Model) and ZigBee SEP 2.0



Starting point:
existing and accepted **CIM related** data models (e.g. **OpenADR** and **ZigBee SEP 2.0**)

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

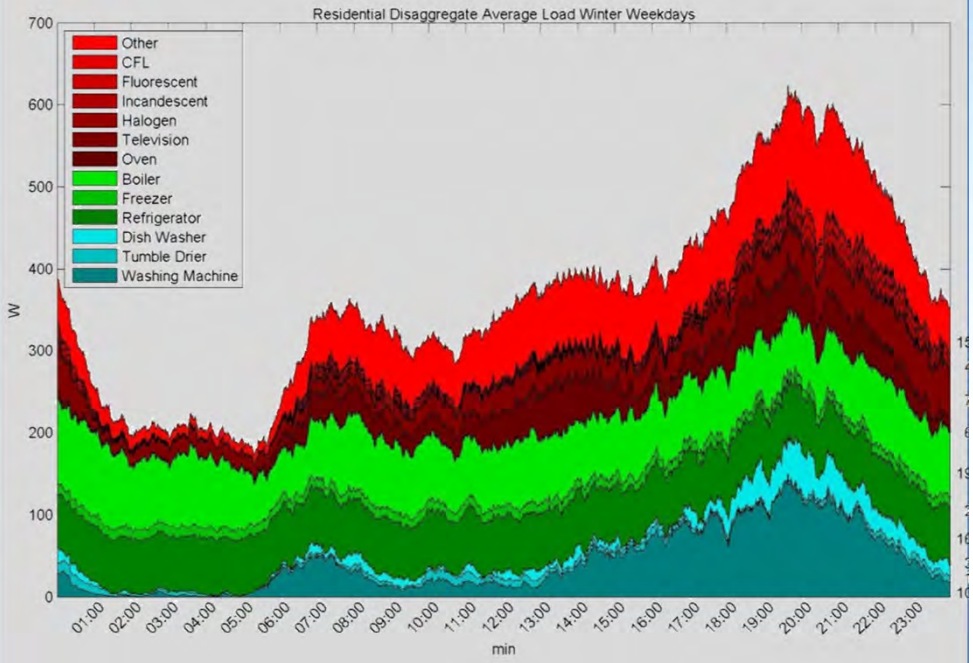
- time of use pricing, reduced contractual power, maximise incentives through self-consumption
- It can exploit the same service provisioning infrastructure of the Smart Home Services

Flexibility enables also Customer 2 Grid Services

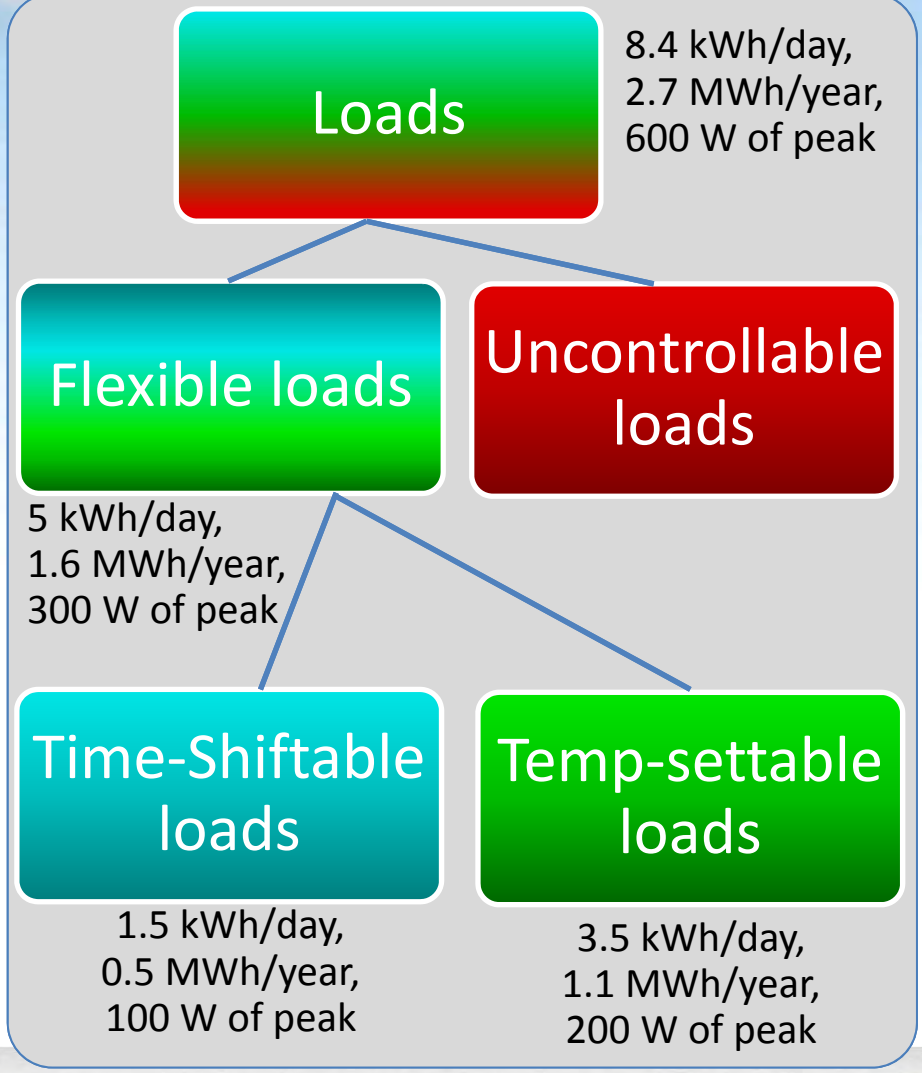
- to increase grid quality and grid reliability and to reduce balancing costs

Demand Side Flexibility of Italian Residential Customers accounts for more than 60% of consumptions

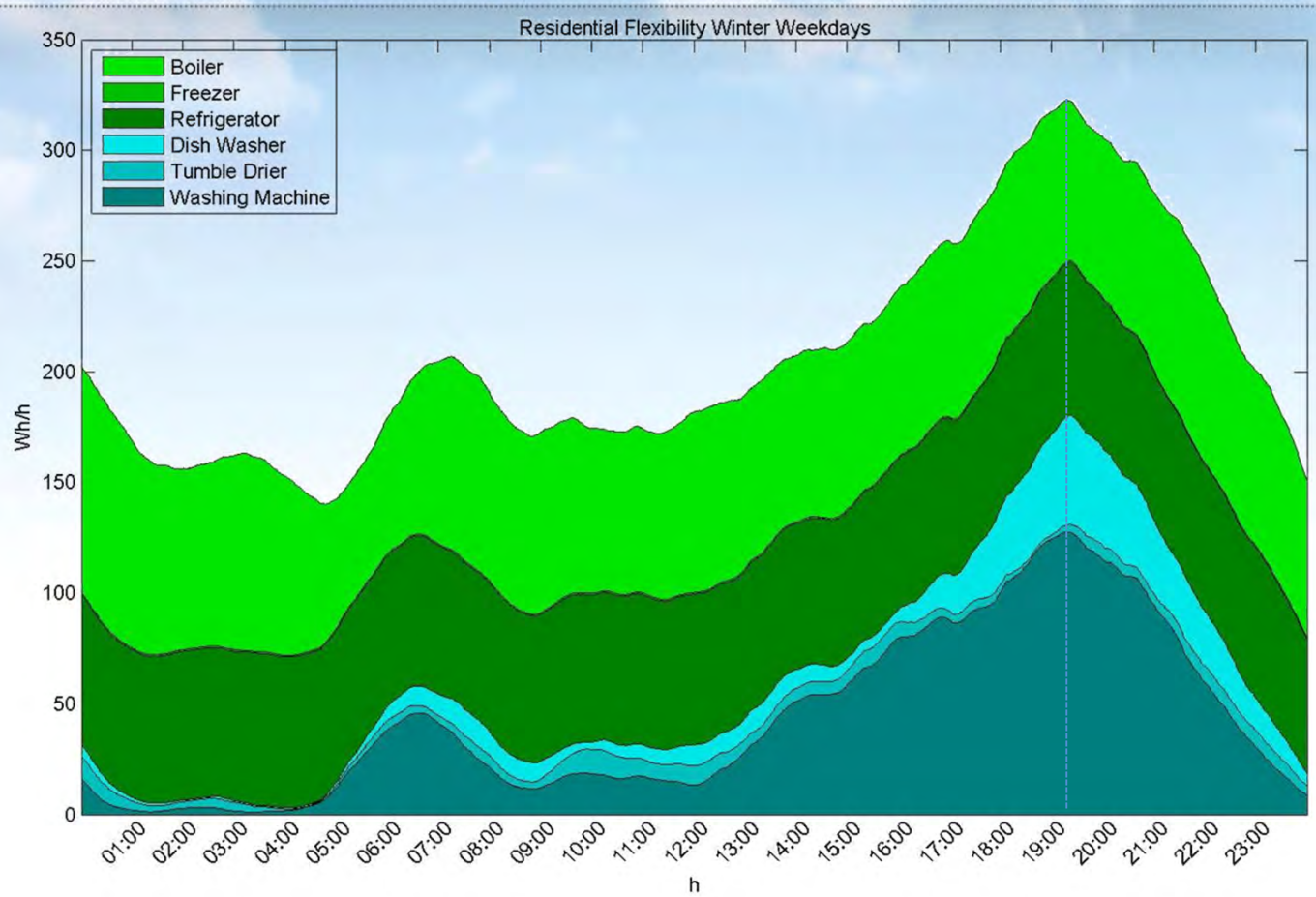
Power Load for Residential Customers



Source: S. Maggiore, M. Gallanti, 2013, Analysis of 2011-2012 data from a sample of 1000 families

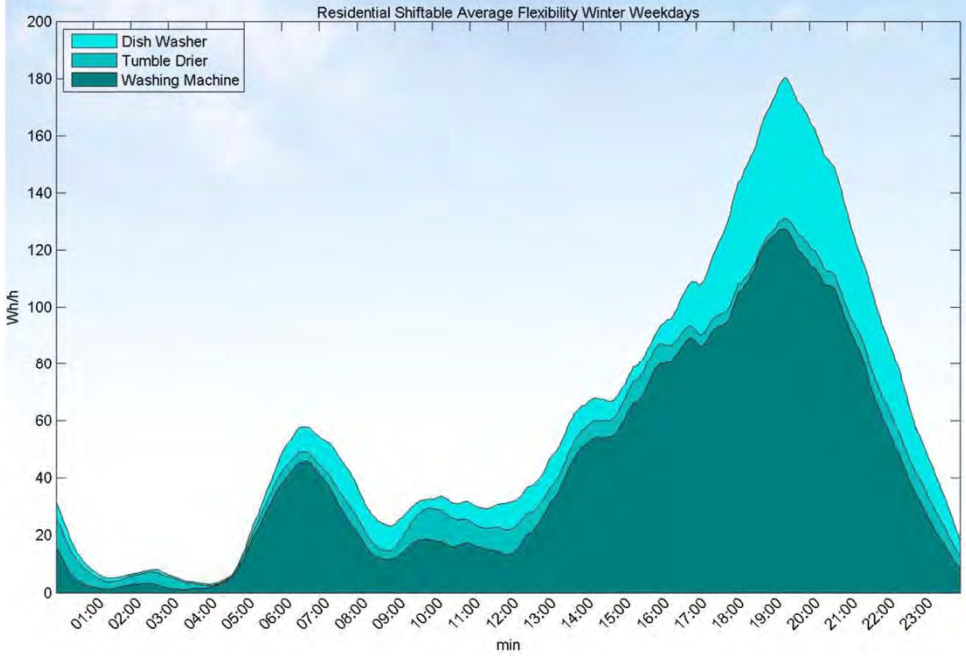


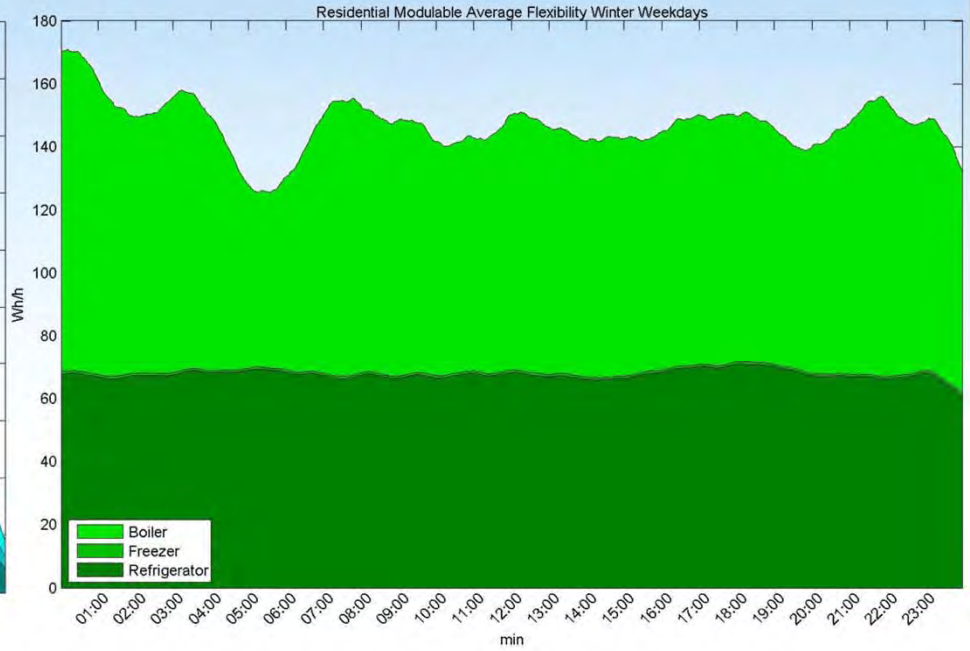
A 1 hour DR-event can get up to 320 Wh/user of flexibility



Avg Residential Flexibility for a 1 hour D-R event

Shiftable VS Modulable Loads





Time-shiftable loads depend on user behaviour
1.5 kWh/day/user, peak 180 W

Temp-modulable loads are homogeneous over time
3.5 kWh/day/user, peak 160 W

Incremental steps towards FlexibilityAsAService

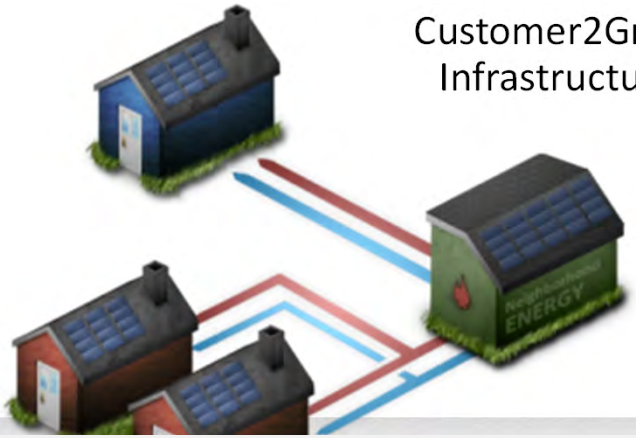
Local infrastructure

Tools for User Awareness

Tools & Methods to
Drive and Motivate changes in
user behaviour

Automatic system
(requiring no user intervention)

Customer2Grid
Infrastructure

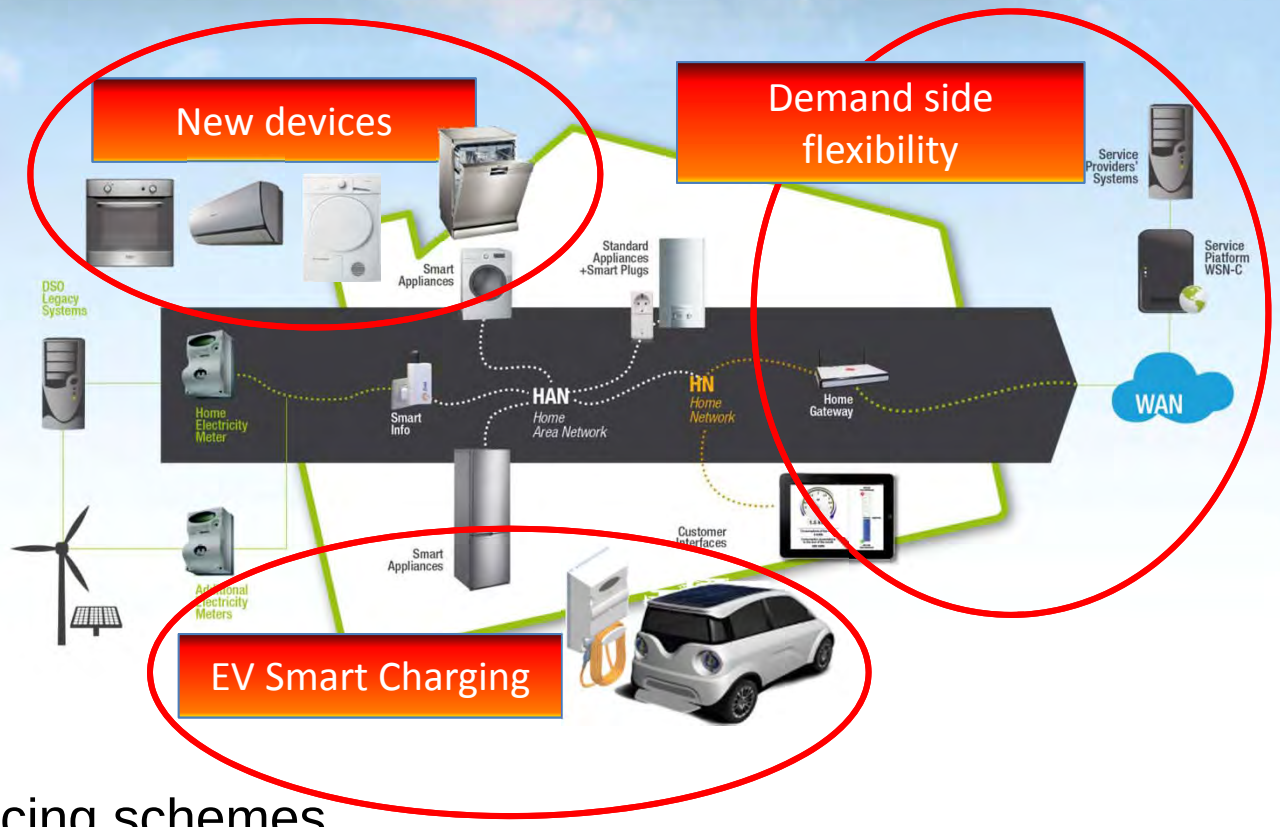


Flexibility as a service

In Jan 2014, during the Polar Vortex, hundreds of Texas businesses, schools, local governments and individuals participating in demand response provided **496 MW of capacity to the grid within 46 minutes of being called**, **an amount equal to the output of an average sized coal fired power plant.**

Energy@home: what's next

- Demand Side Flexibility and Active Demand
- Integration of new devices (storage, heating pumps, …)
- EV Smart Charging



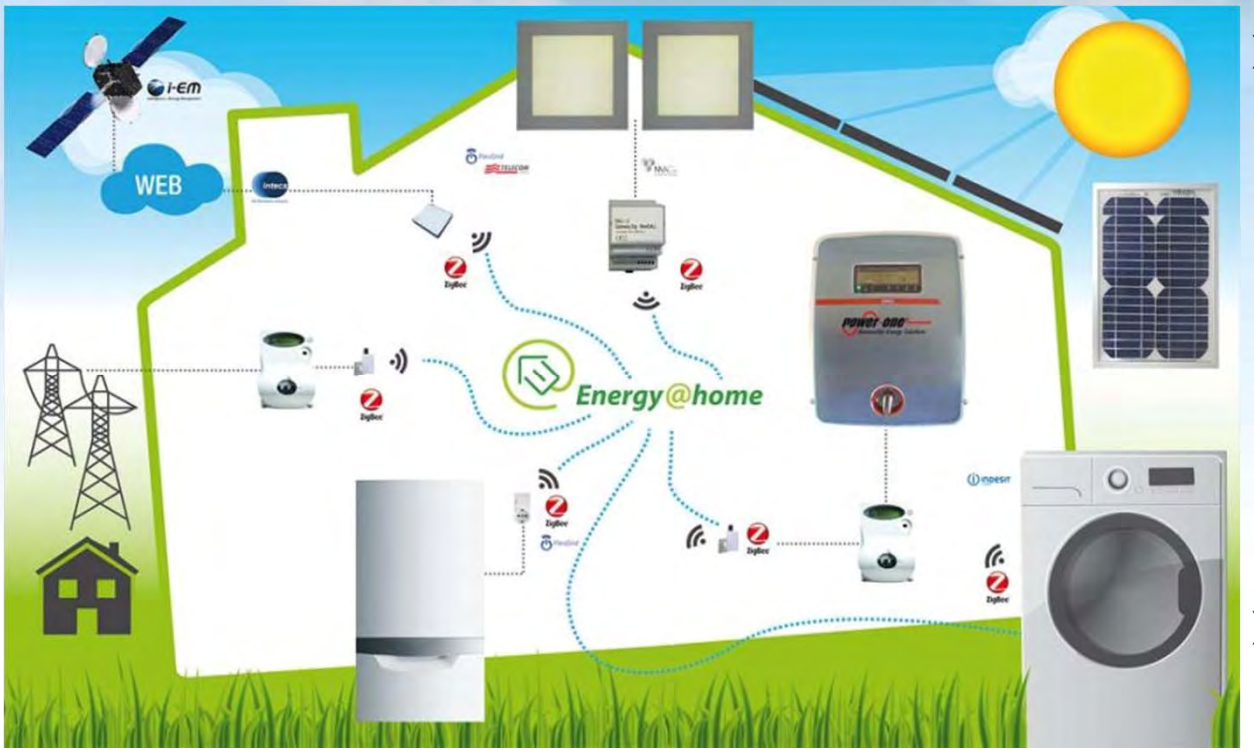
- Dynamic energy pricing schemes
- Integration of IP devices
- Smart Home Ontology (in collaboration with EEBus & DG Connect)

General Conclusions

- **Eco-system approach**
  - Unlikely there is a single stakeholder able to capture all the benefits
  - Consumers will likely have an incremental approach to create their smart home
- **Open and International Standards**
  - Compete in a global market
- **Energy services can be provided on the Smart Home Infrastructure**
  - Scope economy across several types of services sharing the same hub
- **Residential Customers have a relevant degree of flexibility**
  - More than 60%, there are trends to increase (heating pumps + EV)
- **Requires strong collaboration among ICT + Energy + Home Appliances**
  - Home Appliances in broad scope to include whitegoods, home devices, residential storage, heating pumps, …

http://www.energy-home.it

Visit our booth at the M2M Forum, 20/5, Milano



- Integrates devices and sub-systems from 11 different vendors
  - Gateway, smart meter, inverter, whitegood, thermostat, lights, smart plugs, temperature sensor
  - Cloud platform, gateway sw environment, PV forecast system
- Permanent demo at Telecom Italia and at ISMB premises

European Utility Week
15-17 October 2013 • Amsterdam • The Netherlands
www.european-utility-week.com

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