



Smart Appliances for Smarter grids

# The Smartness of Smart Grids

Stockholm, October 6th, 2010

Edi Fabbro

Electrolux – Global Technology Center

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We sell household and professional appliances

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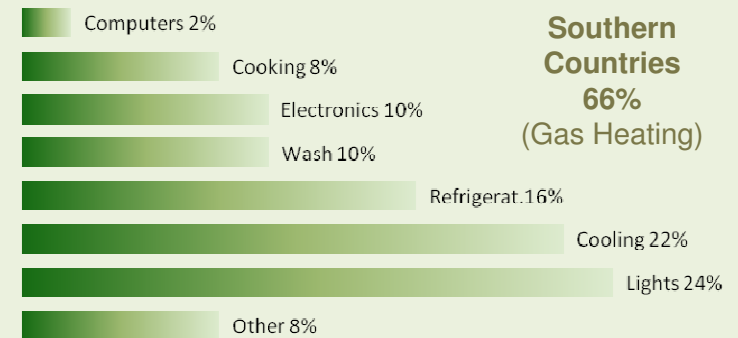
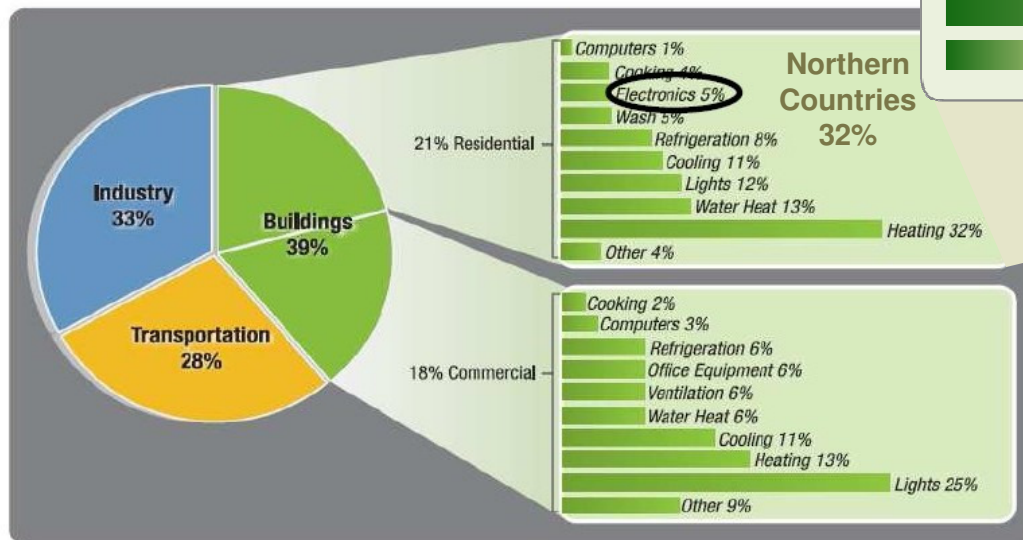


Close to **100** products every minute  
in **150** countries globally

# Smart Grid – White Goods must be there



## Electrical Appliances



Our range of products account for 32% to 66% of the total Residential electrical energy consumption



# Impact of White Goods on the Smart Grid

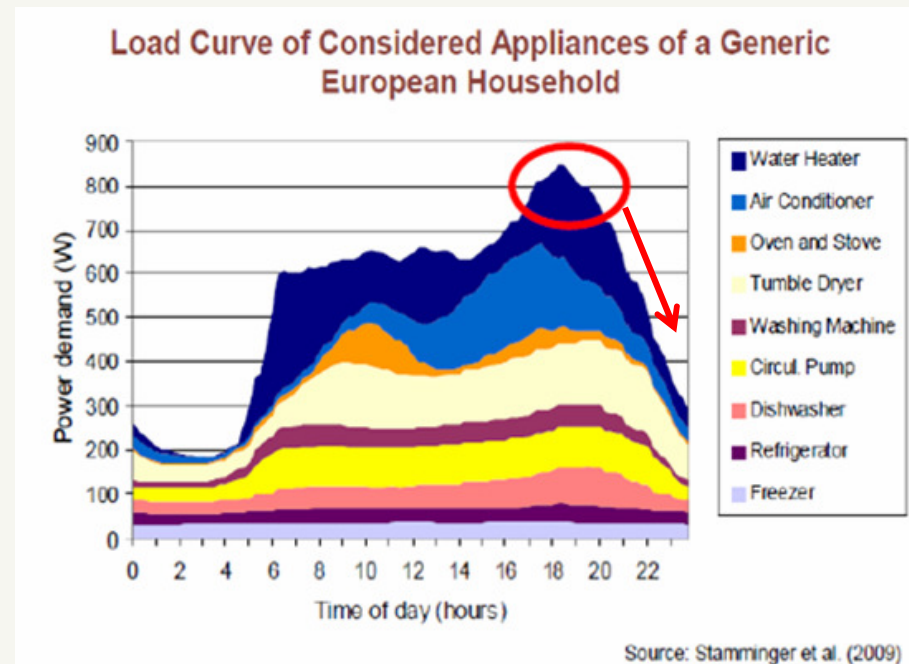
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## Case study Europe



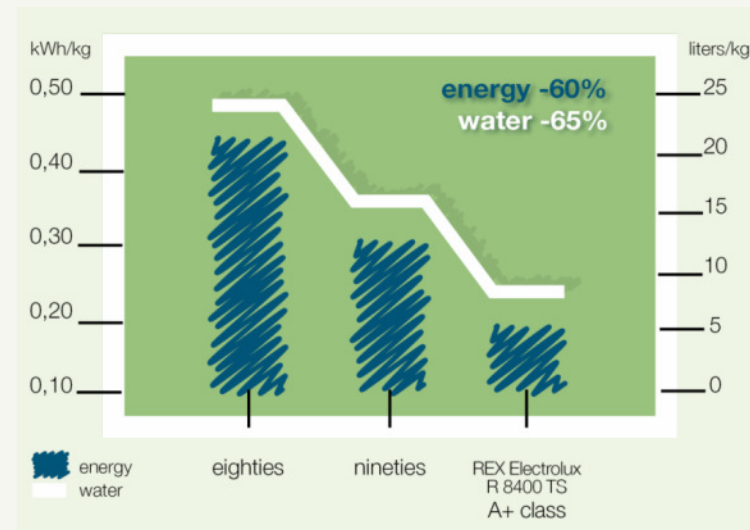
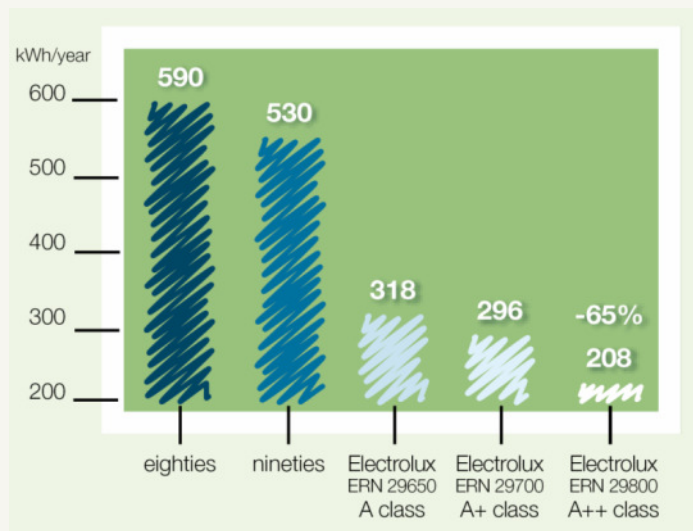
- 150 GW energy consumption at peak time in European households (183 Million)
- If 12% of energy demand at peak time is shifted to other times by using Smart Appliances...
- ... 98 Watts per single household but 18 GWatts for all European households

→ 30 large coal fired power plants would not be needed any more



# Product efficiency

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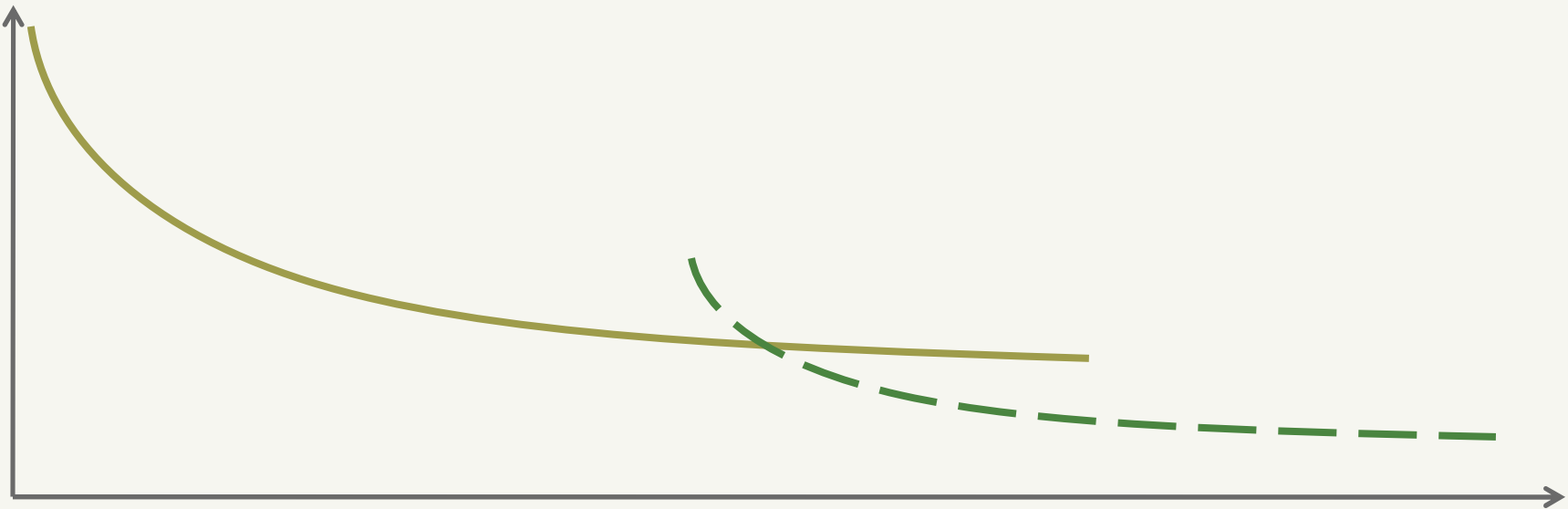


**Electrolux best refrigerator consumes 70% less energy compared to the average 15 years ago.**

# Always more efficient?

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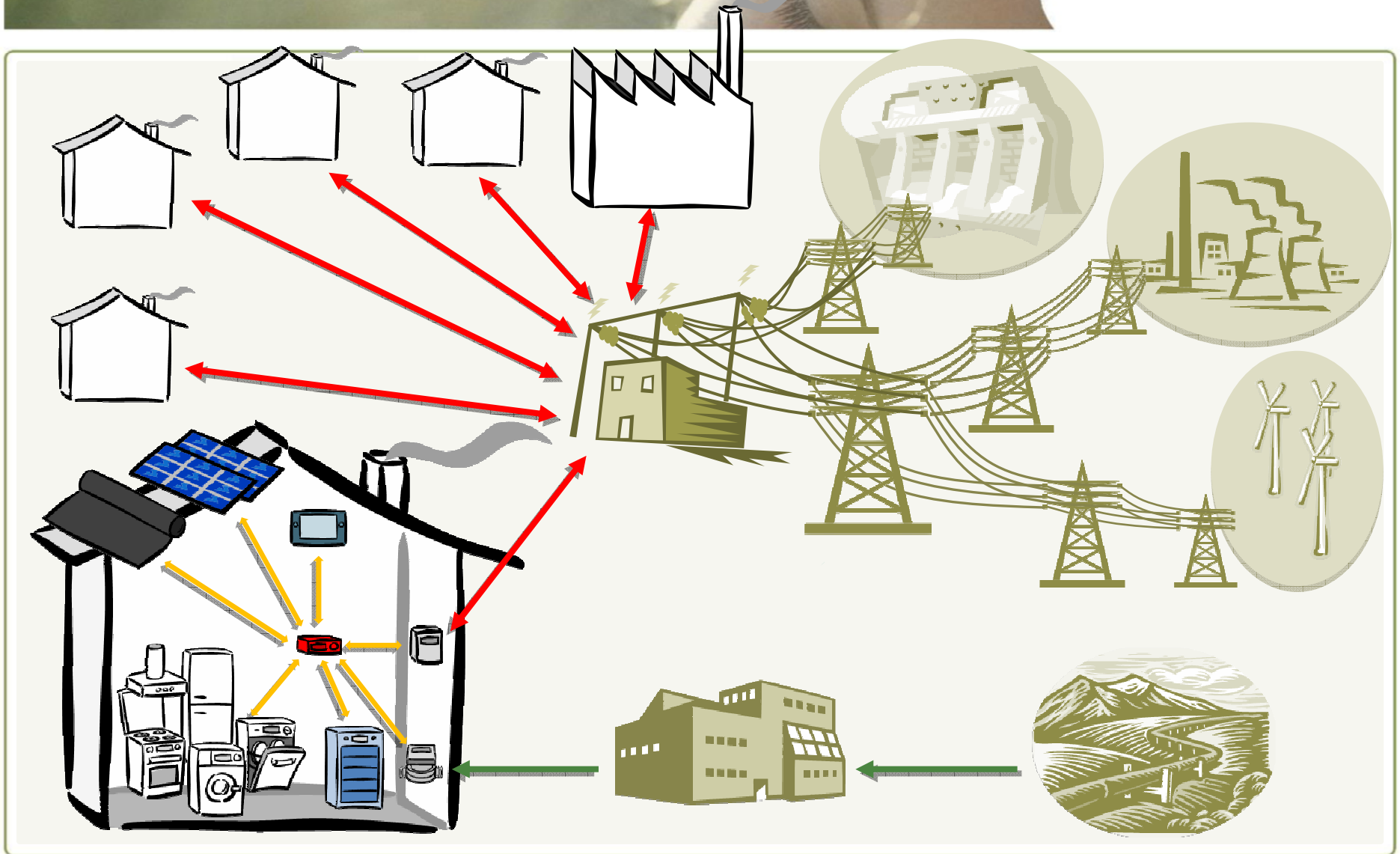
**The research** of more efficient products goes on but without a severe change of the involved process we can't expect improvements as the ones achieved in the past and for this reason a large part of the R&D efforts are devoted to the identification of **new processes** able to wash, cook and preserve food with a limited use of energy and resources in general.



Another way to improve the energy efficiency is to integrate the appliances in wider systems and optimize the overall performances -> i.e. SMART GRIDS.

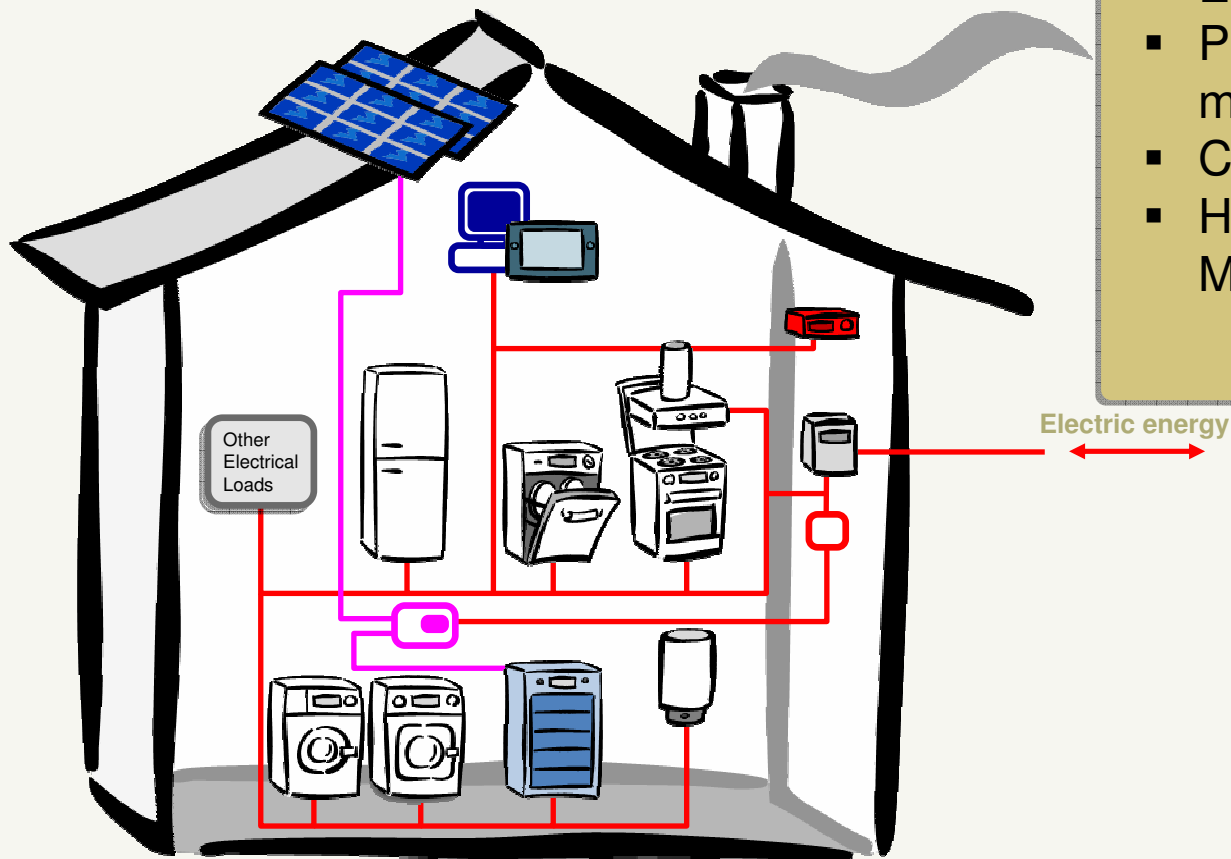
# The General Scenario of Energy

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# The Scenario of Energy: electrical system single house

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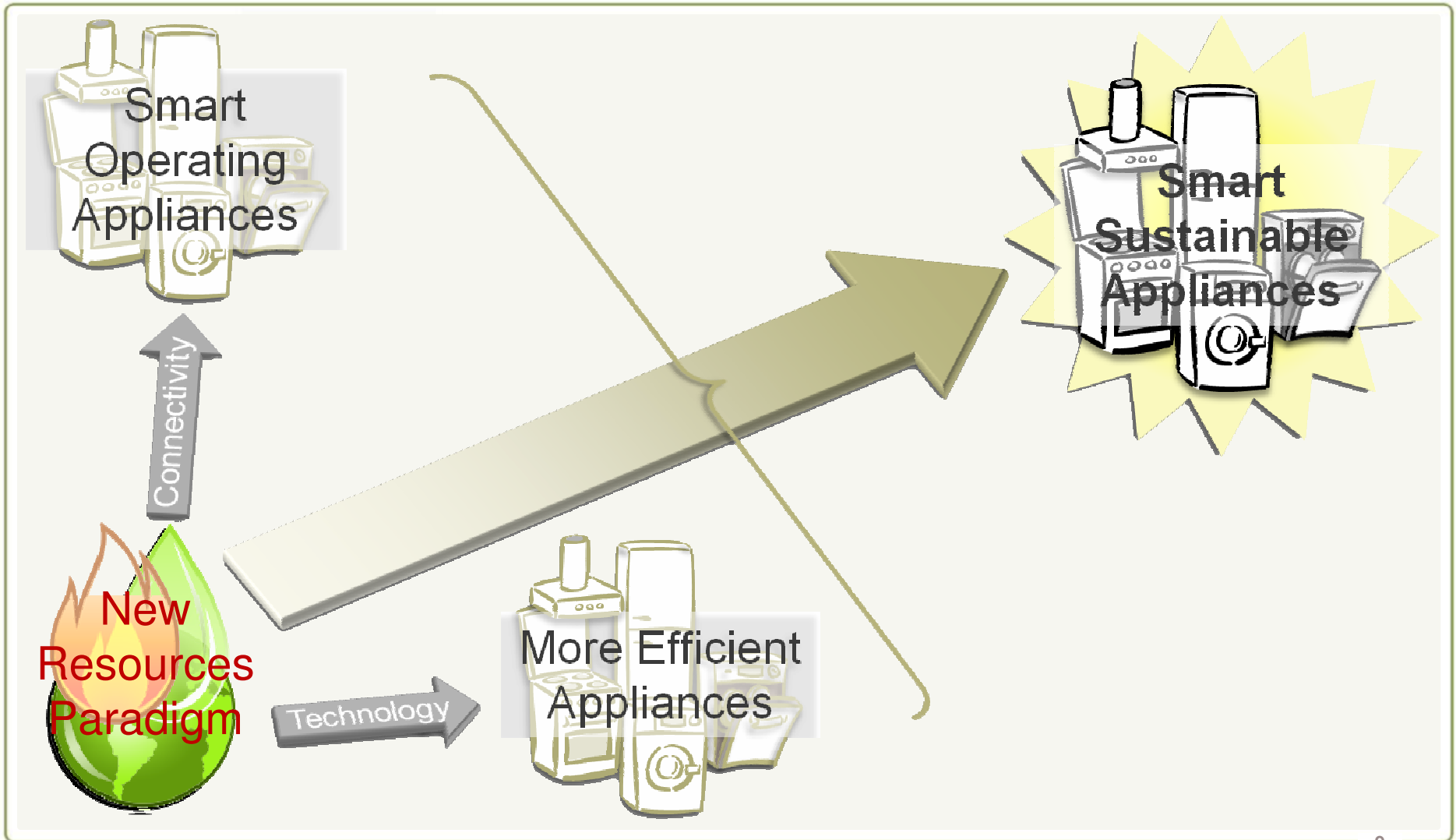
## Main Actors:

- Electric Utilities
- Photovoltaic panels manufacturers
- Cogenerators
- Household Appliances Manufacturers



# The new perspective

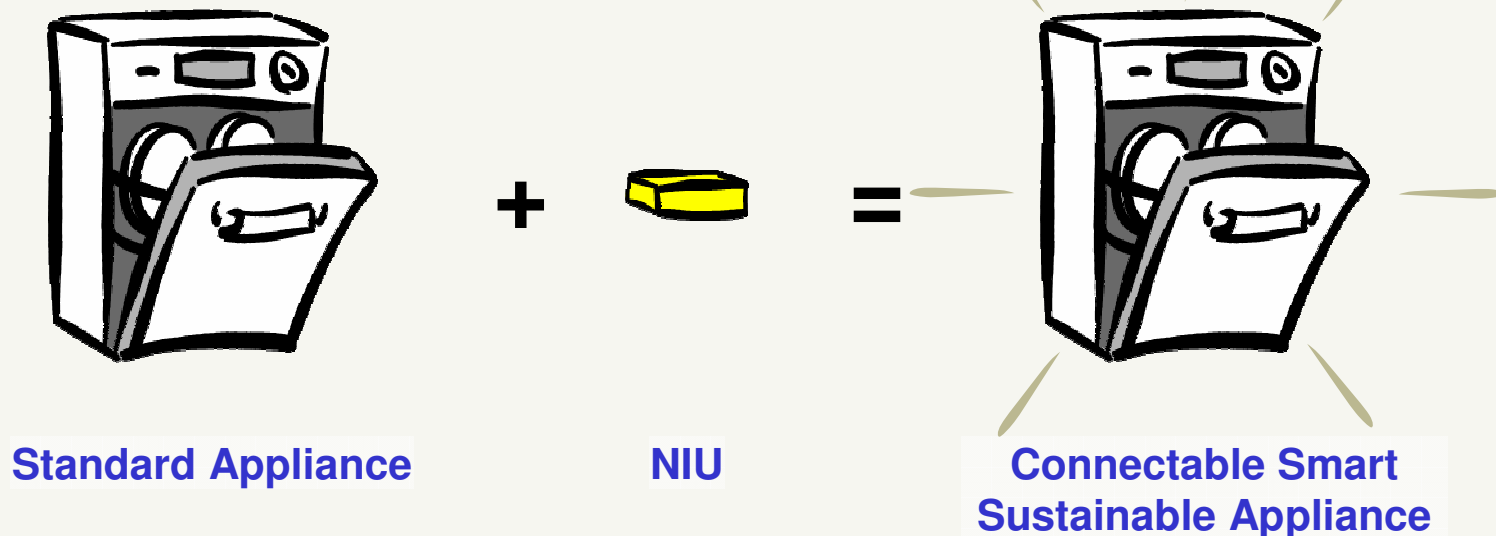
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# Smart Sustainable Appliances: the Connectivity

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The Smart Sustainable Appliances are standard devices to which has been added the ability to communicate over a **Home Network** through a **Network Interface Unit (NIU)**



The **Network Interface Unit** is a **Device** (combination of hardware and software) that can be connected through the **standard communication link** to the electronics of any standard household appliance to integrate the **connectivity functions**.

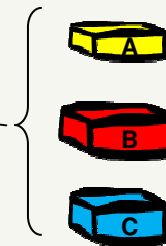
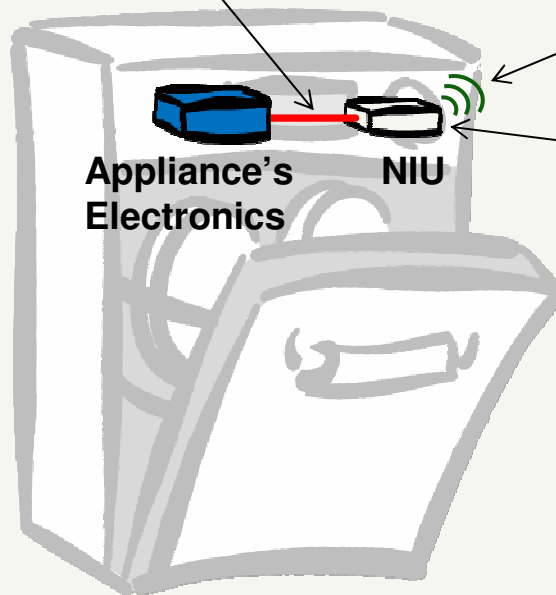
# Smart Sustainable Appliances: the Flexibility of NIU



The **Network Interface Unit** could take advantage of any relevant communication technology. The same appliance could then integrate **different communication technologies** just changing the **NIU**.

**Proprietary Communication: Electrolux  
Appliance Protocol**  
Common for every possible NIU  
(no changes in the Appliance's Electronics)

**Specific  
Home Standard  
Communication**  
(powerline or wireless)



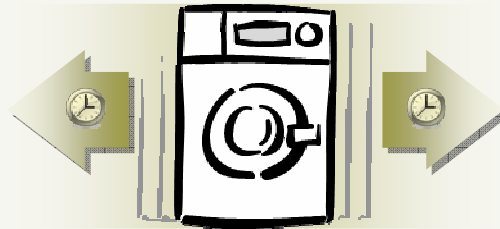
**Different NIUs for different  
standards of Home  
Communication Protocols**

# Smart Sustainable Appliances: Possible Attitudes

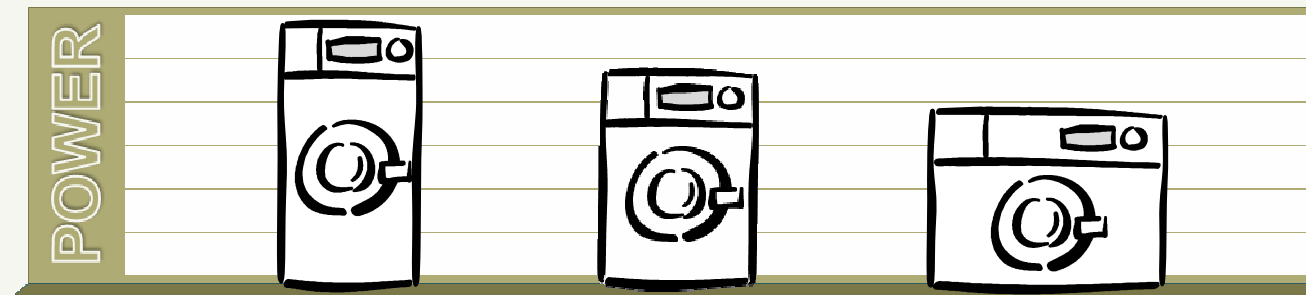
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In front of the Demand Response signals, we can identify the two main **Smart Sustainable Appliance's attitudes**:

- **Reactive**: ability to move the start of running when it is most cost effective → **LOAD SHIFTING**



- **Adaptive**: ability to adapt the cycle to the available resources at that time → **LOAD SHEDDING**

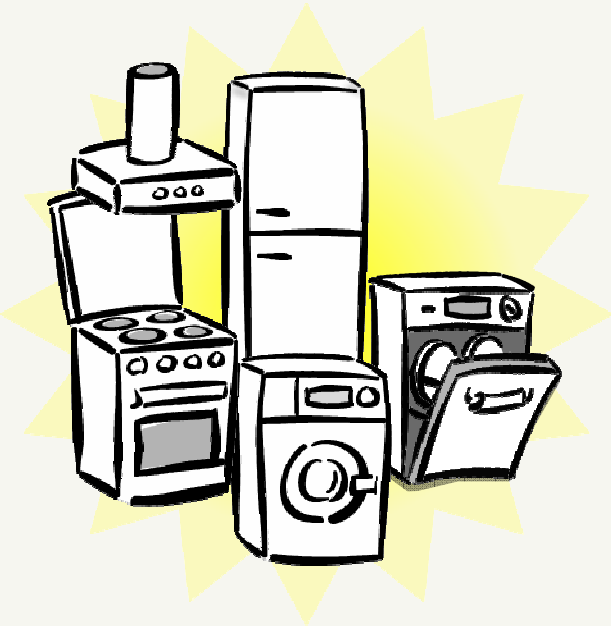




# Smart Sustainable Appliances: their role for a smart use of energy

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For an effective use of the energy, the **Smart Sustainable Appliances** must have an **active role** in the energy management automatic systems:

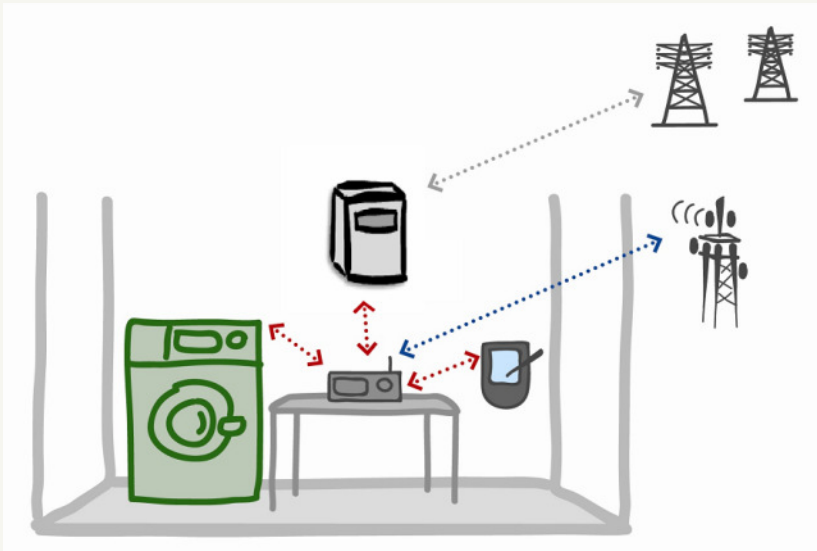


- being able to **completely control the processes** as they are fully **responsible** for the final result;
- offering, thanks to an active **dialog** with the **customer** and the **energy sources**, a valuable **flexibility** in terms of **time and energy profile** (best tariff)

# And full system coordination...

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- Display on the Appliance of the current electrical consumption communicated by the Electronic Meter (if you can measure you can control). This can substitute a specific display in the house to make directly available to the customers such an information (see, as example, Italian legislation DLgs 115/08)
- Manage the appliance knowing the current load info, energy availability and the tariff



# Smart energy system: Home Controller

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14:24  
thursday 10/05/2007



**appliances**



**power**



**cameras**



**electrolux**



**tv**



**photo album**



**lights**

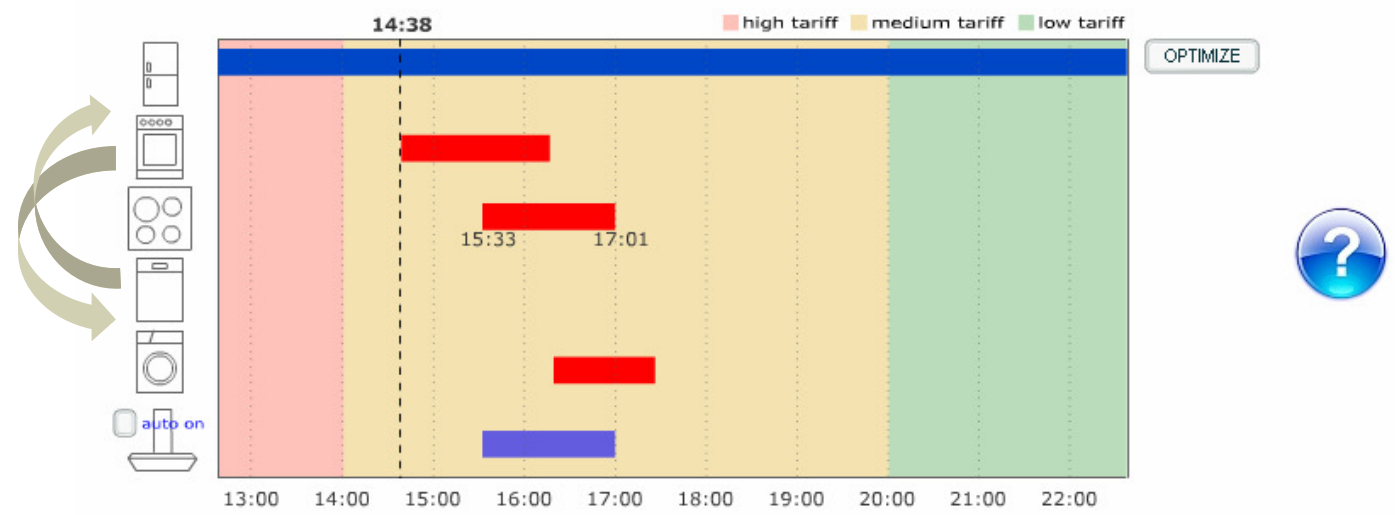


**settings**

# Smart energy system: Customer preferences but...

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Home, Buildings, Clock icons | **Electrolux** | **TELECOM ITALIA** | 14:32 | Giovedì 11/06/2009





# Smart energy system: Customer awareness

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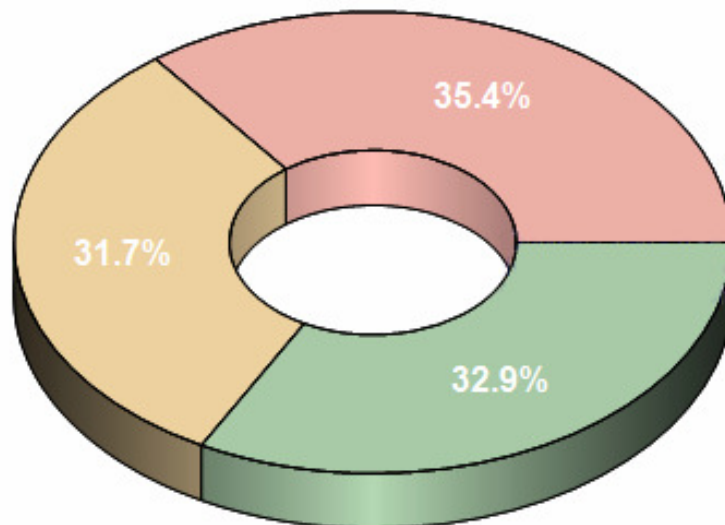


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14:43  
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statistics about last 24 hours:



**total cost : 0.82€**

- low - 0.27
- medum - 0.26
- high - 0.29

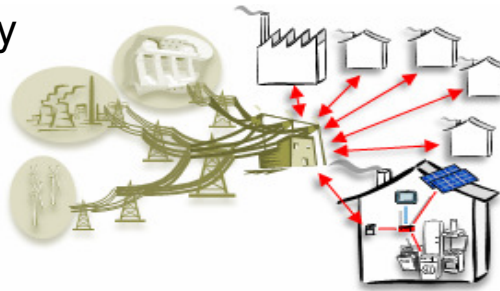
# Requirements

## of a Smart Grid:

- Pricing Rate Structure “realtime”-tariffs
- Wide tariff spread (to reward the final customer)
- Communication Standard
  - Open
  - Flexible & interoperable
  - Secure
  - Global
- Consumer Choice & Privacy

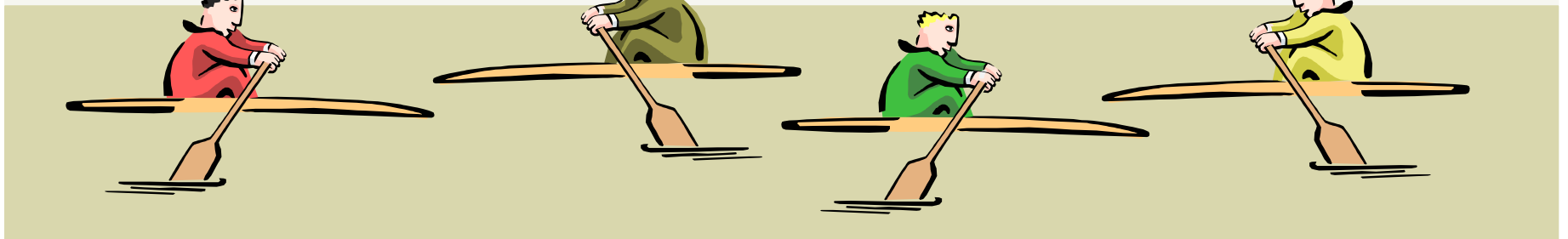
## of a Smart Appliance:

- Same as Smart Grids plus...
- Manufacturer-independent interoperability
- “Plug & Play”
- Use of existing home infrastructures “No new wires” - better “wireless”
- Interoperability between new and existing technologies
- Open specification for additional services



# What is the real change?

To take benefit of the system coordination opportunities, from the traditional, independent business model, we must rethink the market approach, acting for...



... new shapes of mutually satisfactory **cooperation** with many other actors such as **authorities, energy utilities, local generation systems, telcos, system integrators,...**



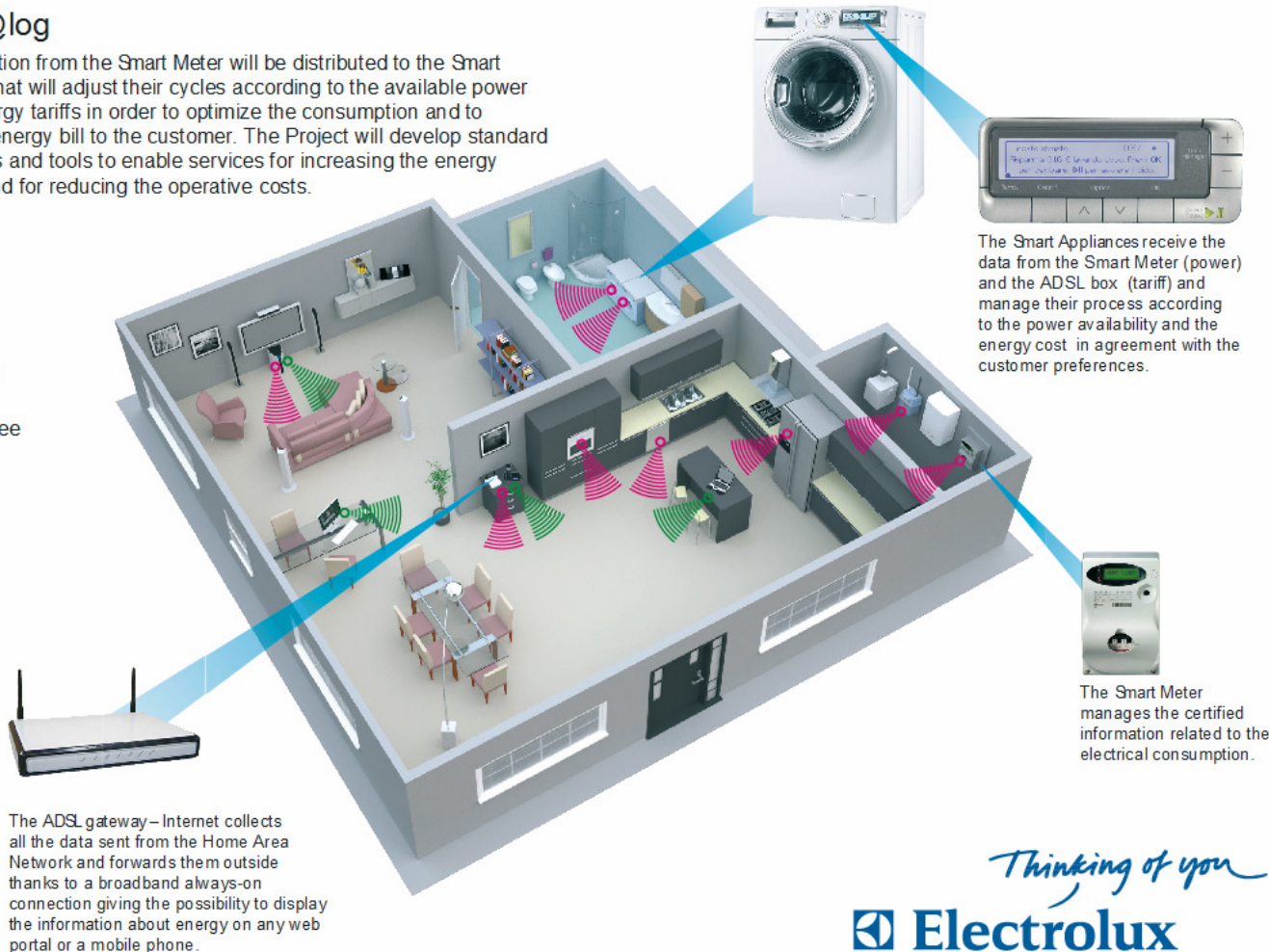
# Energy@Home: development of an EcoSystem

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## EcoDi@log

The information from the Smart Meter will be distributed to the Smart Appliances that will adjust their cycles according to the available power and the energy tariffs in order to optimize the consumption and to reduce the energy bill to the customer. The Project will develop standard technologies and tools to enable services for increasing the energy efficiency and for reducing the operative costs.

WiFi  
ZigBee



**Energy@Home is a collaborative project** among different industries.

The aim of the project is to **develop a communication infrastructure that enables provision of Value Added Services** based upon information exchange related to energy usage, energy consumption and energy tariffs .

Energy@Home aims to **leverage existing standards**, in particular the Zigbee wireless technology.

The resulting **protocol will be open** to any stakeholder that will be free to define its own services and supporting business models, while being assured that **the common communication platform will be able to ensure interoperability** among platform of different vendors

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**Thank you!**

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