



LISBOA e-nova 
AGÊNCIA MUNICIPAL DE ENERGIA E AMBIENTE



SAVE ENERGY – LISBON PILOT

Helsinki, 17th June 2011

www.lisboaenova.org

LISBON'S SAVE ENERGY PILOT

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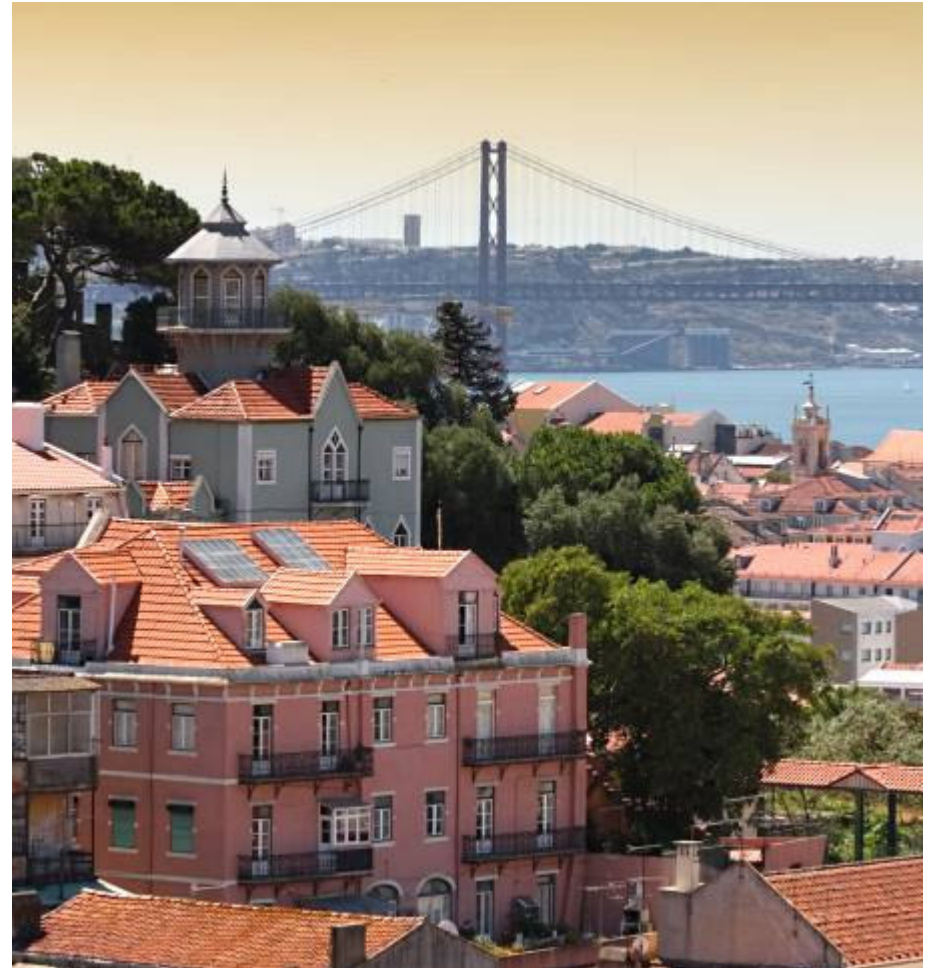
LISBON'S SAVE ENERGY PILOT

LISBON

Lisbon is the capital and largest city of Portugal, evolving over 84.7km²;

Its municipality, which matches the city proper excluding the larger continuous conurbation, has a population of 489,562 inhabitants;

The Lisbon Metropolitan area in total has around 2.8 million inhabitants.



LISBON'S SAVE ENERGY PILOT

LISBOA E-NOVA

MISSION:

Contribute to Lisbon's sustainable development through the promotion and dissemination of good practice in energy and environment.

AFFILIATES

25 Affiliates

12 Employees

5.500 Mailing list subscribers

50 Communication actions/year

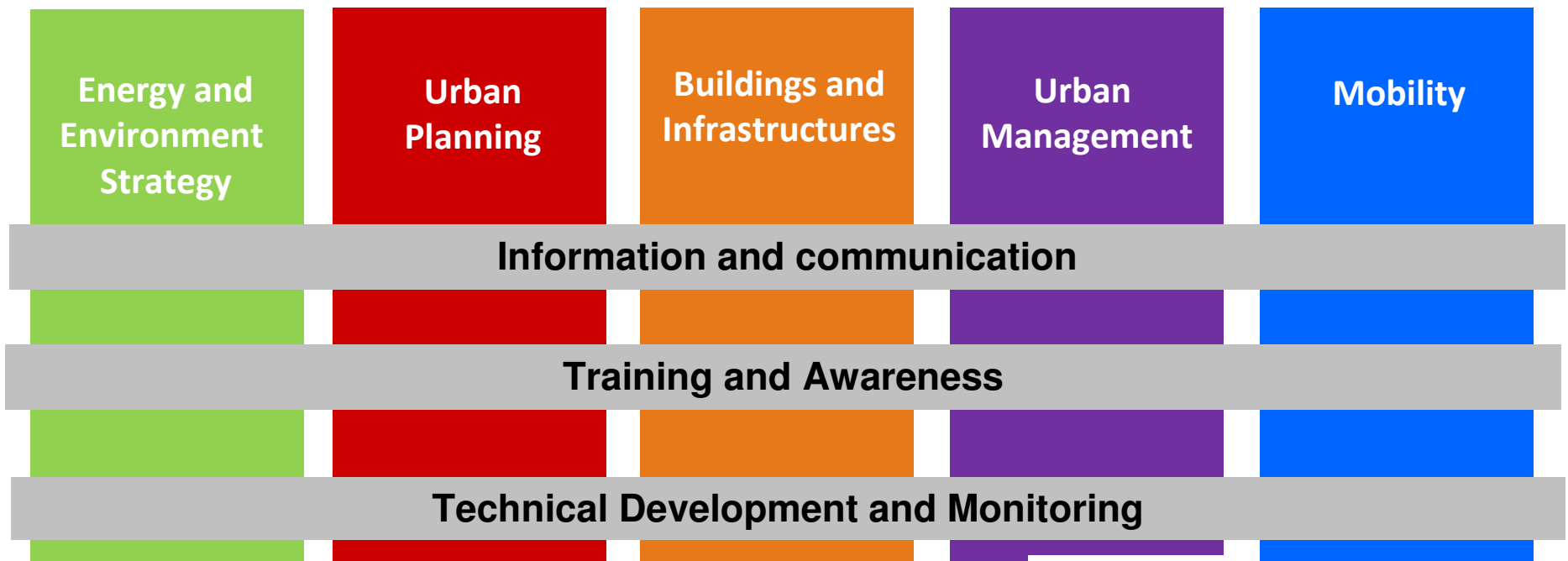
25 Current projects



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LISBOA E-NOVA

MAIN AREAS OF INTERVENTION



LISBON'S SAVE ENERGY PILOT

ISA in Numbers



20

Years of experience in the telemetry technology domain

110

Highly qualified employees

40%

Employees dedicated to R&D

10x

Turnover from 2003

Still growing fast...

42%

CAGR (Compound Annual Growth Rate) in the past 6 years

80%

Percentage of turnover coming from the international market

50,000

Number of products successfully installed worldwide...



LISBON'S SAVE ENERGY PILOT

ISA around the world



Headquarter and R&D Center in Portugal
Offices in Spain, France, UK and Brazil
Agents in Greece, Finland, Slovenia, Chile, Angola and Australia

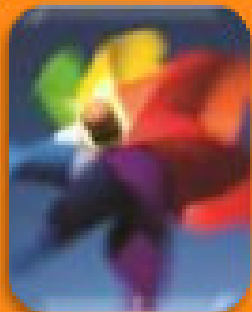


● Offices ● Agents ● Installations



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Markets and Solutions



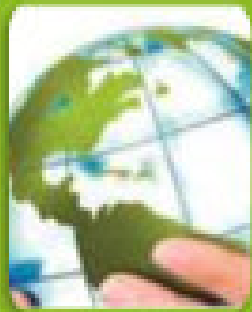
Energy

- Remote monitoring
- Energy efficiency
- Smart grids
- Renewable energies
- Aggregator Solutions



Oil&Gas

- Monitoring of LPG and piped gas networks
- Supply logistics (tanks and cylinders)
- Remote management of fuel stations
- Refineries monitoring



Environment

- Measurement of carbon footprint
- Meteorology and Seismology
- Hydropower Potential



Health

- Ambient Assisted Living
- Tracing people and assets
- Remote medicine



LISBON'S ENERGY AND ENVIRONMENTAL STRATEGY

City Targets for 2013

Energy consumption reduction: 8.9%

Water consumption reduction: 7,8%

Losses in the water supply network: 15,6%

Reused water: 3.1 m³/hab.year

Materials consumption reduction: 10%

Selective materials recycling increase: 29%

Council Target for 2013

Energy consumption reduction: 9.4%

DGEG, valores provisórios



BRIEF BUILDING DESCRIPTION

Lisbon's Municipality main office building.

Started to function in 1998, serving both as administrative office and public attending services.

- approximately 1800 employees;
- approximately 200 daily visits;
- constituted by 6 blocs, all interconnected;
- working hours from 7 am to 11 pm;
- useful area for working places: 18.000 sqm
- annual electricity consumption: 3 GWh



INTEGRATED APPROACH TO THE BUILDING

Dynamic analysis of the building energy performance

Identification of the opportunities matrix regarding the building energy consumption optimization;

Emission of the Energy and Indoor Air Quality Certificate (B-).

Mobility Plan

Mobility matrix for the building users;

Identification of sustainable mobility strategies: teleconference between users; car-sharing among technicians, dynamic information on public transports.

User Behaviour Change: SAVE ENERGY project

Involve the building users and promote a dissemination campaign on good practices, influencing their energy consumption pattern.



THE SAVE ENERGY PILOT AREA

The SAVE ENERGY project focus on two of the building areas:

Block 1 B – Intervention

Administrative services
52 working technicians
478 sqm

Block 2 B – Control

Administrative services
64 working technicians
550 sqm



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THE SAVE ENERGY PILOT AREA



LISBON'S SAVE ENERGY PILOT

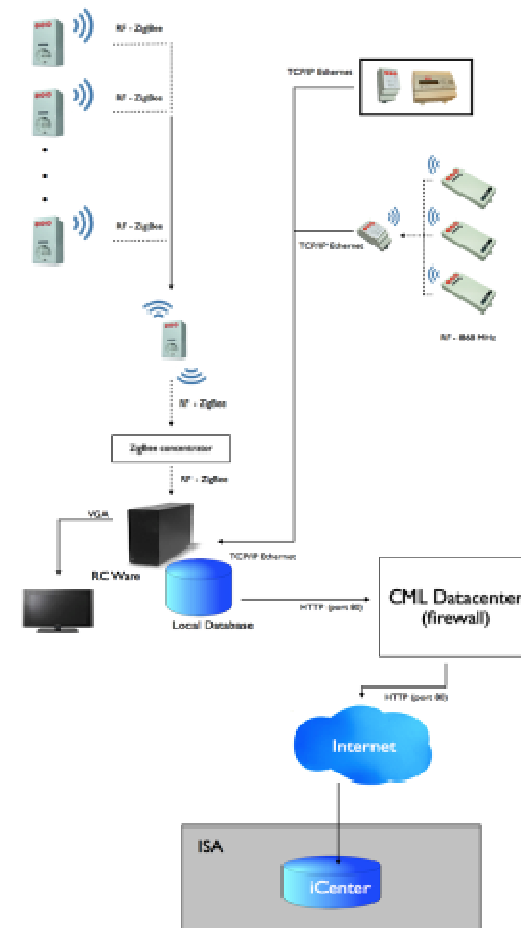
ENERGY MONITORING ARCHITECTURE

Real time data collection every 15 min.

The main circuit board monitors the global electrical consumption and the electric consumption of the lights, plugs and HVAC circuits (2 iMeterBox + 18 iMeterRail)

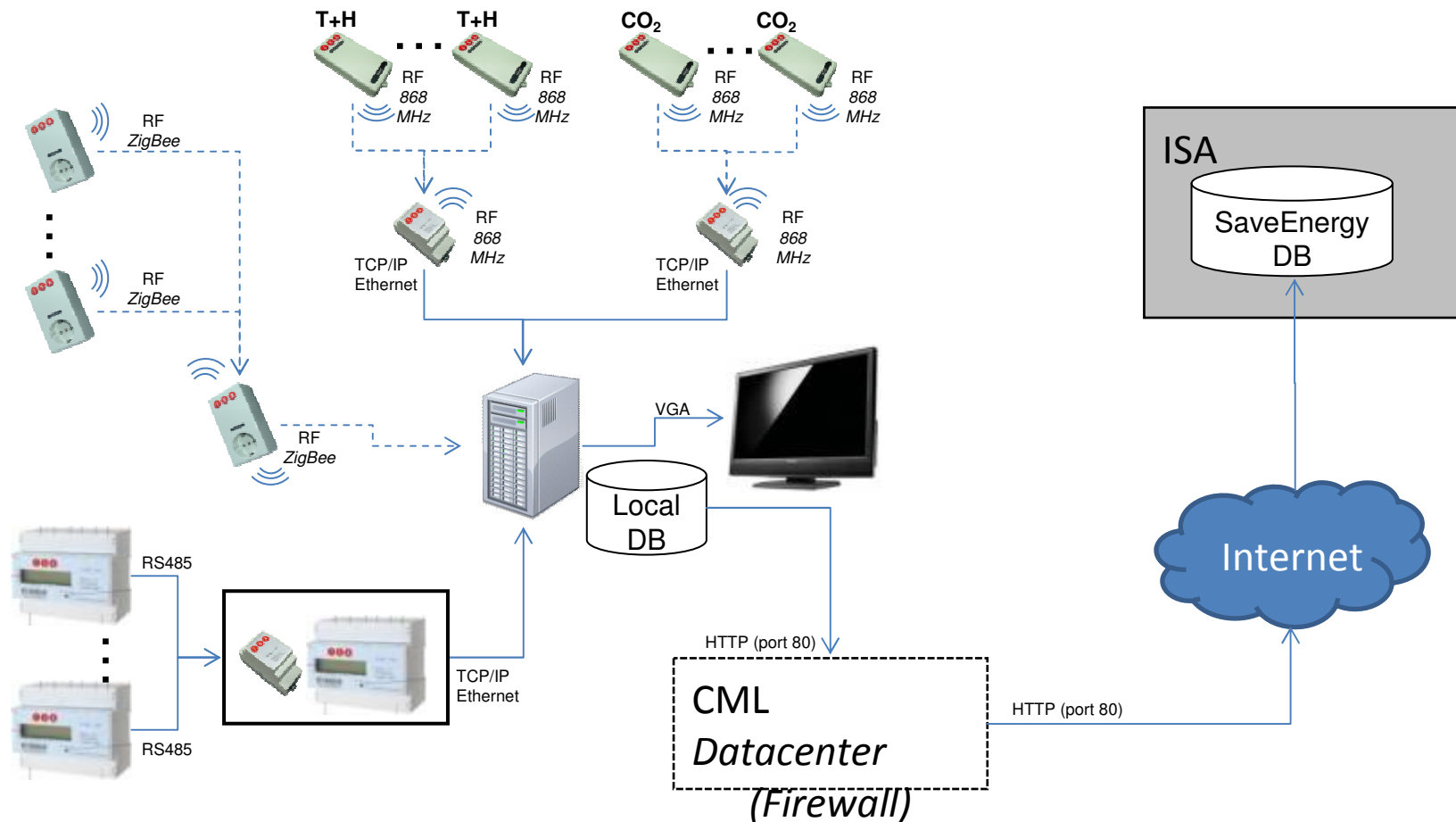
Monitoring points in the open space to monitor equipment and working stations (18 iMeterPlugs)

Room temperature, humidity and CO2 levels (6 iPoints (Temp+RH) + 2 iCO2)



LISBON'S SAVE ENERGY PILOT

ENERGY MONITORING ARCHITECTURE

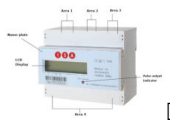






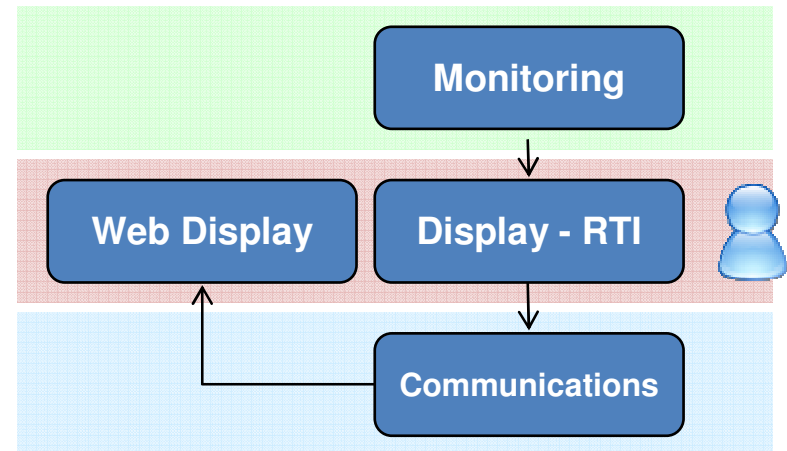
LISBON'S SAVE ENERGY PILOT

ENERGY MONITORING ARCHITECTURE

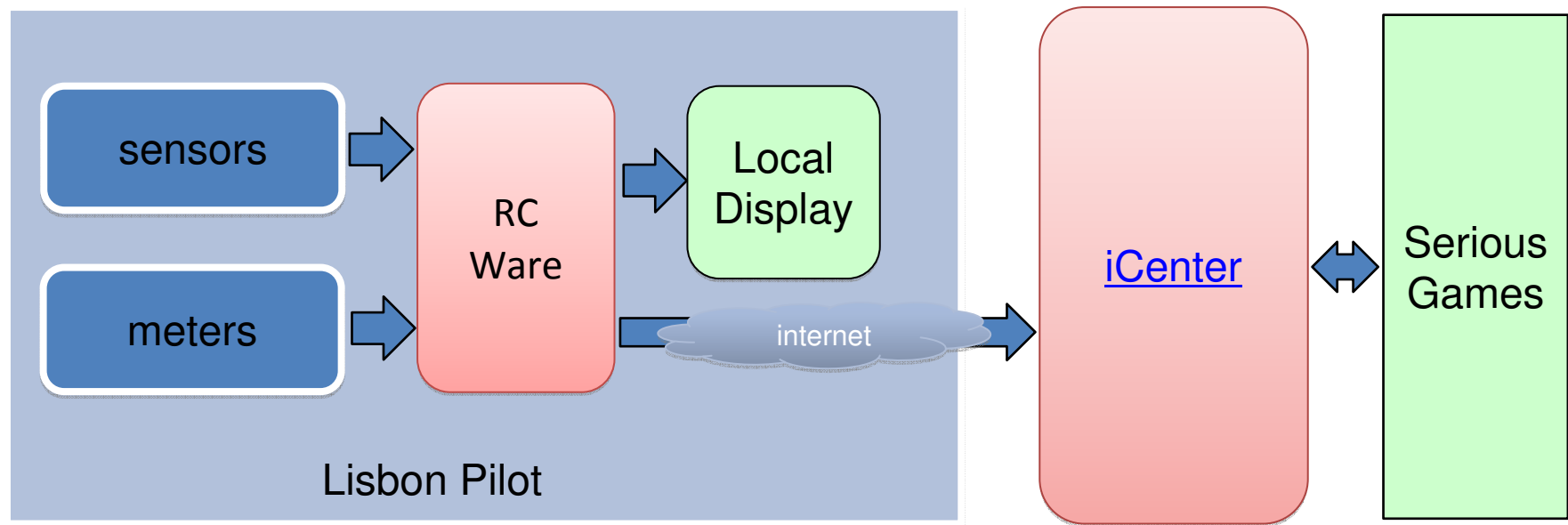


INTEGRATION OF PLATFORMS - Equipment used

	<p>iMeterRail DIN:</p> <p>The iMeterRail DIN measures the energy consumption and other electric parameters such as voltage, current, power factor, frequency, among others.</p>	Electricity Measurement
	<p>iPlugMeter:</p> <p>The iPlugMeter measures the energy consumption at plug (socket) level and communicate via Bluetooth or ZigBee.</p>	
	<p>iPoint:</p> <p>The iPoint measures the air humidity and temperature and send the measures via radio frequency (RF) to other equipment with RF receiver, such as the ISA Aggregator. The iPoint casing will also comprise CO2 levels measurements, but with different sensor, the communication module is the same.</p>	Comfort Parameters Measurement
	<p>iMeterBridge:</p> <p>This bridge can be RS485 to TCP/IP bridge, Bluetooth to TCP/IP bridge, ZigBee to TCP/IP bridge, RF to TCP/IP bridge or Z-wave to TCP/IP bridge.</p>	Communications
	<p>RCWare:</p> <p>This solution will act as the hub for the communication and sensors spread throughout the blocks. It will also be used to display the data collected.</p>	



iCENTER INTEGRATION



<http://saveenergy.isa.pt/Account/LogOn?ReturnUrl=%2f>

MONITORING AND BASELINE

102 kWh/working day

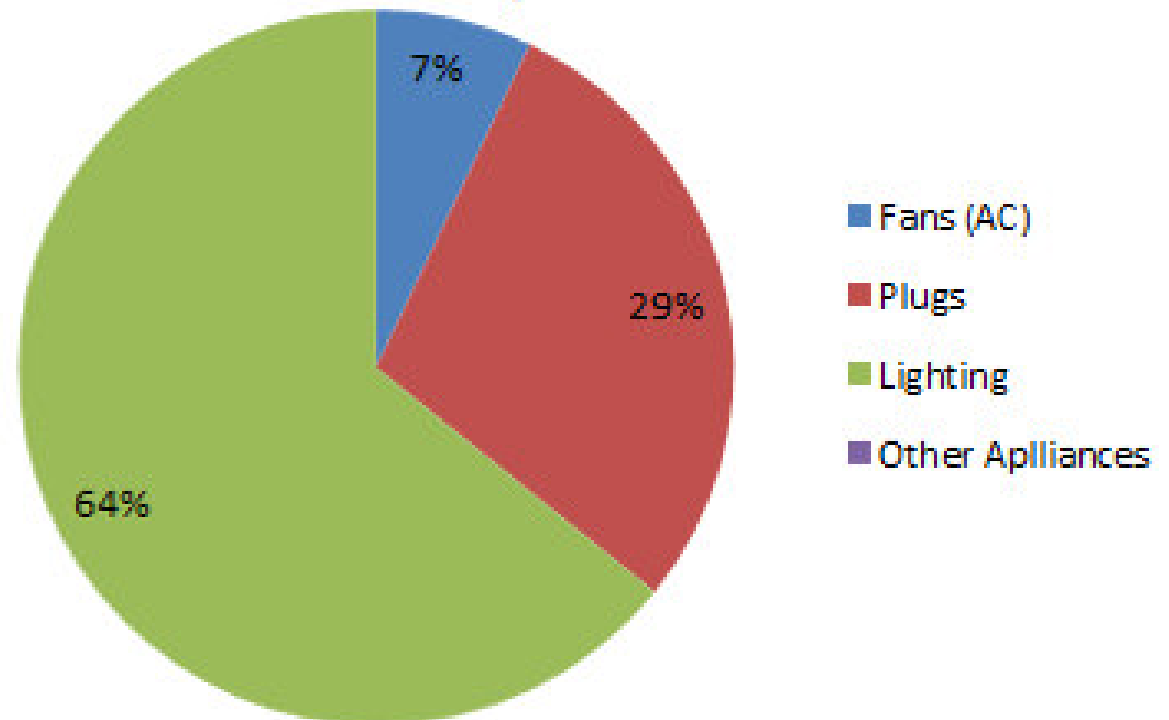
HVAC: 7,2 kWh
Lights: 65,6 kWh
Plugs: 29,3 kWh

Comfort conditions:

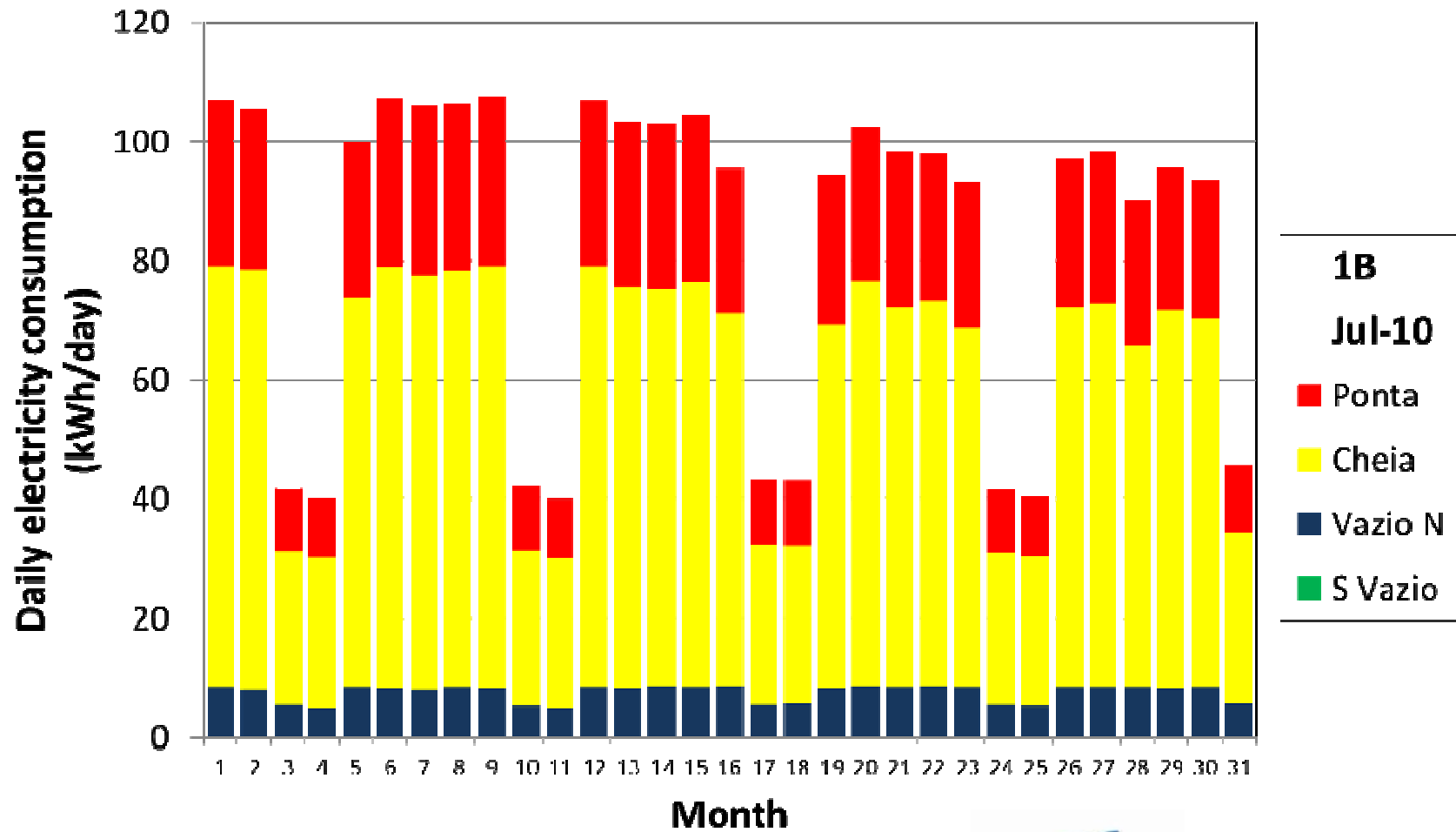
- Indoor temperature: 24°C;
- Relative Humidity: 40%;
- CO2 levels: 400 ppm.

- **2.4 MWh/month;**

Lisbon's pilot electricity consumption baseline

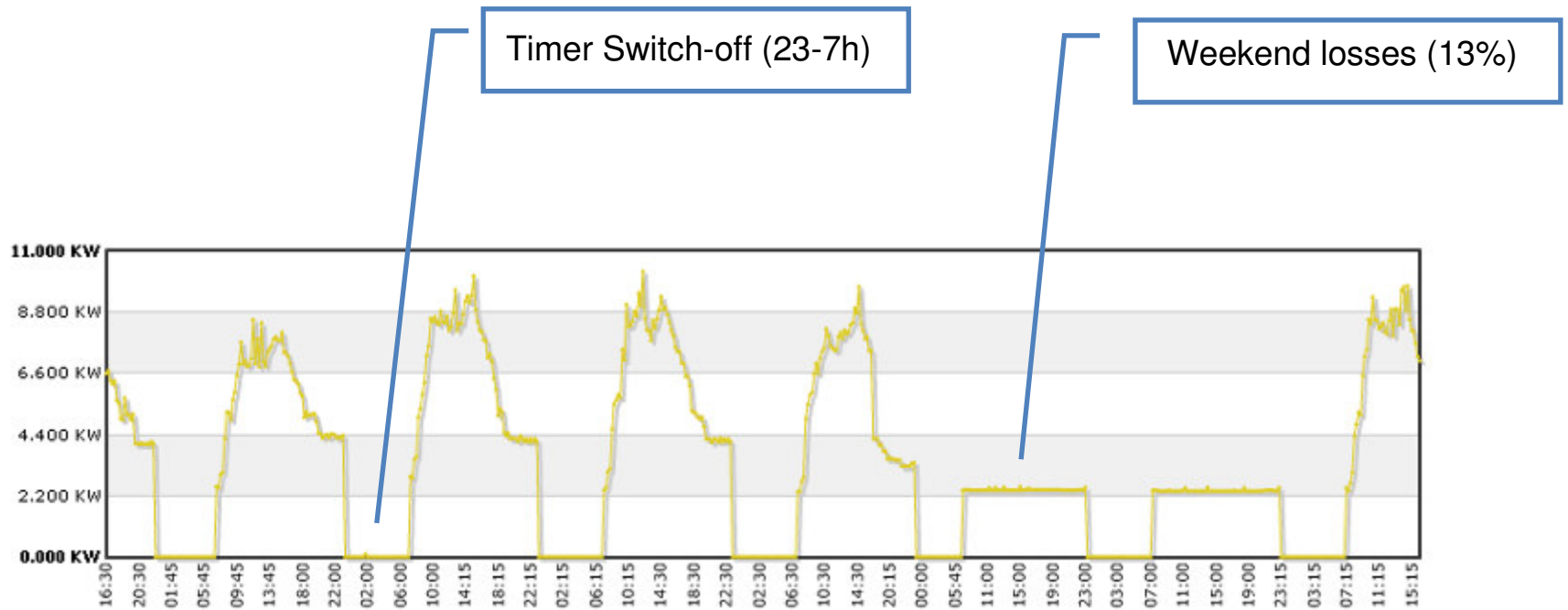


MONITORING AND BASELINE



LISBON'S SAVE ENERGY PILOT

MONITORING FIRST RESULTS



FOSTERING USER BEHAVIOUR CHANGE

- Real time information display
- Users interest and knowledge on energy issues
- User engagement strategies



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REAL TIME INFORMATION DISPLAY

Available since the 20th of May 2010



Hourly real time data.



USERS INTEREST AND KNOWLEDGE ON ENERGY ISSUES

Users awareness on energy issues.

The questionnaire to the Municipality technicians::

A - Interest in energy and energy efficiency

B - At the office

B1 - Behavior

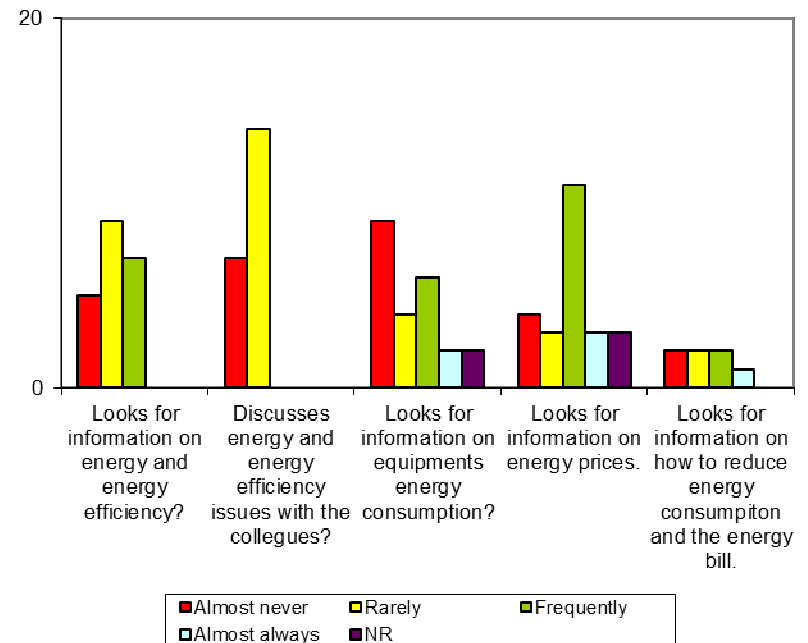
B2 - Knowledge on equipment power

C - At home

C1 - Electricity consumption

C2 - Knowledge on equipment power

Framework - 1B



LISBON'S SAVE ENERGY PILOT

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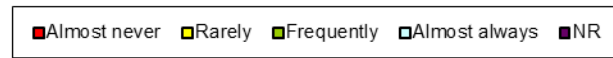
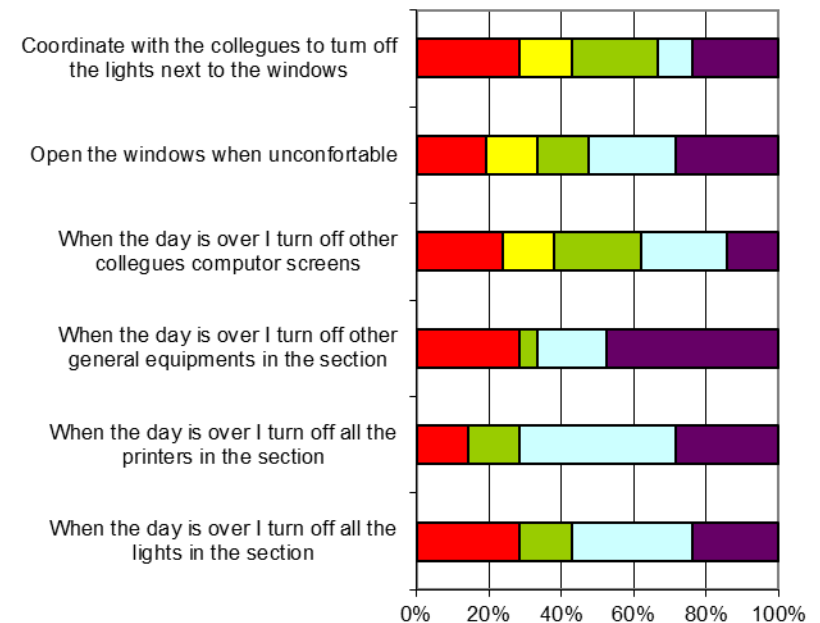
B2 - Knowledge on equipment power

C - At home

C1 - Electricity consumption

C2 - Knowledge on equipment power

In my section - 1B



LISBON'S SAVE ENERGY PILOT

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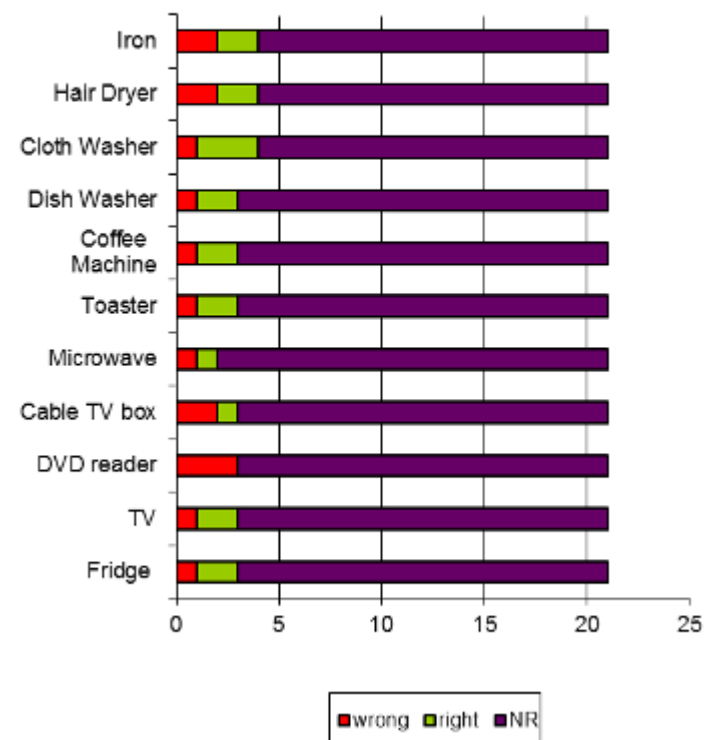
B2 - Knowledge on equipment power

C - At home

C1 - Electricity consumption

C2 - Knowledge on equipment power

Domestic equipments power -1B



USER ENGAGEMENT STRATEGIES

- **Provide dedicated information**

SAVE ENERGY's applets will provide information on how to reduce electricity consumption, in the working place and at home!

- **Create critical mass on energy efficiency**

Users will be able to test the consumption of some of their domestic appliances, allowing them to have equipments consumption sensibility.

- **Promote serious games**

Users have access to the SAVE ENERGY serious games and are incentivised to play at home with the family, widening the range of the games!

- hall display,
- applets with saving tips,
- interface with domestic appliances,

- web 2.0 tools,
- serious game,
- internal workshops,
- user feedback.



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USER ENGAGEMENT STRATEGIES

Workshops on energy efficiency

The workshops were open to all the workers of the building and more than 70 people assisted.



Workshop Energia e Eficiência Energética

Data: 27 de Abril 2011

Hora: 12h-13h

Local: Mezzanine do Campo Grande 25

O projecto SAVE ENERGY, a decorrer nos blocos 1 e 2 B convida-o a participar numa sessão onde pode saber mais sobre energia e eficiência energética.

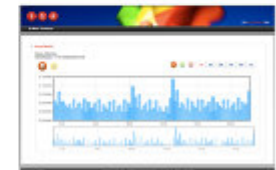
Trata-se de uma sessão aberta onde serão apresentadas boas práticas e alguns conceitos a serem adoptados nos sectores residenciais e de serviços, principalmente no que se refere à análise dos consumos, à eficiência energética e à utilização eficiente de electrodomésticos.

Saiba mais em:

www.ict4saveenergy.eu

www.lisboaenova.org

<http://greenmyplace.net>



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USER ENGAGEMENT STRATEGIES

Real time data display

Available since the 20th of May 2010



Hourly real time data.

Available since the February 2011



The hourly average consumption has been added. Green bar for lower consumptions and red for higher ones!



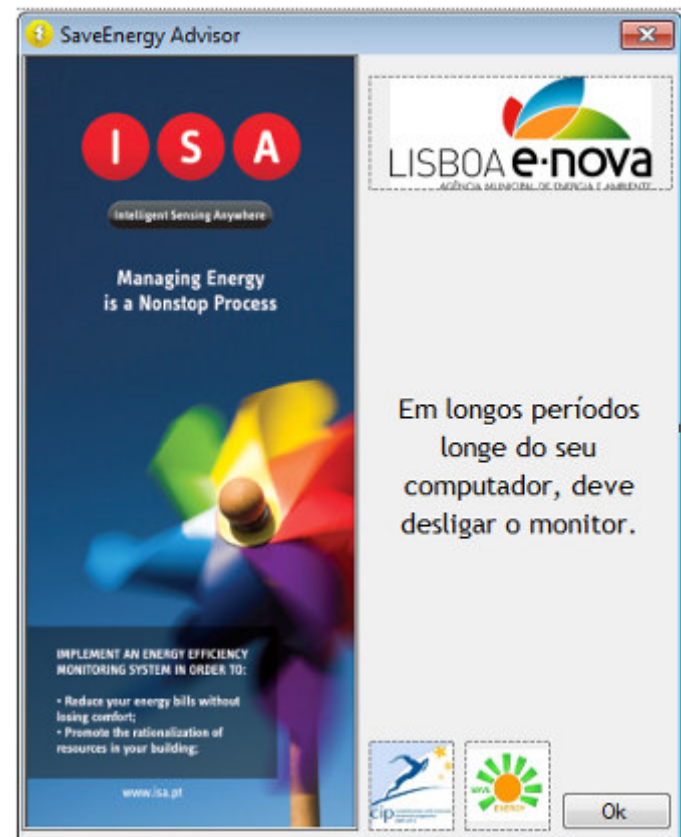
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USER ENGAGEMENT STRATEGIES

Energy Efficiency Applet

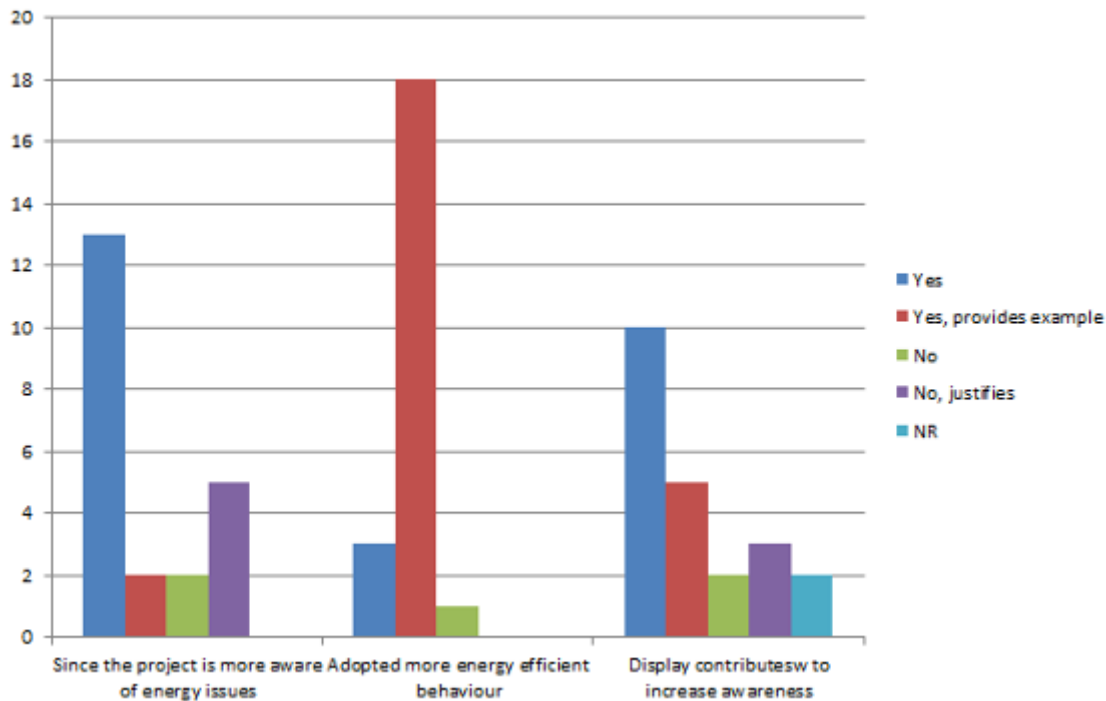
A set of messages related to energy, energy efficient behavior at the office and at home has been collected and are periodically sent to the pilot users two times a day, at 11h and 16:30h.

Available since March 2011!

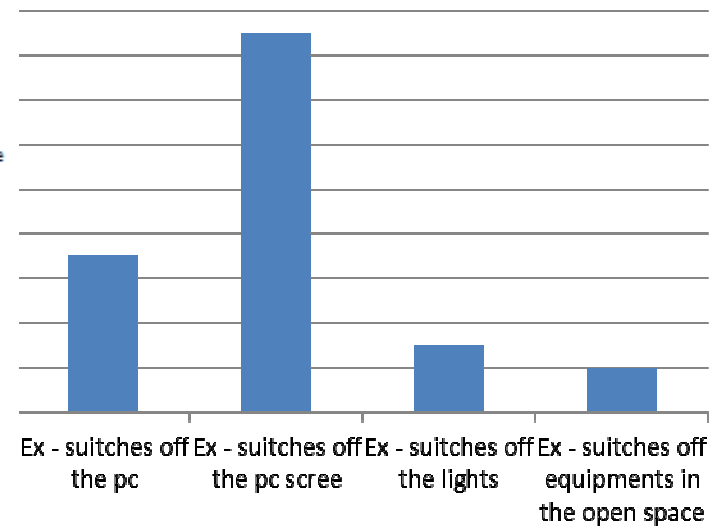


USER ENGAGEMENT STRATEGIES

Feed back information



Adopted more energy efficient actions

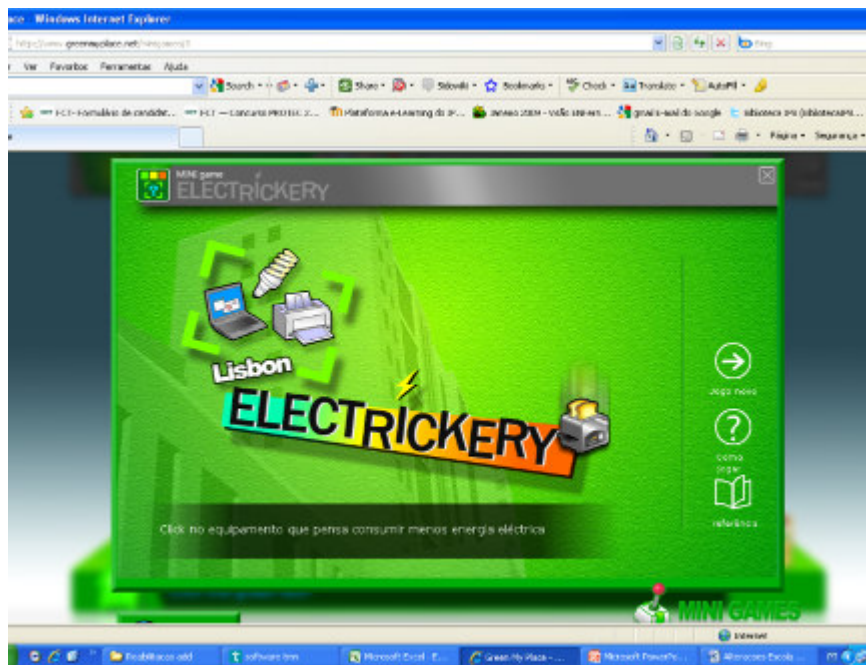


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USER ENGAGEMENT STRATEGIES

Serious games

Games available to the technicians since February 2011!



USER ENGAGEMENT STRATEGIES

Smart plugs

Users received smart plugs to test at home, allowing them to gain equipments consumption sensibility.

Distributed in April 2011!



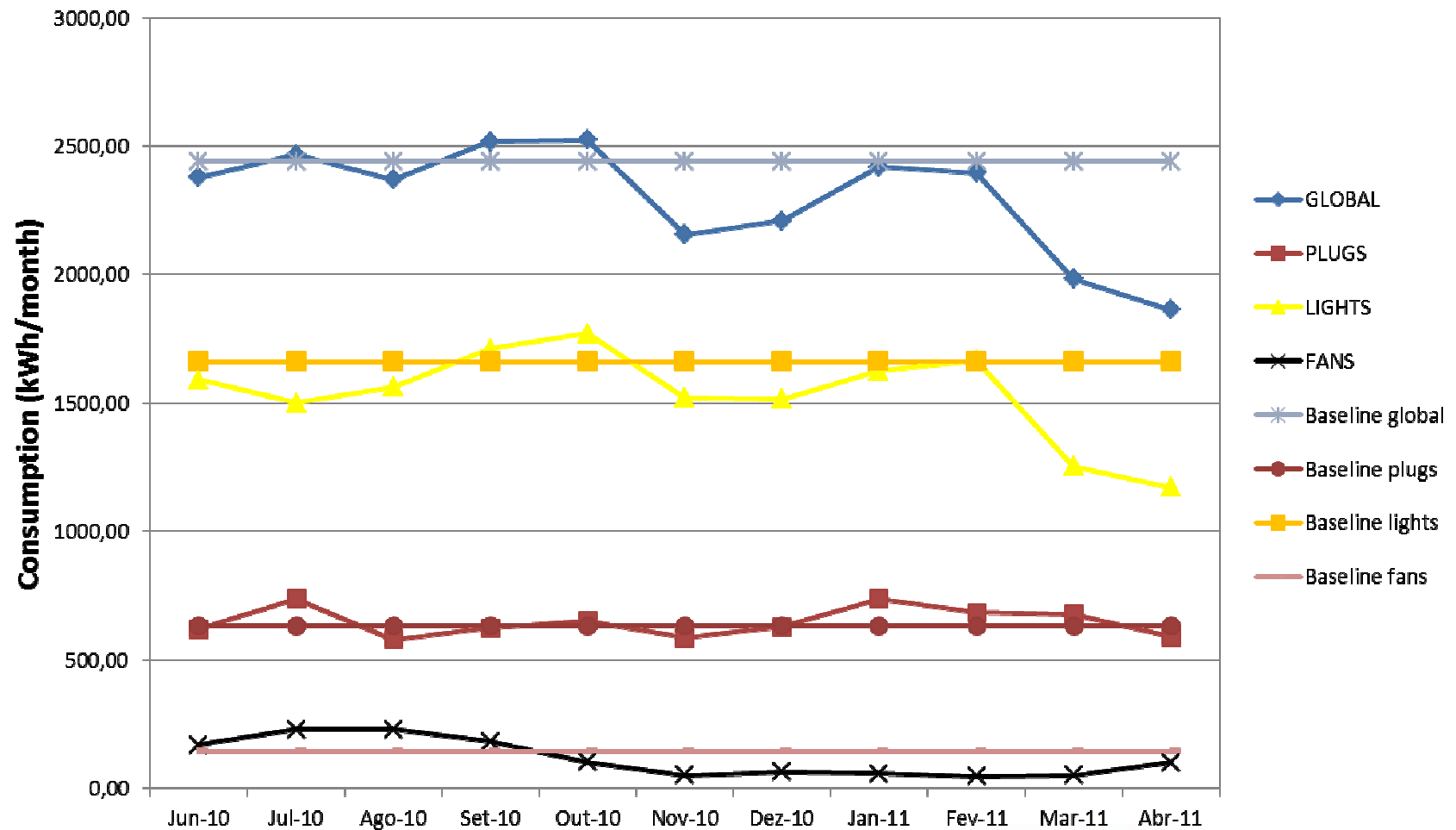
Reported experiences:

- TV box consumption and opportunity for savings!!
- Refrigerator consumption
- Difference between desk computer and portable
- Bread machine consumption



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ENERGY CONSUMPTION RESULTS

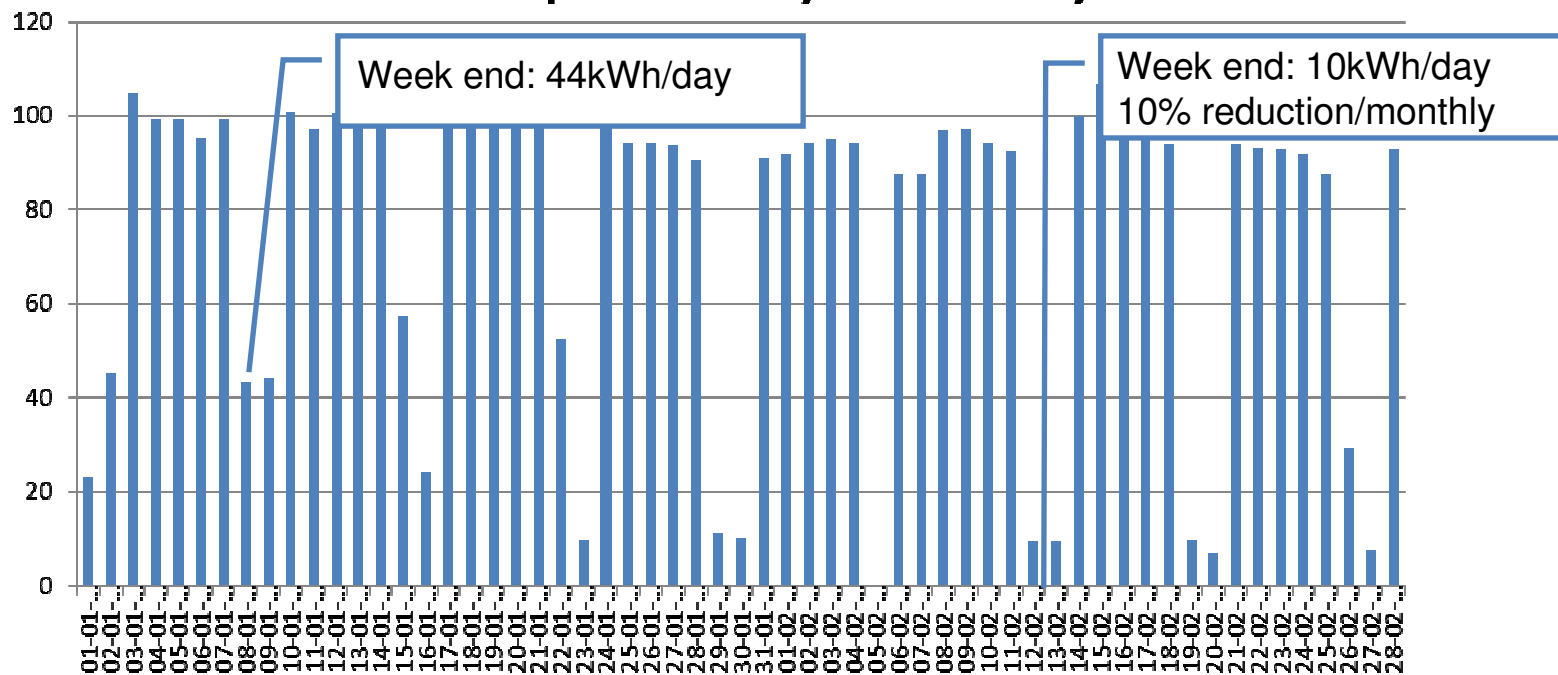


ENERGY CONSUMPTION RESULTS

Intervention in the block's electrical system to diminish the consumption during the weekends!

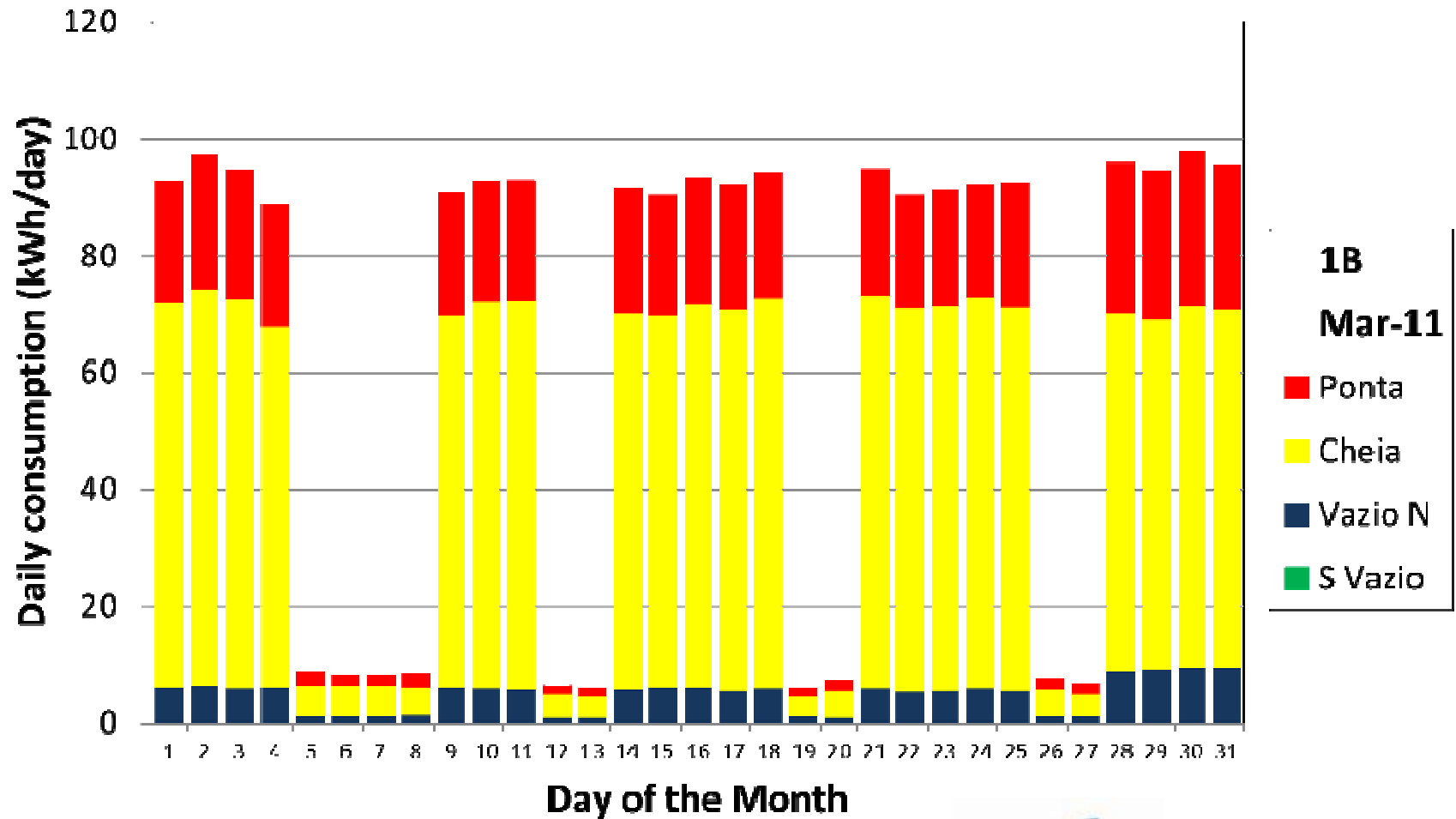
Reduction in lights consumption – 250kWh!!!!

Consumption January and February



LISBON'S SAVE ENERGY PILOT

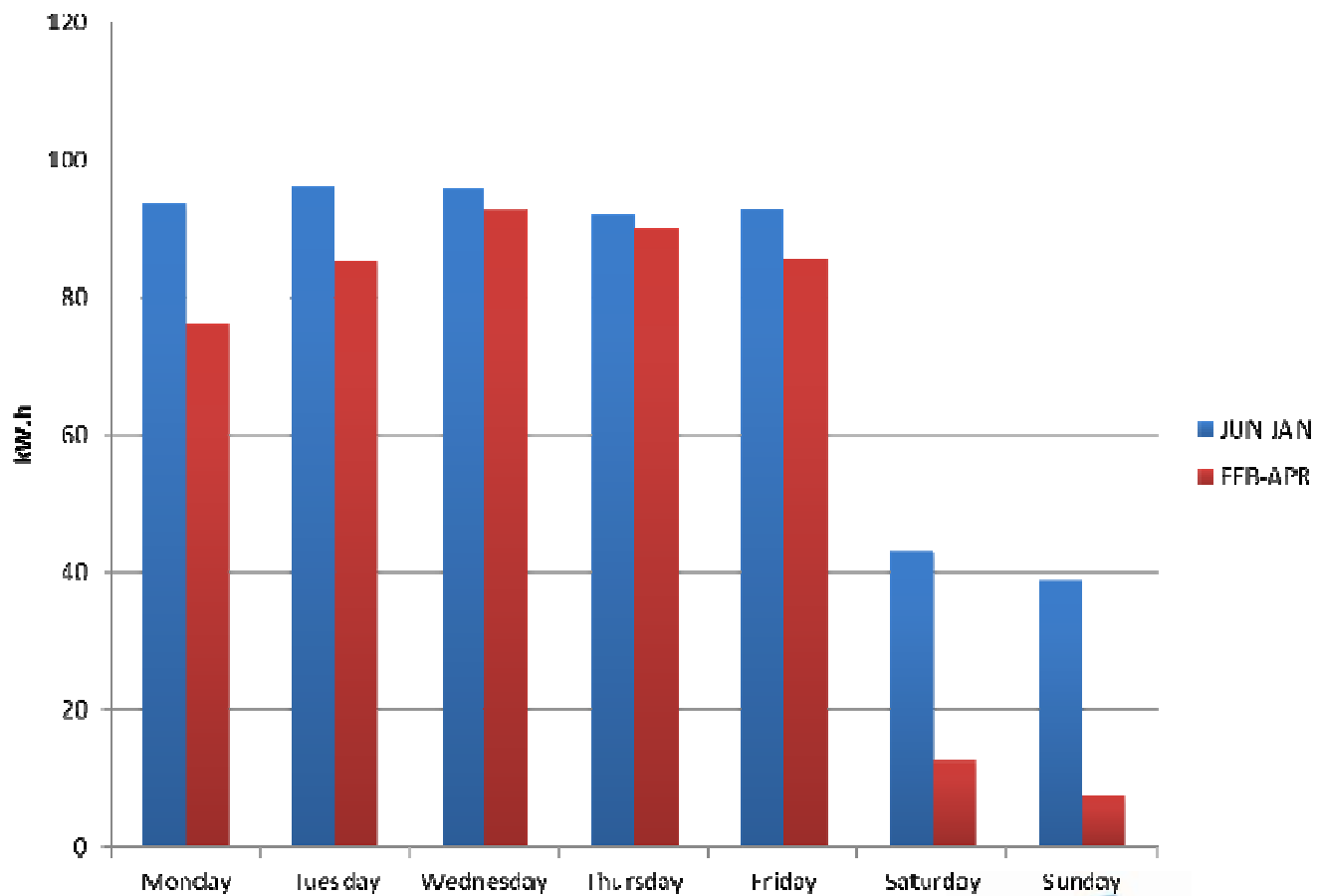
ENERGY CONSUMPTION RESULTS



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ENERGY CONSUMPTION RESULTS

Global Consumption

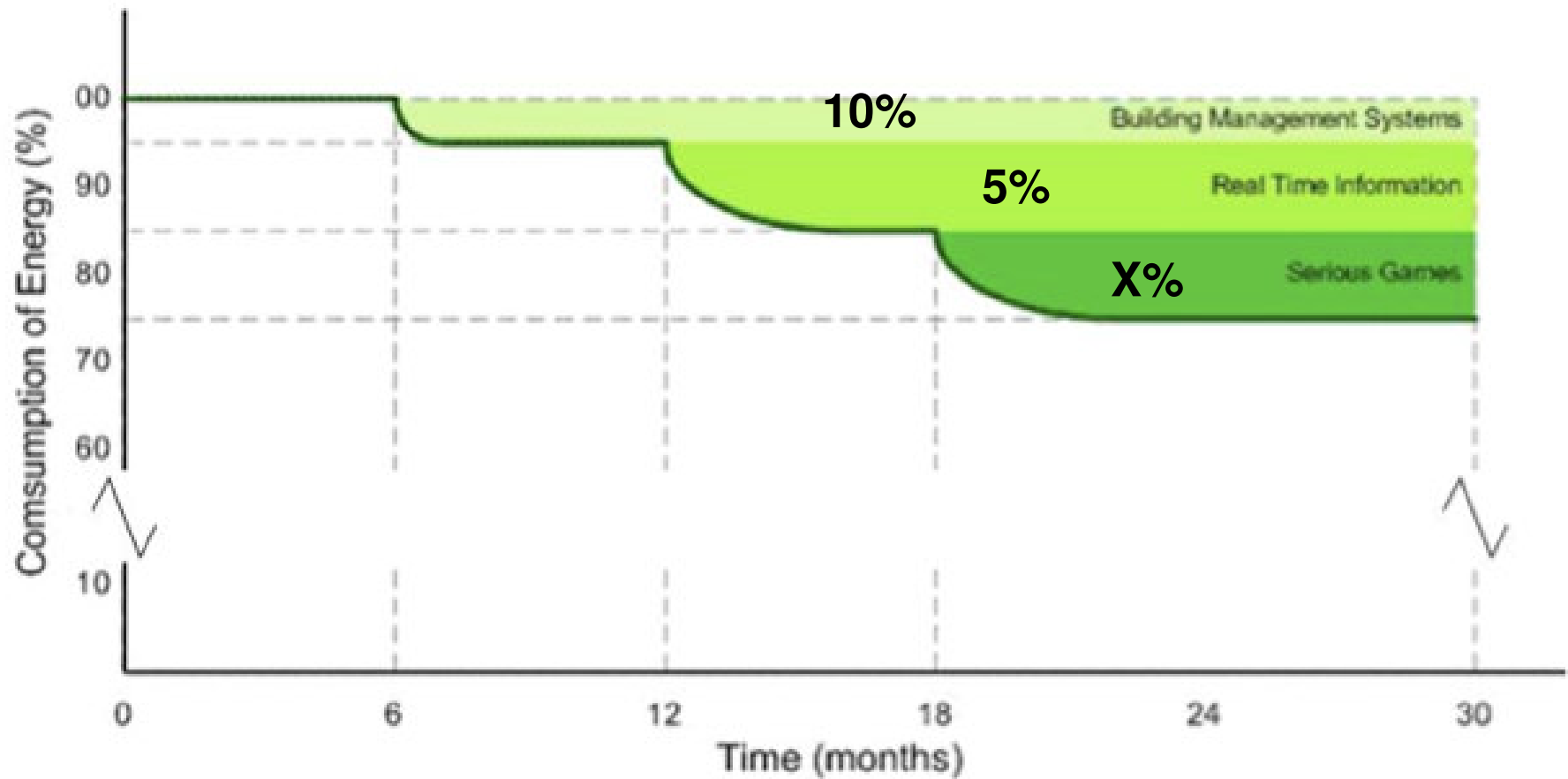


CONCLUSIONS - FACTS

- The definition of an adequate baseline requires one year monitoring;
- In office buildings users are totally disconnected to the need to optimize and reduce energy consumption;
- Users are sensitive to global consumption, not to dedicated circuits;
- Knowledge and interest in energy issues is still reduced;
- Users engagement bases on leaders behaviour and incentives;



CONCLUSIONS - RESULTS



CONCLUSIONS – SUCCESS FACTORS

- Energy and energy efficiency **information workshops** are an essential to raise users awareness;
- **Adequate the message and language to the audience;**
- Real time data is an added value if the presentation is adequate to the audience:
 - **real time display with the baseline**, green and red bars;
- Continuous incentive is crucial in the early stages:
 - **energy efficiency applets;**
- The **link to domestic environment** is essential to leverage the base of knowledge;
- Serious games connection to energy efficiency messages and to effective user behaviour transformation still depends on mentality changes;

Promote a direct link between savings and investments in energy efficiency at the work place – create the **energy efficiency fund!**

Engage users in a broader goal – **reduce energy to reduce CO₂ emissions!**



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NEXT STEPS

Presentation of results.

Promote the serious games.

Evolution for a broader monitoring system in the Lisbon Municipality Campo Grande 25 building. All the building will be monitored and the data publically displayed in the main hall.

Evaluate the extension of similar projects to other public buildings.

Promote the dissemination of the data collected and creation of added value functionalities.



