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LIFE DOMOTIC PROJECT

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CONAMA 2014 - AULA DINÁMICA (25th NOVEMBER 2014)
Castilla y León Permanent Delegation to the EU

Demonstration of Models for optimization of technologies for intelligent construction. (D.O.M.O.T.I.C.)

OBJECTIVE:

- ✓ To demonstrate and quantify the great CO2 emissions reduction potential of intelligent technologies and models of construction (house automation and latest generation inmotic) applied to buildings having a great visitors flow and owning a high exemplifying capacity.

EXPECTED RESULTS:

- ✓ Validation of three "good building governance" models based in domotic applications serving as benchmarking patterns of transfer by its important energy performance levels demonstrated in public buildings.
- ✓ Demonstrate and quantify the reduction of CO_2 emissions.
- ✓ Encourage energy efficient behavior of users of the buildings .
- ✓ Evaluate the results of the project through data collection and audits.
- ✓ Avoid unnecessary energy consumption and excess of light
- ✓ Over 50% energy consumption reduction demonstrated for the three pilot actions in comparison to the current energy demands existing in those types of buildings.

Programe = LIFE+2009 Environment Policy and Governance
Budget = 2.355.198 € (grant = 1,113,799 € - 47,29%)
Web: http://www.lifedomotic.eu/

3 Pilot Actions

PRAE Building – Center for environmental education and sustainability Valladolid (Castilla y León)

Fundación San Valero Building – Vocational training centre – Zaragoza (Aragón)

San Jorge University Valladolid (Aragón)

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San Valero Foundation (FSV) – The Building

- It is a building built in the 80s of the XX century where he is taught compulsory secondary education, secondary education and vocational training formal and continuous and occupational.

- It has more than 1,200 students per course

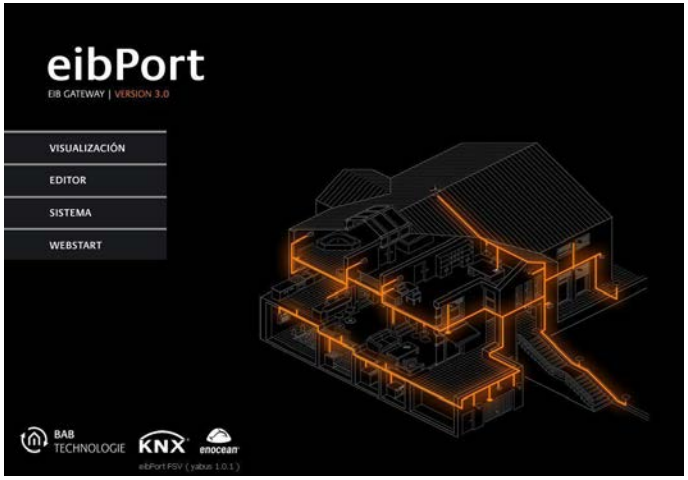
- South wing.
  - 2 floors
  - 19 rooms
  - 2 toilets
  - 2 corridors

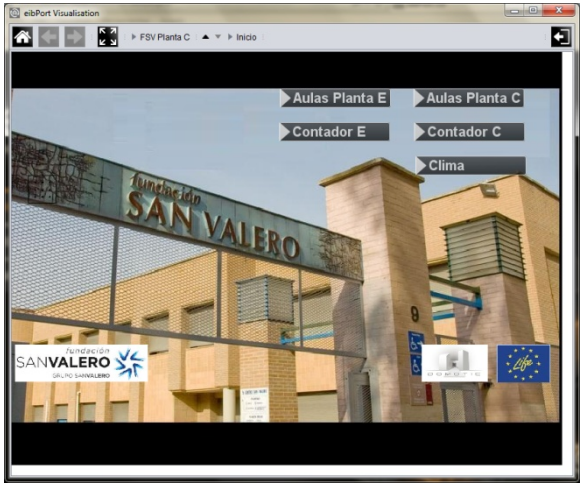
FSV – Actions - Lightning

- **Control** through bus KNX and DALI ballasts.
- **Replacement of luminaires** T8 (2X56W) by luminaires T5 (1X28W)
- Reduction in the consumption of 672w to 308w
- **Light sensors.** They take advantage of natural light and regulate automatically the luminaires of a same group governed by a detector.
- **Light buttons KNX.** Located in every classroom, which allows to establish a regular, automatic operating mode each independently lighting circuit.

FSV – web server. remote energy control

- Installation of eibPort.
- Access from any browser, mobile phone.





FSV – Servidor web. Persianas

- A system of blind control has been implemented in classrooms.
- Blinds can be controllled both, individually and also as running a scene acting on all of them.

FSV – Results

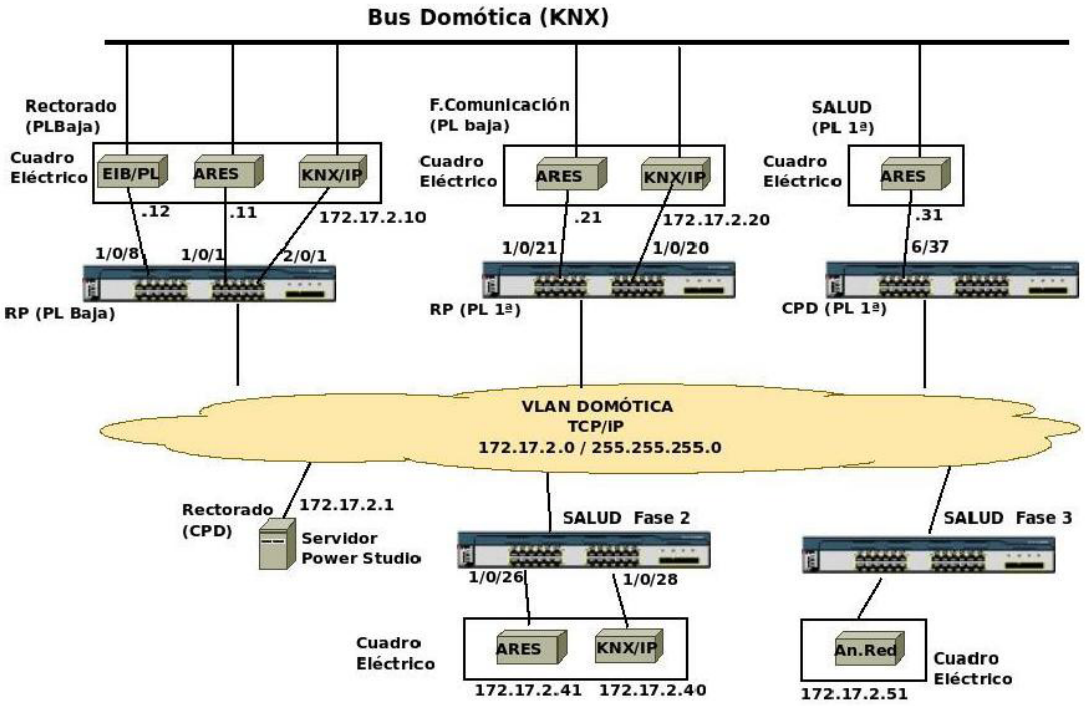
	Annual electricity consume [kWh]	Annual CO_2 emissions [Tm]
Baseline	**40.455**	**26,3**
Final Results	**21.245**	**13,8**
Savings	**47,5 %**	

San Jorge University

- Buildings designed under energy efficiency criteria.
- Absence of systems of control and monitoring of consumption.
- Difficulties in laying new wiring.
- Taking advantage of the existing computer network.
- Lighting excess

- Actions implemented in:
  - Rector´s Building
  - Communication studies building
  - Health studies building

USJ – Interconnection of several buildings

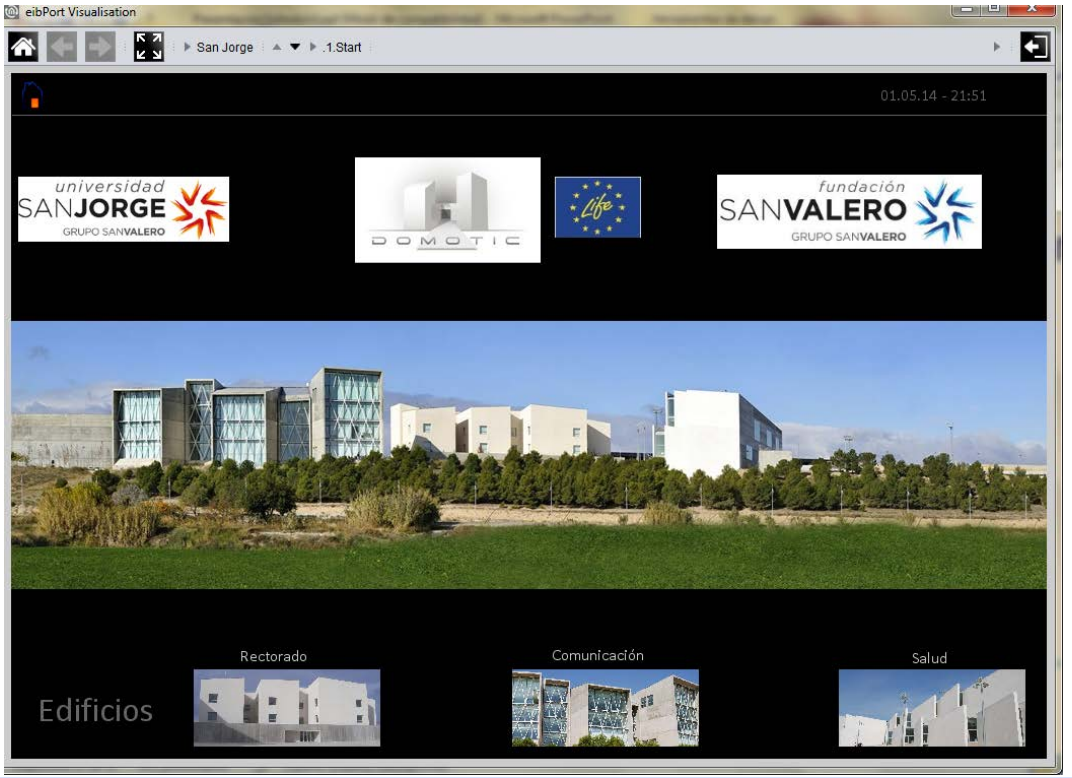


USJ - Lightning

- Installation of KNX controllers for individual control of each circuit.
- Sensor installation of regulation that capture the natural existing light and regulate.
- Visualization and control of each circuit through a web server.
- The custodians of buildings can run scenes and know the status of each area of the building.

USJ –web server. Remote access

- Installation of eibPort
- access protected by VPN
- access to the 3 buildings



USJ – Resultados

	Annual electricity consume [kWh]	Annual CO_2 emissions [Tm]
Baseline	77.618	50,4
Final Results	27.166	17,6
Savings	65 %	

Castilla y León Natural Heritage Foundation – PRAE Building

- PRAE Building. Sustainable building assessment IISBE (SB Tool)
- Building finished in 2008
- Consumption monitorizations under EMAS (register ES-CL-000032)
- The use of energy (mainly renewable) was supposed to be efficient but the project was an opportunity to optimize it).

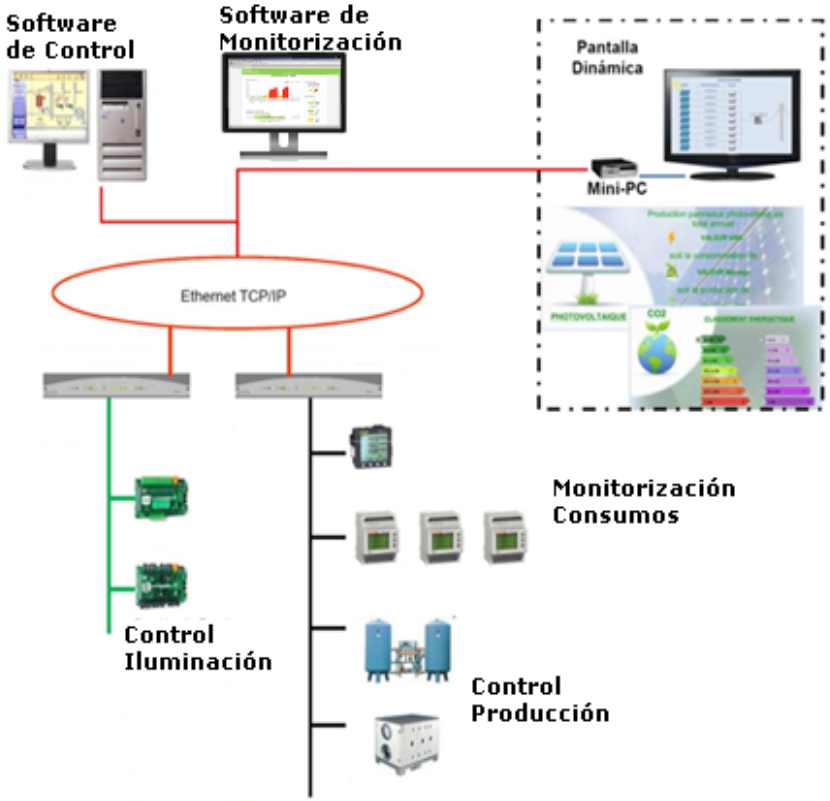
Initial data collected

- Internal Audit carried out in april 2011

- Dimensions: 3.541 m^2
  - Administrative area: 1.180 m^2
  - Exhibitions and public area: 2.361 m^2

- Some data revealed in the initial audit
  - Existing building management system (BMS) was not appropriate for the project and had critical restrictions.
  - As is was detected at the beginning of the project the servers in Data Center were undersized for the project and new one should be supplied
  - Monitorization was based only in suppliers invoices.
  - Integration of the systems was needed
  - Existing an intermediate level of domotic devices but some of them were not well used and need a global integration

Scheme of the proposed actions in PRAE



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Actions Implemented

- *Implementation of domotic devices for control and monitoring collecting consume data:*
  - 21 network analyzers
  - 12 analyzers for air treatment units
  - 35 Mixed detector of presence-lightness connected to bus
  - 2 energy meters (solar thermal and heating-cooling)
  - 1 pulse counter at biomass boilers.
- *Building Management System for monitoring (DEXMA).*
- *Permanent Auditing and improvement actions*

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Network analyzers

- Instalattion of 21 network analyzers at existing electric distribution panels.

  The analyzers provide energy consume data sending that to the BMS through bus communication system (MODBUS).

- Optimization of solar photovoltaic grill (PV) supplying energy to the building and to a electric car battery charger

Medidores energéticos

DEXGate
Concentrador

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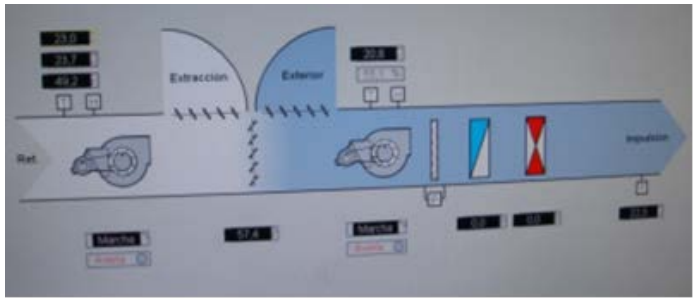
Analyzers for air treatment units (UTAs)

- Instalattion of 2 control pannels of UTA´s for remote control of heating-cooling and control of thermal confort level.



Sondas inalámbricas

DEXGate
Concentrador

- Installation of air quality analyzers at each UTA´s (10) y 1 inner temperature analyzer and humidity analizers at each control pannel (2).

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Detector of presence-lightness

- Installation of 35 presence detector for Optimization of lightning consume at Common areas of the buildind(toilets, hall Corridors and kitchen).

24 sensors
Infrared passive

11 sensors
ultrasonic

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Energy meters and poulse counters

- Installation of 2 new energy meters at
  - Heating/cooling system
  - solar thermal system, provinding data of energy production (heat water).
- Connecting the 2 new energy meters to the SEDICAL BMS System.
- Improvement of PLC (programable logic controller) for the management of the heating/cooling system, distribution and management of hot water.

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Electricity Monitoring

- Monitoring of data provided by analyzers and counters shall contribute to:
  - Having statistical reports and information of energy consume.
  - Acting over the equipments rutines optimizing the use of them.
  - Receiving “alerts” to detect anomalies in the facilities
  - Dissemination of information to the general public on-line and through a monitor at the entrance of the building

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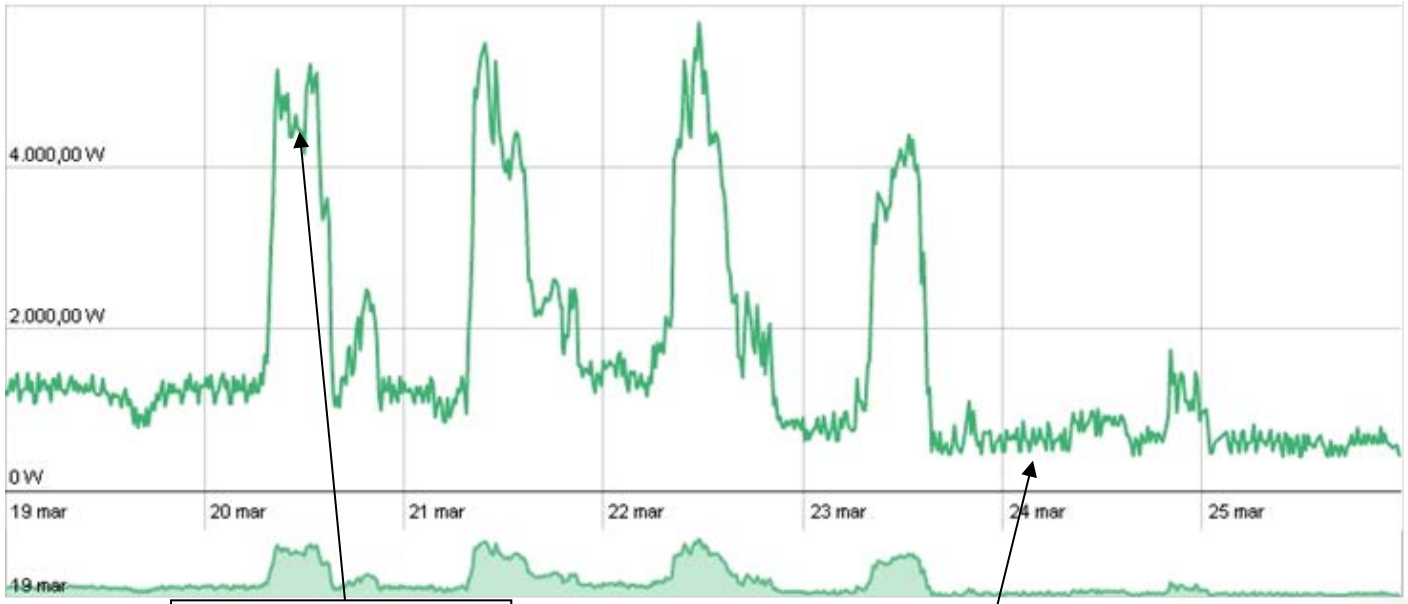
Example: monitoring of lightning



Main consume is made at office hours during the day . At night only outside lightning for security purposes.

On week-ends there ar no consume at officies, only at exhibition rooms.

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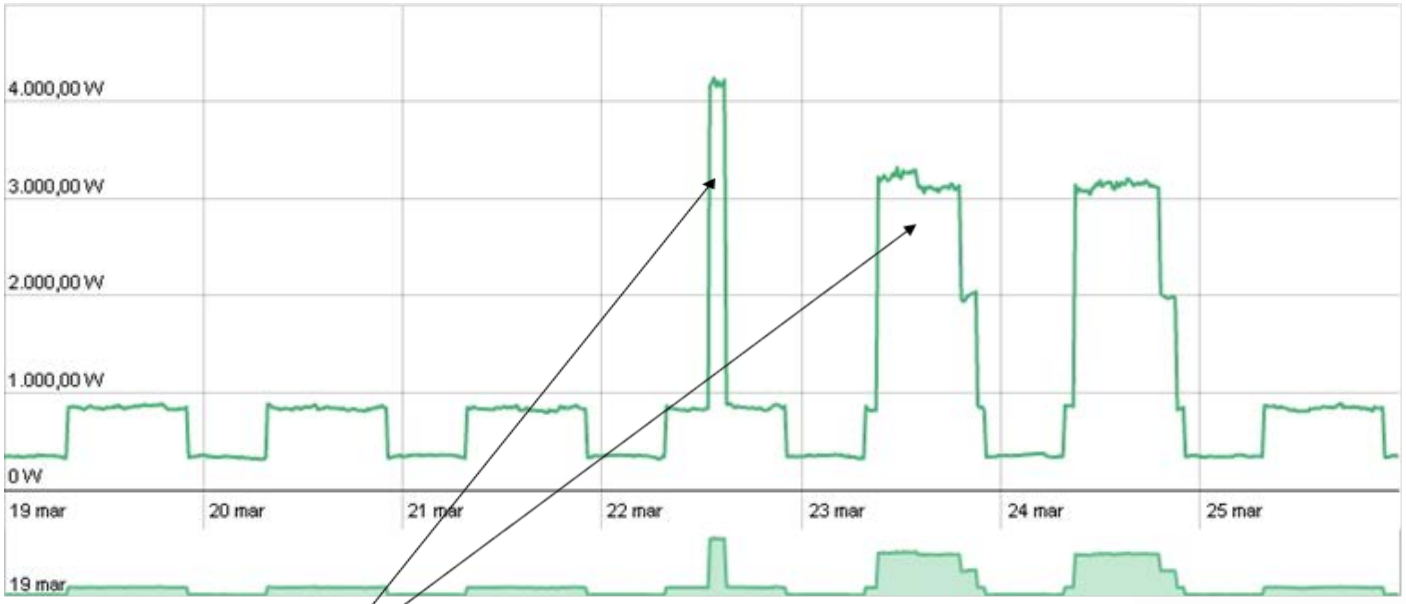
Example of Heating/Cooling Monitoring



Heating/Cooling of the left wing ot the building only increases at exhibition rooms when conferences, courses or other activities take place

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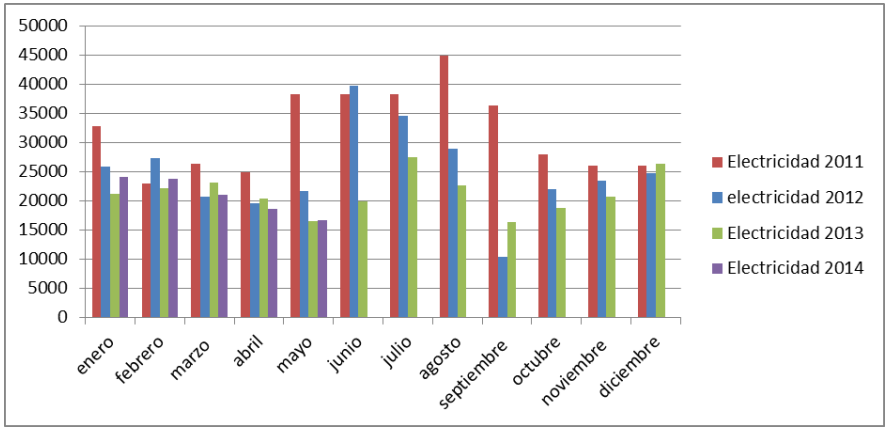
Evolution of electricity consume 2011/2014

	Annual electricity consume [kWh]	Annual CO_2 emissions [Tm]
Baseline	456.803	159,88
Final Results	255,588	89,46
Savings	44 %	



Conclusions

- **Monitoring of energy consumption is a premise** for drafting a building management system and implementing domotic devices.

- Permanent monitoring of energy consumption energy, in a context of "Comprehensive provision of services for the management of energy"; should be **incorporated into maintenance contracts** to ensure the sustainability of energy management systems.

- **The choice of "Open systems**" for device management, control of energy production and consumption, against "Proprietary systems"; It is key to reducing dependence on third parties, ensure the durability of the facilities, the compatibility between devices and reducing future costs by adapting them to new configurations.

- **Smart buildings – smart cities**: "Energy management" systems should be considered now as part of "a whole" beyond the traditional measurement of consumption and the control of the own facilities; in an orientation that allows a harmonized network of smart buildings .

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Thank you for your attention

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