FAR SYSTEMS
SISTEMI ELETTRONICI DEL TRASPORTO AMBIENTE E COSTRUZIONI
ELECTRONIC SYSTEMS FOR TRANSPORTATION ENVIRONMENT & BUILDINGS

GRUPPO INDUSTRIALE TOSONI

R & D SYSTEMS
SISTEMI DI RICERCA E SVILUPPO
RESEARCH & DEVELOPMENT SYSTEMS

R&D – Energy division

SMART BUILD - EU PROJECT

FARECHO IN
S. MICHELE ALL'ADIGE
DEMO SITE

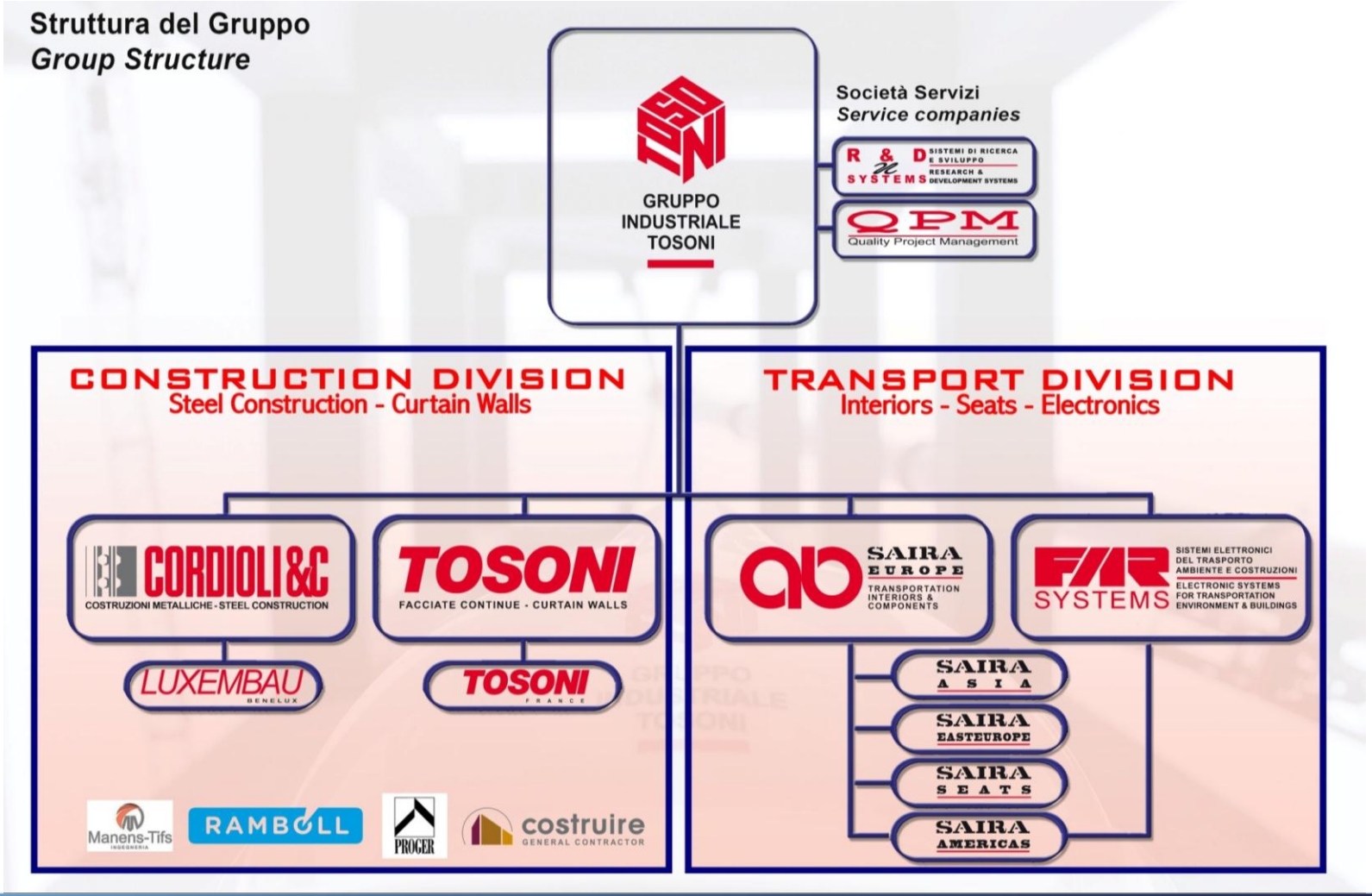
cip competitiveness and innovation framework programme 2007-2013

Smart Build

AGENDA

1. Introduction
2. FAREcho
3. S. MICHELE – Demo site

1. INTRODUCTION



1. INTRODUCTION

FAR SYSTEMS S.p.A.

Electronic systems for:

Transport division→ Design&Development

Electronic board devices

New Pendolino - High Speed Train - Italy

Talent 2 - Regional Train - Germany

1. INTRODUCTION

FAR SYSTEMS S.p.A.

Electronic systems for:

Construction & Infrastructure division→ “TURNKEY" solutions in

- Building Integrated PhotoVoltaic (BIPV),
- Architectural LED lighting,
- Building Automation & Energy Management

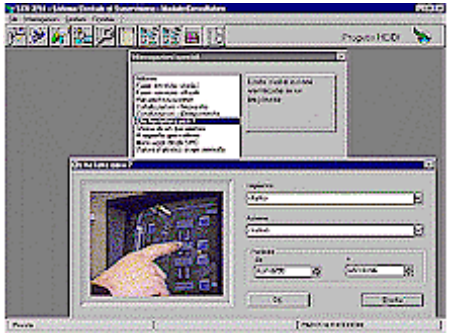
Verona Forum – Verona

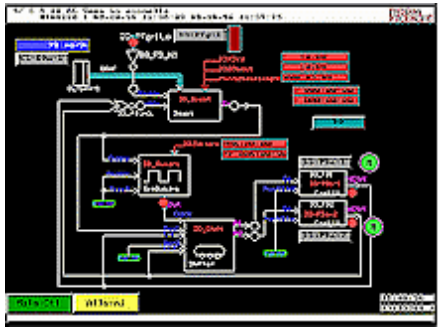
1. INTRODUCTION

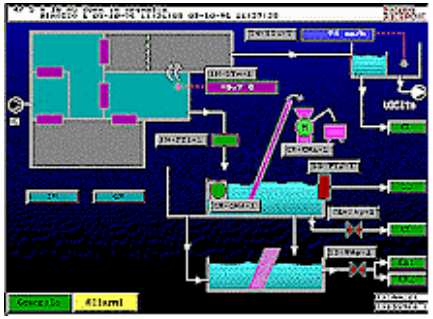
FAR SYSTEMS S.p.A.

Service Centre

- Computerized management of the water cycle
- Supervision of complex infrastructure
- Remote control and management of industrial systems
- Data acquisition
- Traffic monitoring systems and tunnels



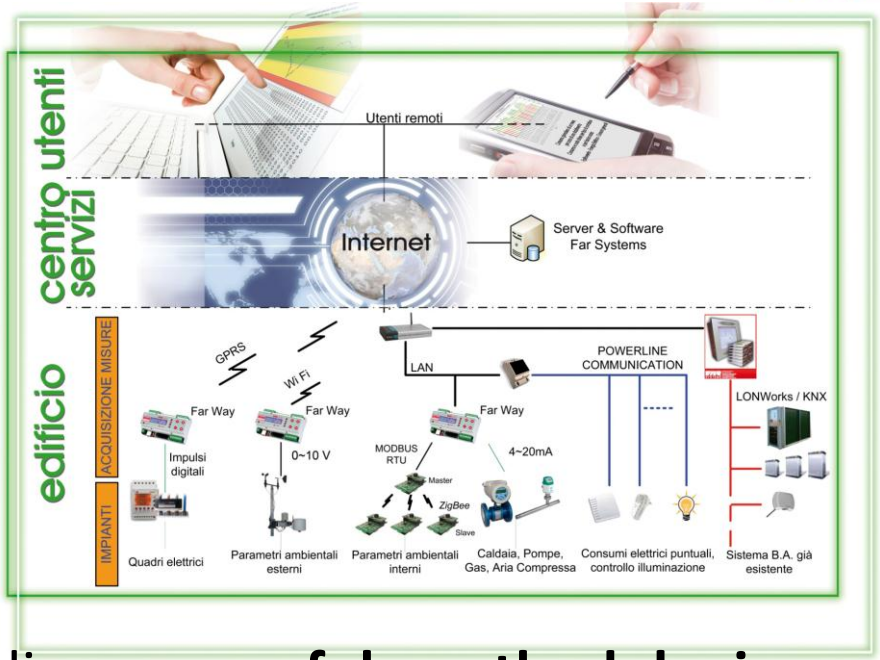




2. FARECHO

An Innovative ICT concept

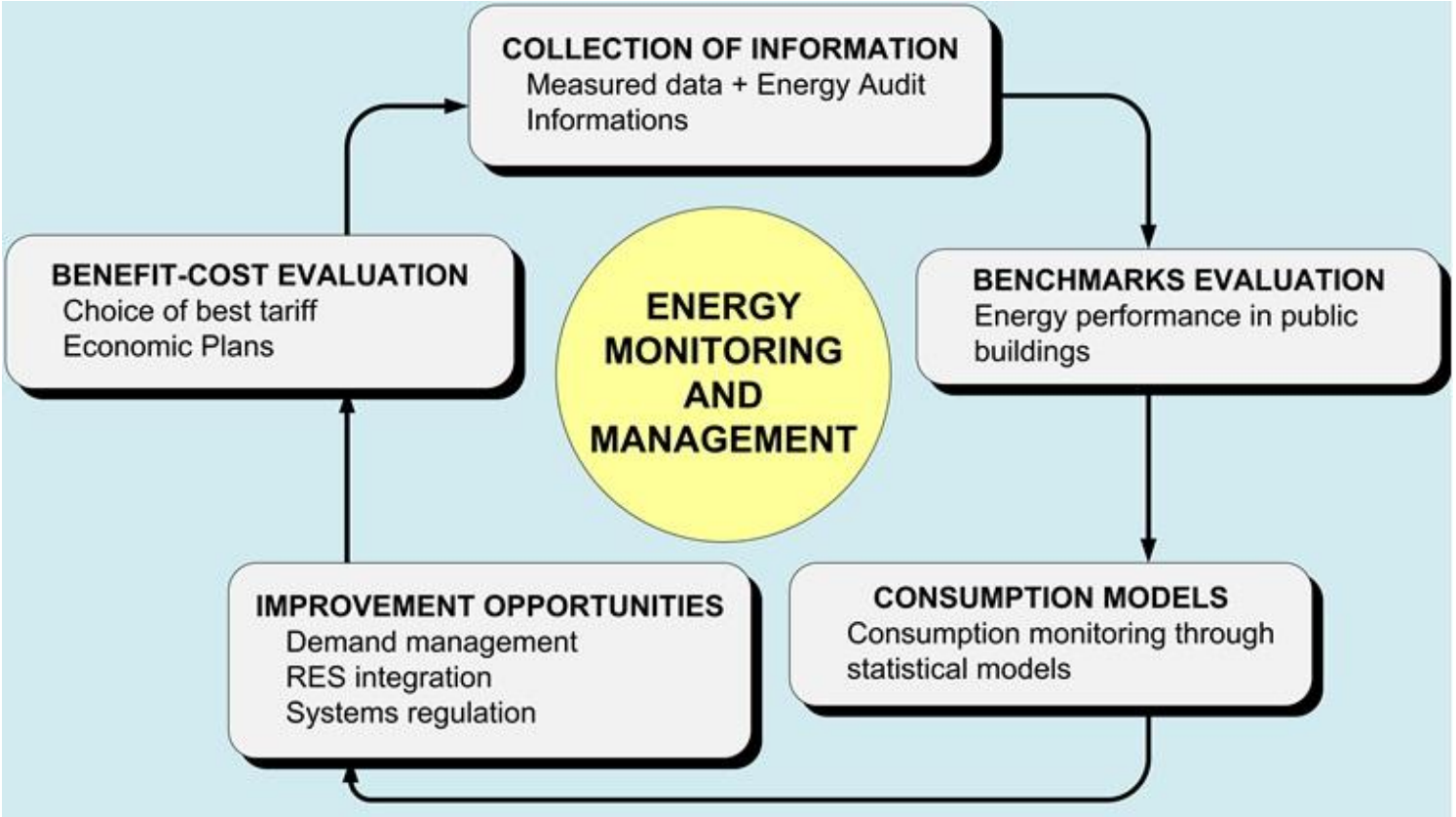
- HARDWARE
- SOFTWARE



FAR ECHO is a tool, including **powerful methodologies and analysis instruments** in order to simplify the work of energy managers.

2. FARECHO

Features: Wide overview



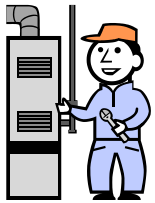
Features: LEED compliance

LEED – Green Building Operations & Maintenance

- Energy & Atmosphere
  - Prerequisite 1: Energy Efficiency Best Management Practices – Planning, Documentation and Opportunity Assessment
  - Credit 2.3: Existing Building Commissioning - Ongoing Commissioning
  - Credit 3.1: Performance Measurement – Building Automation System
  - Credit 3.2: Performance Measurement – System-Level Measurement
- Indoor Environmental Performance
  - Prerequisite 1: Minimum Indoor Air Quality Performance
  - Credit 2.2: Controllability of Systems – Lighting
  - Credit 2.3: Occupant Comfort – Thermal Comfort Monitoring

2. FARECHO

Features: Multi-site System



⇨	ENERGY MANAGER	SERVICE MAN	ADMINISTRATION
⇨	ENERGY MANAGER	SERVICE MAN	ADMINISTRATION
⇨	ENERGY MANAGER	SERVICE MAN	ADMINISTRATION

2. FARECHO

Public bodies

- Schools, offices, sport buildings, hospitals…
- Very articulated and differentiated buildings

Energy management needs useful tools

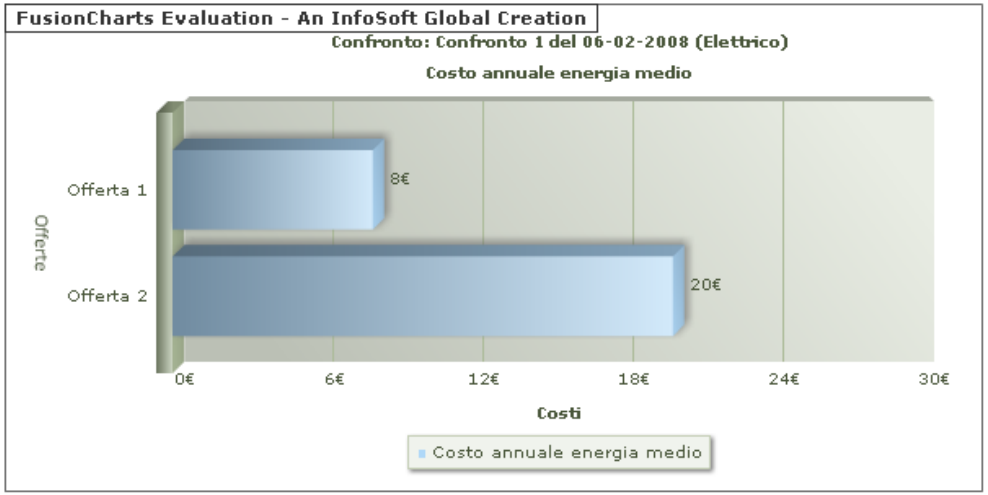
ICT SYSTEMS ARE THE SOLUTION TO THE PROBLEM:
THEIR DESIGN IS THE MOST IMPORTANT STEP

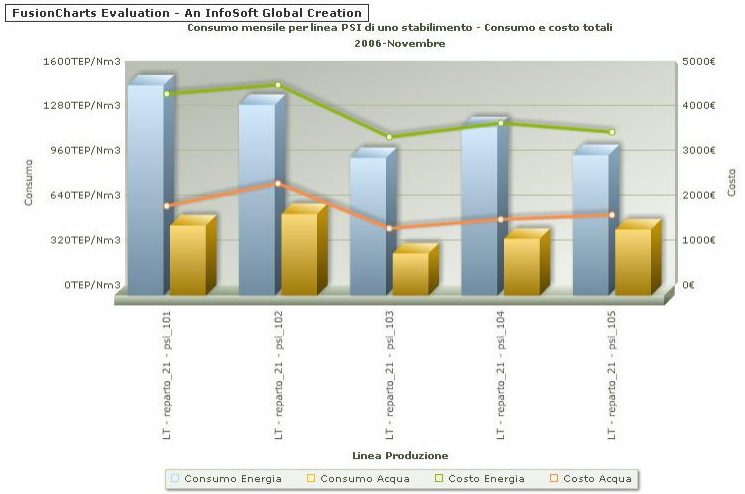
2. FARECHO

Private bodies

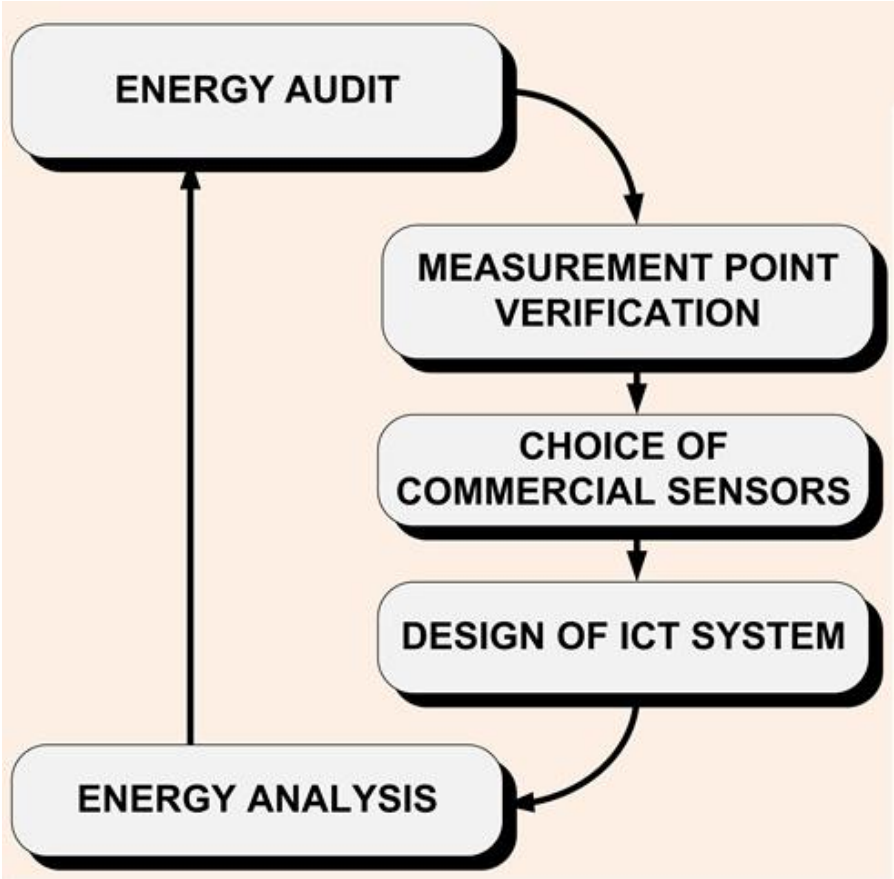
ESCo customer

TOOL for validation of feasibility study where innovative energy systems are proposed



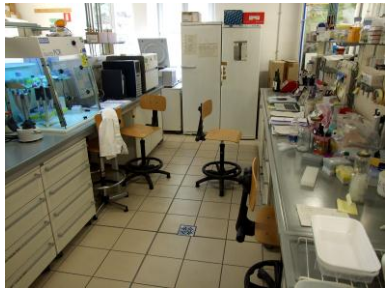


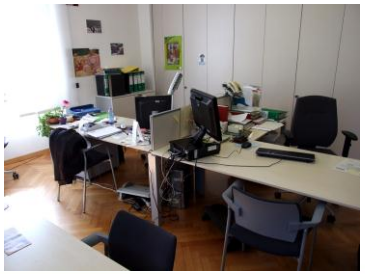
Design procedure



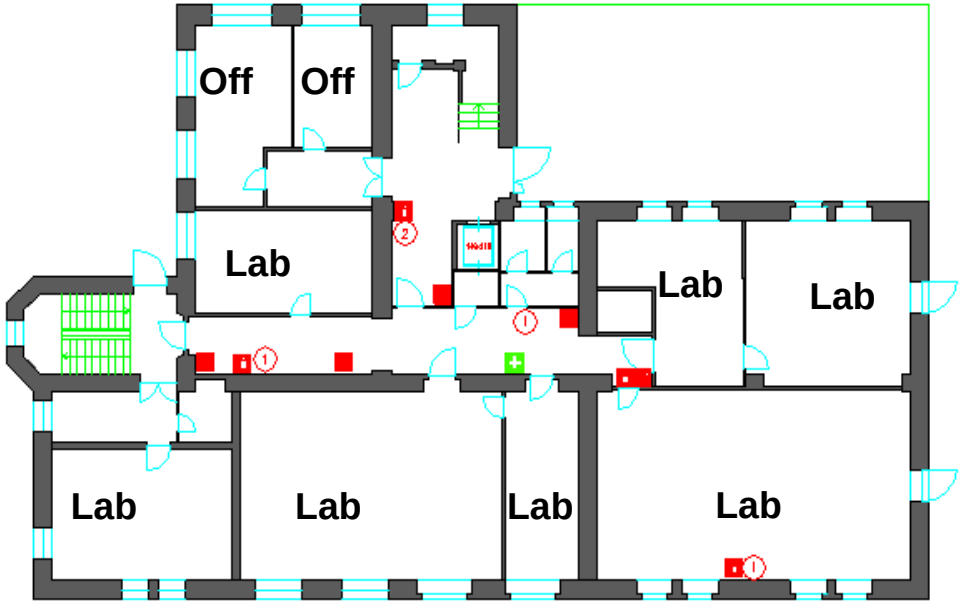
3. S. MICHELE – DEMO SITE

Research institute for agriculture





Laboratories & Offices - 3 floors



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Energy audit – Utilization profile

Yearly profile: 2 wk. Christmas's
1 wk. Easter 's
2 wk. summer holiday

Daily profile: Mon.-Fri. 8.00 - 18.00

Room categories: Lab and Office

Electric tariff

Amount for free and free market

	Mon	to	Fri	Sat	Sun
01:00	F3	F3	F3	F3	F3
to	F3	F3	F3	F3	F3
06:00	F3	F3	F3	F3	F3
07:00	F2	F2	F2	F2	F3
08:00	F1	F1	F1	F2	F3
to	F1	F1	F1	F2	F3
18:00	F1	F1	F1	F2	F3
19:00	F2	F2	F2	F2	F3
to	F2	F2	F2	F2	F3
23:00	F2	F2	F2	F2	F3
00:00	F3	F3	F3	F3	F3

[C€ per kWh]	
F1	8,78948
F2	8,629
F3	6,72623

Heating tariff

External agency and own power plant

	Mon	to	Fri	Sat	Sun
01:00	F1	F1	F1	F1	F1
to	F1	F1	F1	F1	F1
06:00	F1	F1	F1	F1	F1
07:00	F1	F1	F1	F1	F1
08:00	F1	F1	F1	F1	F1
to	F1	F1	F1	F1	F1
18:00	F1	F1	F1	F1	F1
19:00	F1	F1	F1	F1	F1
to	F1	F1	F1	F1	F1
23:00	F1	F1	F1	F1	F1
00:00	F1	F1	F1	F1	F1

[€ per MWh]	
F1	42,8

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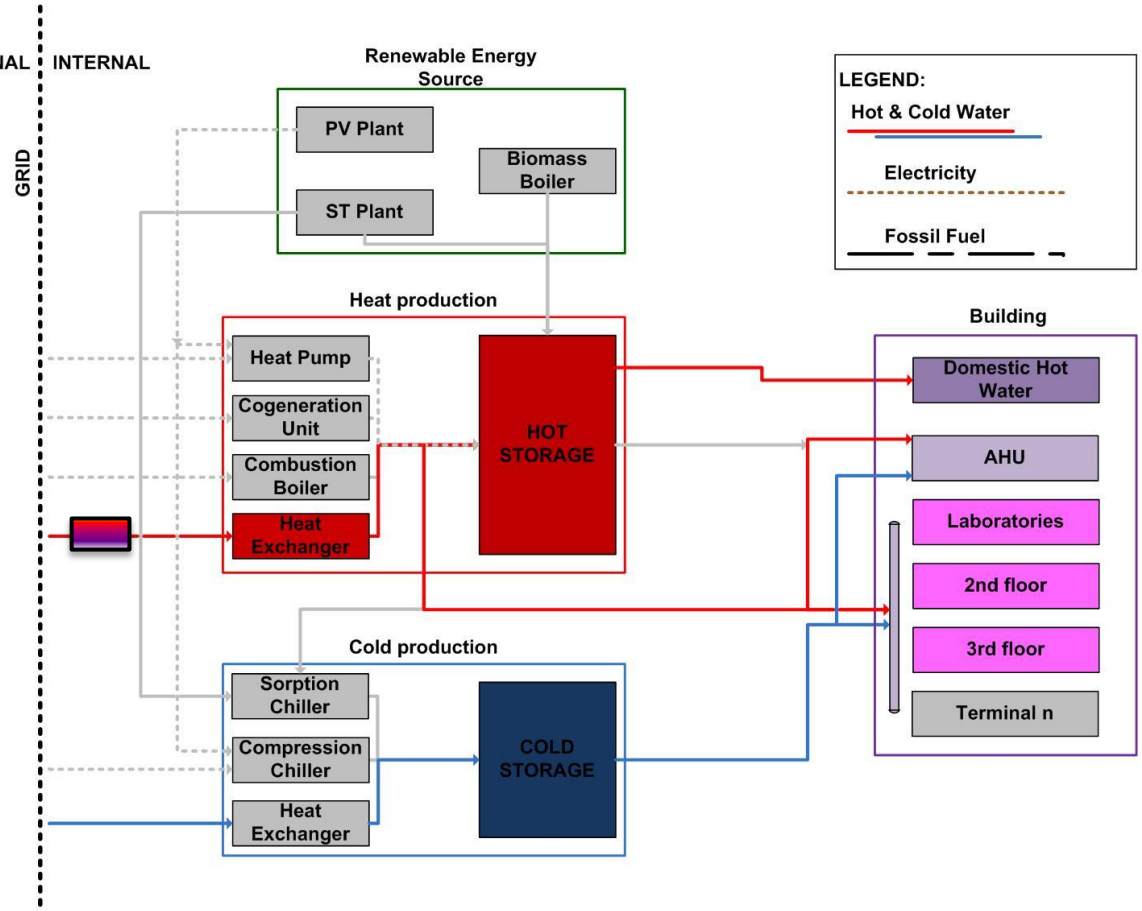
Energy audit – Thermal plant

District Heating Sys:
150 kW Heat exchanger

Air Handling Unit:
One Duct
Lab → 6 vol/h

Domestic Hot Water:
By Electricity in summer time

Monitoring:
Heat meter for DHS



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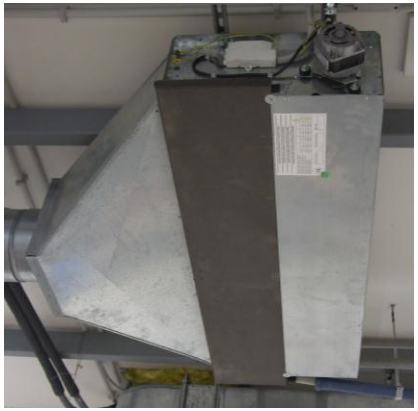
Thermal Plant Details

150 kW heat exchanger

One duct AHU

Hot storage 200 l

Heating element



Ventilation post battery

Fan Coil

Cold storage 500 l

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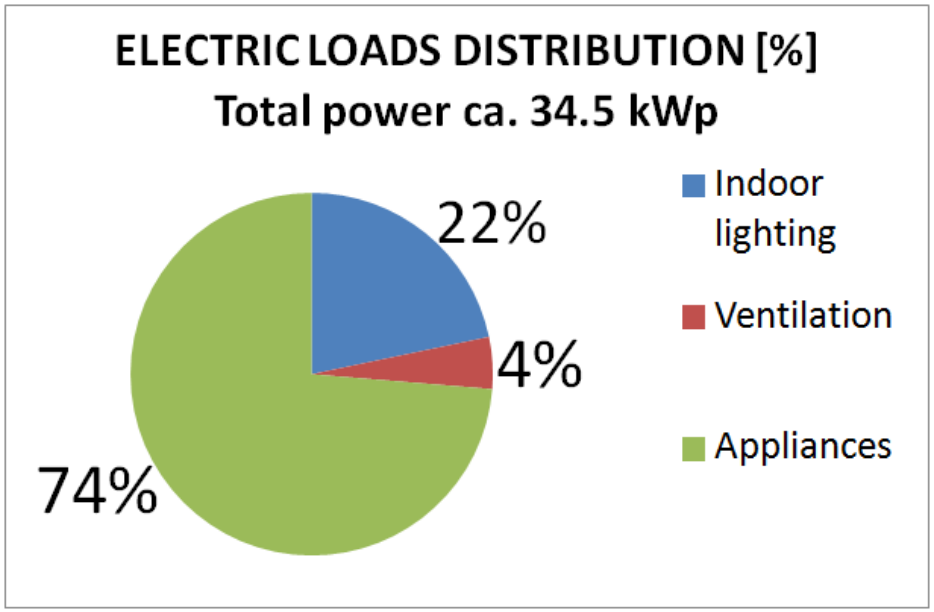
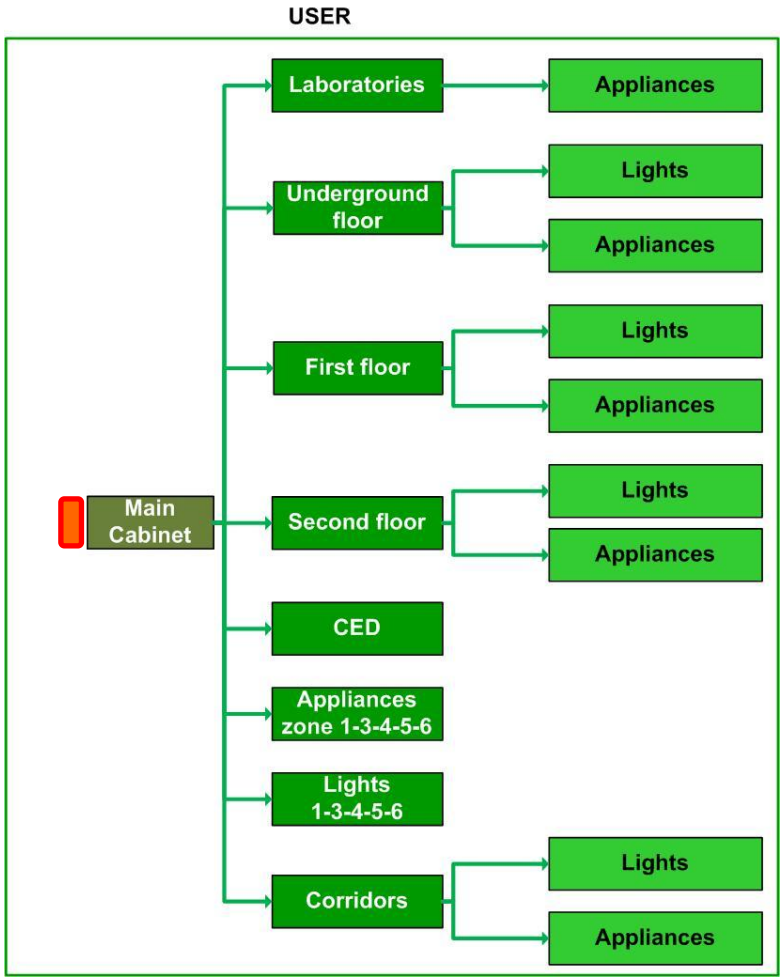
Energy audit - Electric plant

Lab continuous load profile

Office 24 printers

Monitoring network analyzer





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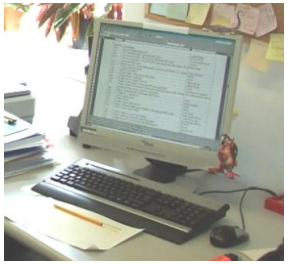
Electric Plant Details









A lot of electric loads …

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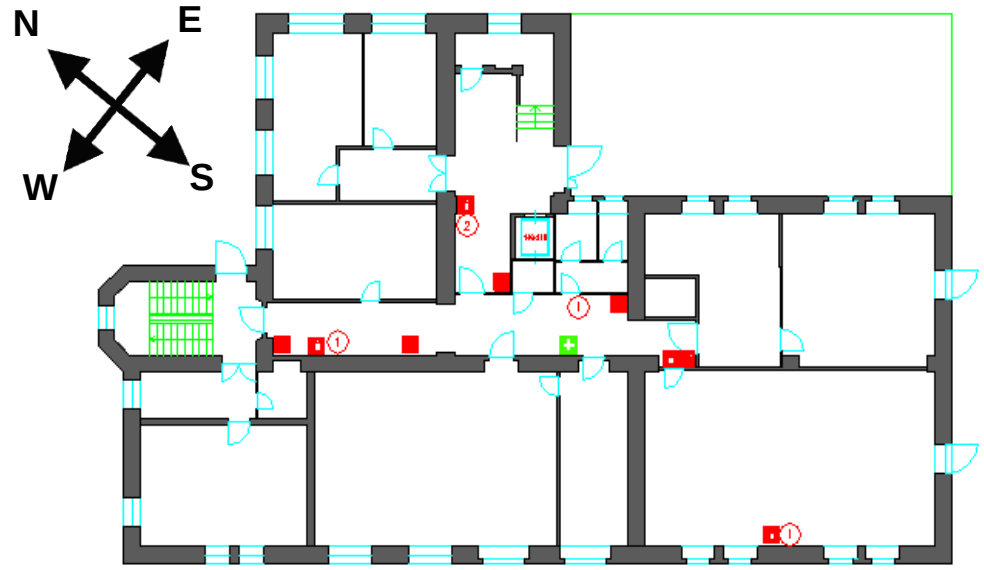
Energy Audit - Indoor comfort



According to the occupants:

Lighting comfort -> **good**

Humidity -> **good**

The main discomfort:

a) **Cold** on Monday morning in winter

b) **Hot** in summer in the offices on the south side and with many occupants

c) Fan Coils not properly located

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Indoor comfort Details

Thermal Control manually made by users

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Measurement point verification

MAIN NEEDS:

- No invasive installing
- No long period electric shortcut
- Sensors well integrated with the internal design

	Level of analisys	Quantity	Measure	Monitoring point	Note and location
ELECTRIC PLANT	*Main*	1	GRID analyzer		Replace existing analyzer with more
					professional GRID analyzer (Shark), 160 A, T
	First level	10	counter [Wh]	Laboratories	Q. Generale, Quadro Laboratorio, 63 A, T
				Undedrground	Q. Generale, Quadro P. Interrato, 40 A, T
				First floor	Q. Generale, Quadro P. Primo, 40 A, T
				Second floor	Q. Generale, Quadro P. Secondo, 40 A, T
				CED	Q. Generale, Quadro Cen. Calc., 40 A, T
				Appliances	Q. Generale, F.M. Zona 1-3-4-5-6, 16 A, M
				Light	Q. Generale, ILL. Zona 1-3-4-6, 10 A, M
					Q. Generale, Illum. Giroscali, 10 A, M
					Q. Generale, Illum. Corridoi, 10 A, M
				Corridors	Q. Generale, Servizi Corridoi, 16 A, M
	Second level	2	counter [Wh]	Corridors light	Q. P. Primo, Ill. Corrid. e Servizi, 10 A, M
					Q. P. Secondo, Ill. Corrid. e Servizi, 10 A, M
	Third level	4		First floor light	Q. P. Primo, Ill. Zona 1, 10 A, M
					Q. P. Primo, FM. Zona 1, 10 A, M
				Second floor light	Q. P. Secondo, Ill. Zona 1, 10 A, M
					Q. P. Secondo, FM. Zona 1, 10 A, M
	Mobile	10	counter [Wh]	Small Appliance (Coffè	MilkyWay Zplug
	Master	2		Machine, Fax, Printer, ...)	MilkyWay Master
THERMAL PLANT	*main Heat meter*	1	massflow fixed	Hot - circuit	Existing, WATTS CA502M
		2	Temperatures		
		1	massflow portable	Cold - circuit	
		2	Temperatures		
	Zero level	2	Temperatures	Temperature sensors storage	
	Second level	1	massflow portable	Hot/Cold	
		10	Contact temperature probes (PT500)		
	Third level	0	massflow portable	Hot/Cold	
		2	Temperatures	Not defined	Reserve
		1	Temperatures	UTA	
		1	Umidità	UTA	
AMBIENT PARAMETERS	*Weather condition*	1		Existing station closest to the building	To be connected
	Indoor conditions	6	Temperature	Office type 1-2, First & Second f	Temperature + Humidity + Lux Sensor (E+E E80)
		6	Humidity		
		6	CO2		
		6	LUX	Office type 1-2, First & Second floor + Corridors	Theben
		6	Occupancy		
	Indoor conditions portable	4	Temperature	Laboratories	Temperature + Humidity + Lux Sensor (OPTO-I)
		4	Humidity	Laboratories	
	Master	2			Master OPTO-I

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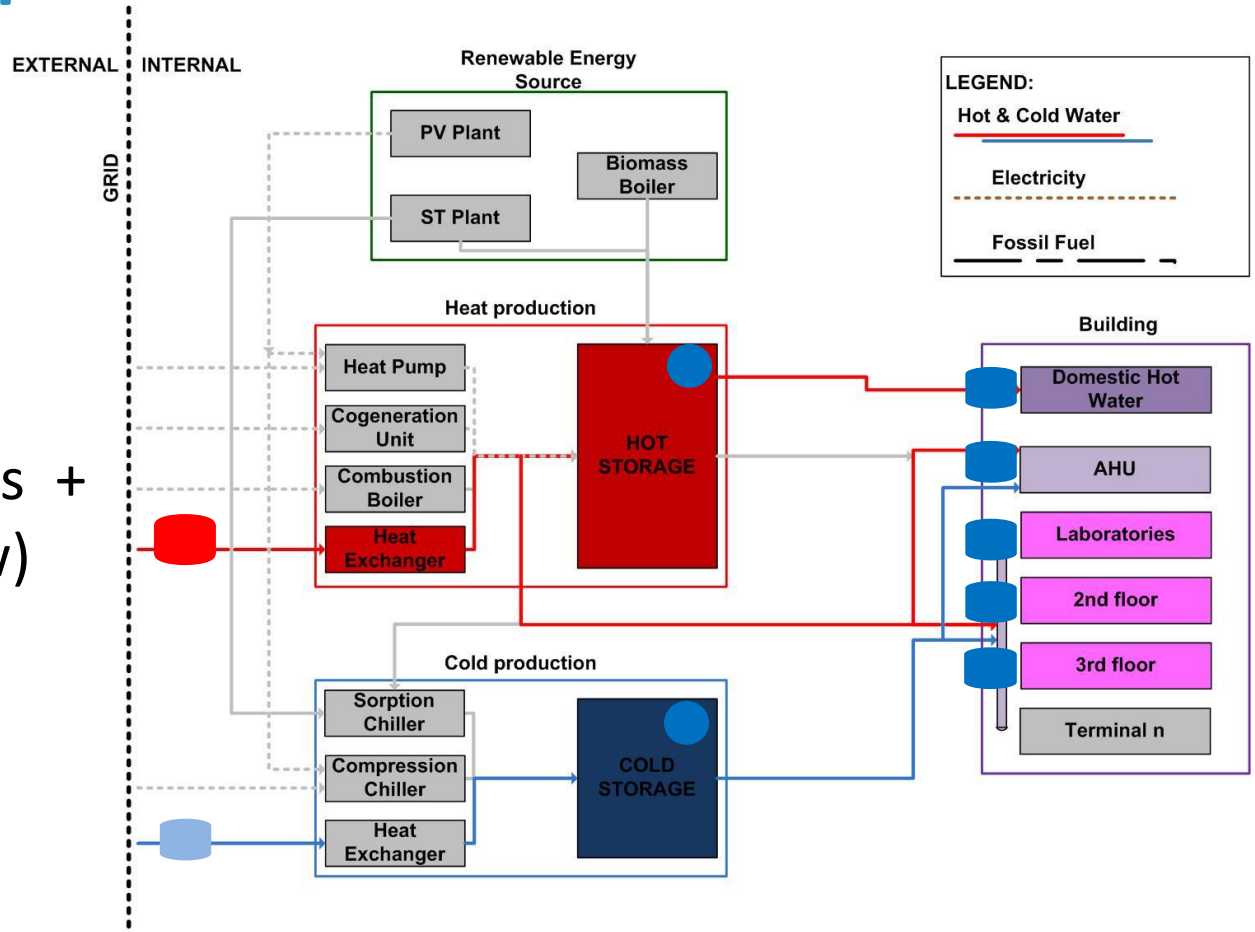
Measurement point verification- TH Plant

1 Massflow + temperature

2 Temperature

8 Energy meter (2 temperatures + known massflow)



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Measurement point verification- EL Plant

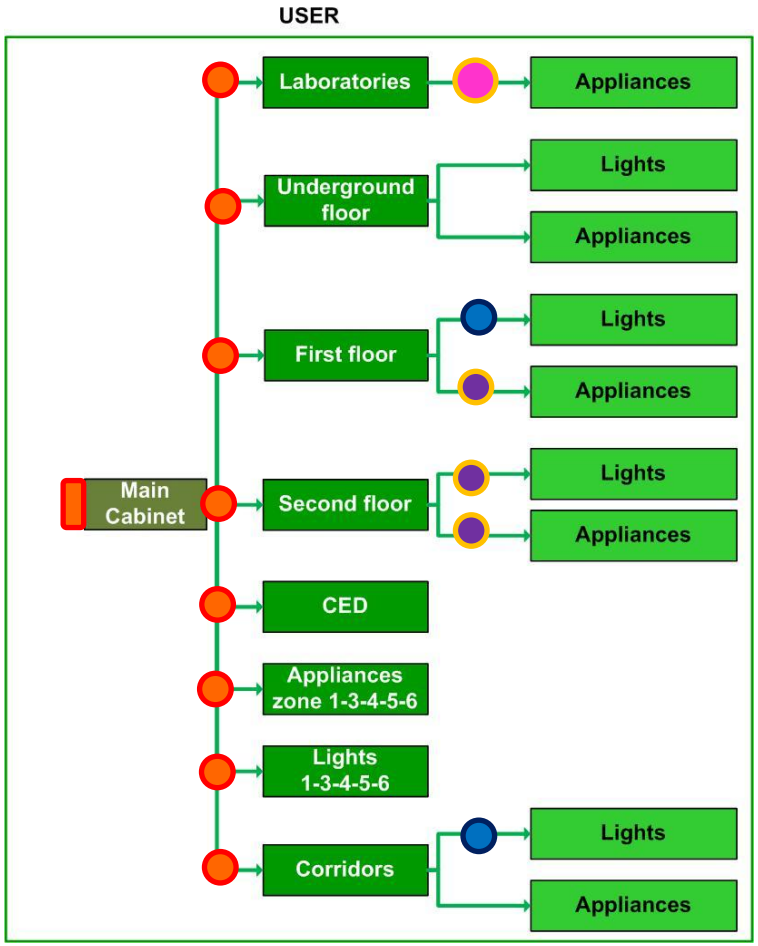
Network analyzer

8 Counter meters

10 Counter meters

6 Counter meters

10 Mobile meters



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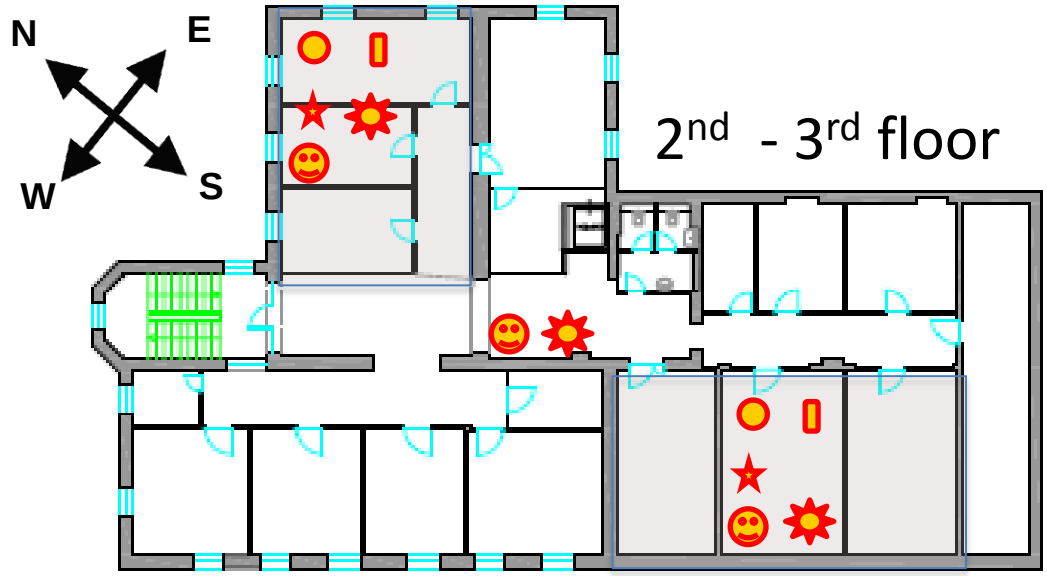
Measurement point verification- Comfort

4	Humidity
4	Temperature
4	CO_2
6	Luminosity
6	Occupancy



Mobile sensor for monitoring the lab:
4 Temperature + Humidity

Connection to the existing **meteo station**

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Choice of commercial sensors

Commercial sensors less invasive meet the needs of all customers

Every sensor is located in the measurement point

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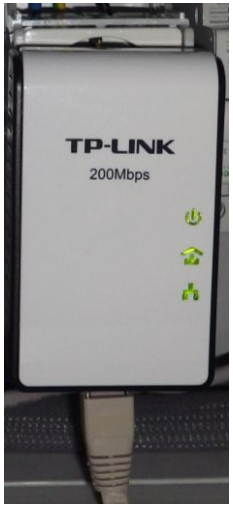
Design of the ICT system

The communication among sensors and the data storage requires the management of differents communication protocol (Modbus RTU, ModbusTCP, M-bus, LONWorks, KNX)

Gateways



Power line comunicator

Datalogger

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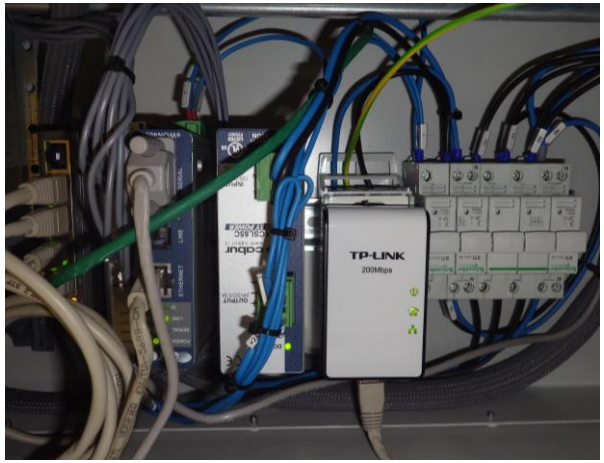
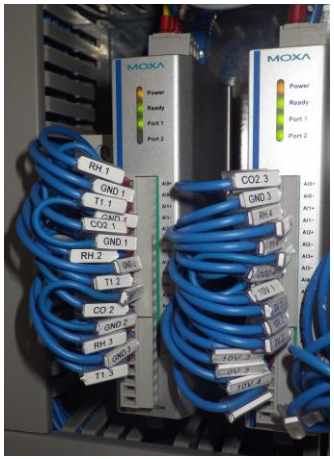
Installation





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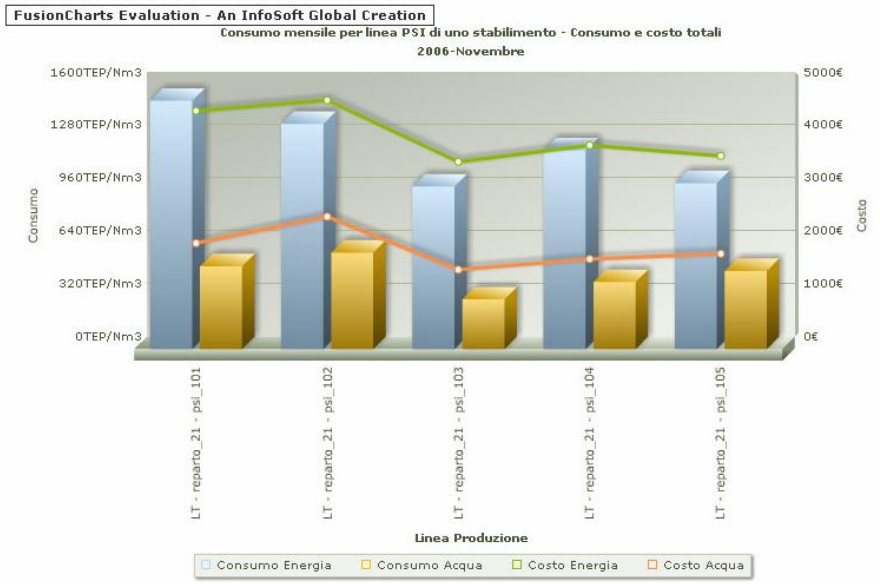
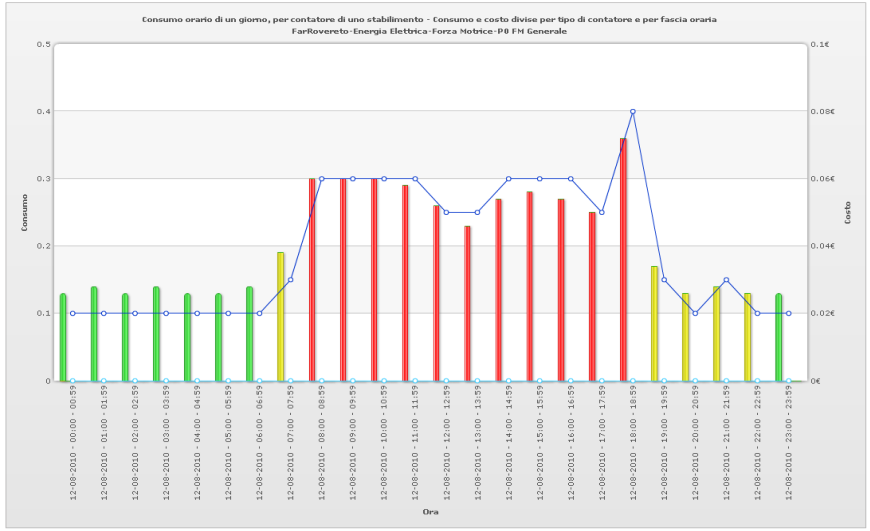
Energy analysis – first data



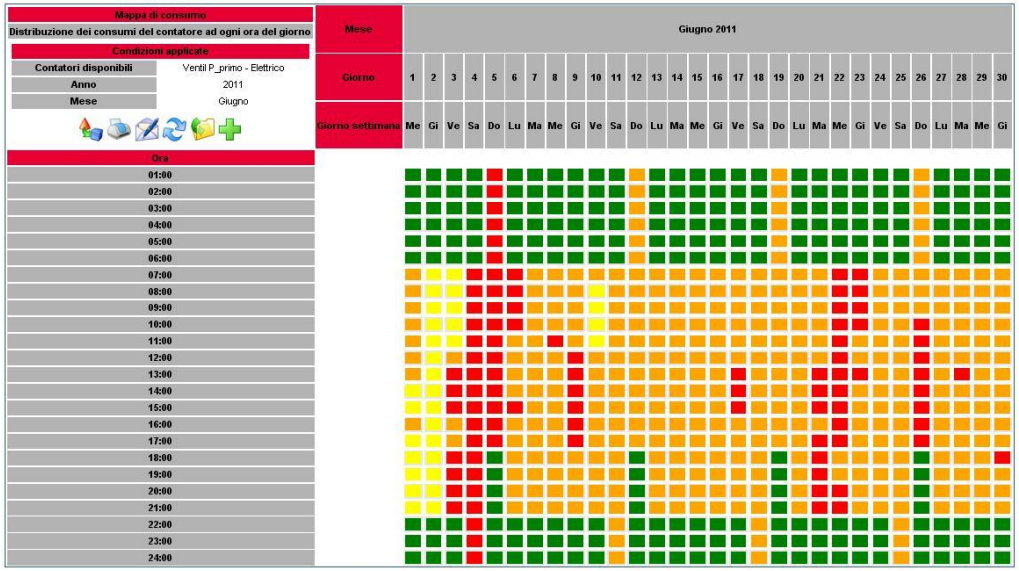
Consumptions

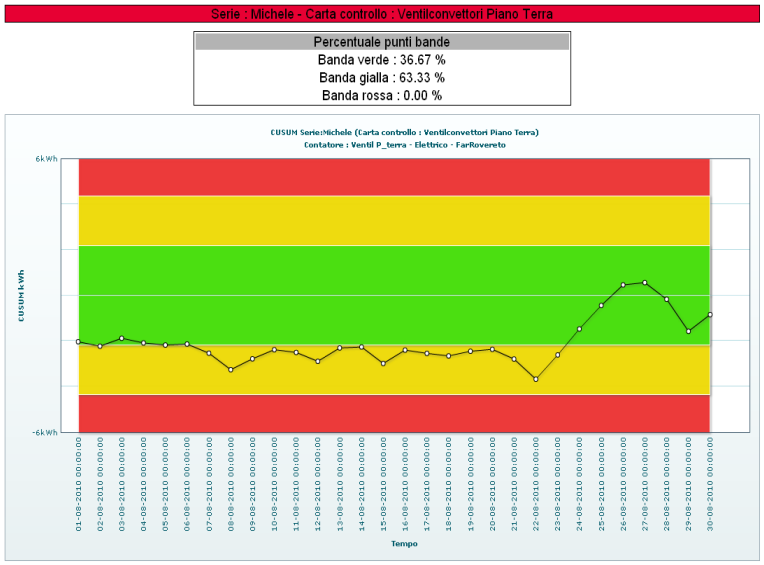
Daily loads



3. S. MICHELE – DEMO SITE

Energy analysis – first results



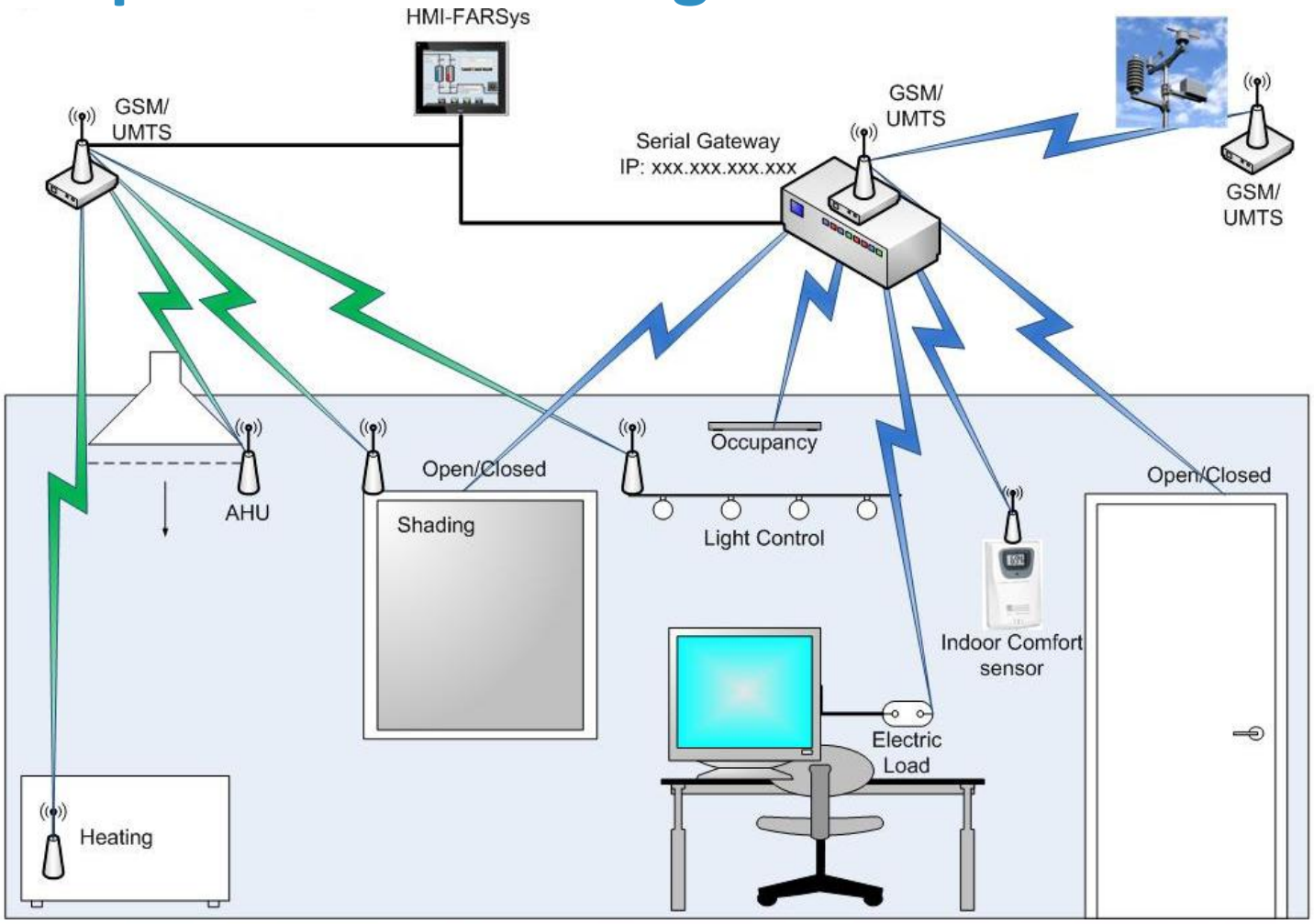


Temporal maps

Control charts

3. S. MICHELE – DEMO SITE

Next step – Control strategies



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THANK YOU FOR YOUR ATTENTION