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WIP – Renewable Energies

SMART BUILD PROJECT

Smart Build

SMART BUILD PROJECT

Agenda

- Overview of the Smart Build project
- Demo sites selected for the project
- Conclusions

OVERVIEW – SMART BUILD PROJECT

- Full title: Implementing smart ICT concepts for energy efficiency in public buildings
- Co-financed under the Competitiveness and Innovation Framework Programme (CIP) of the European Commission
- Project duration: 01.02.2012 – 31.01.2015 (36 months)
- Project website: www.smartbuild.eu

OVERVIEW – SMART BUILD PROJECT

Objectives

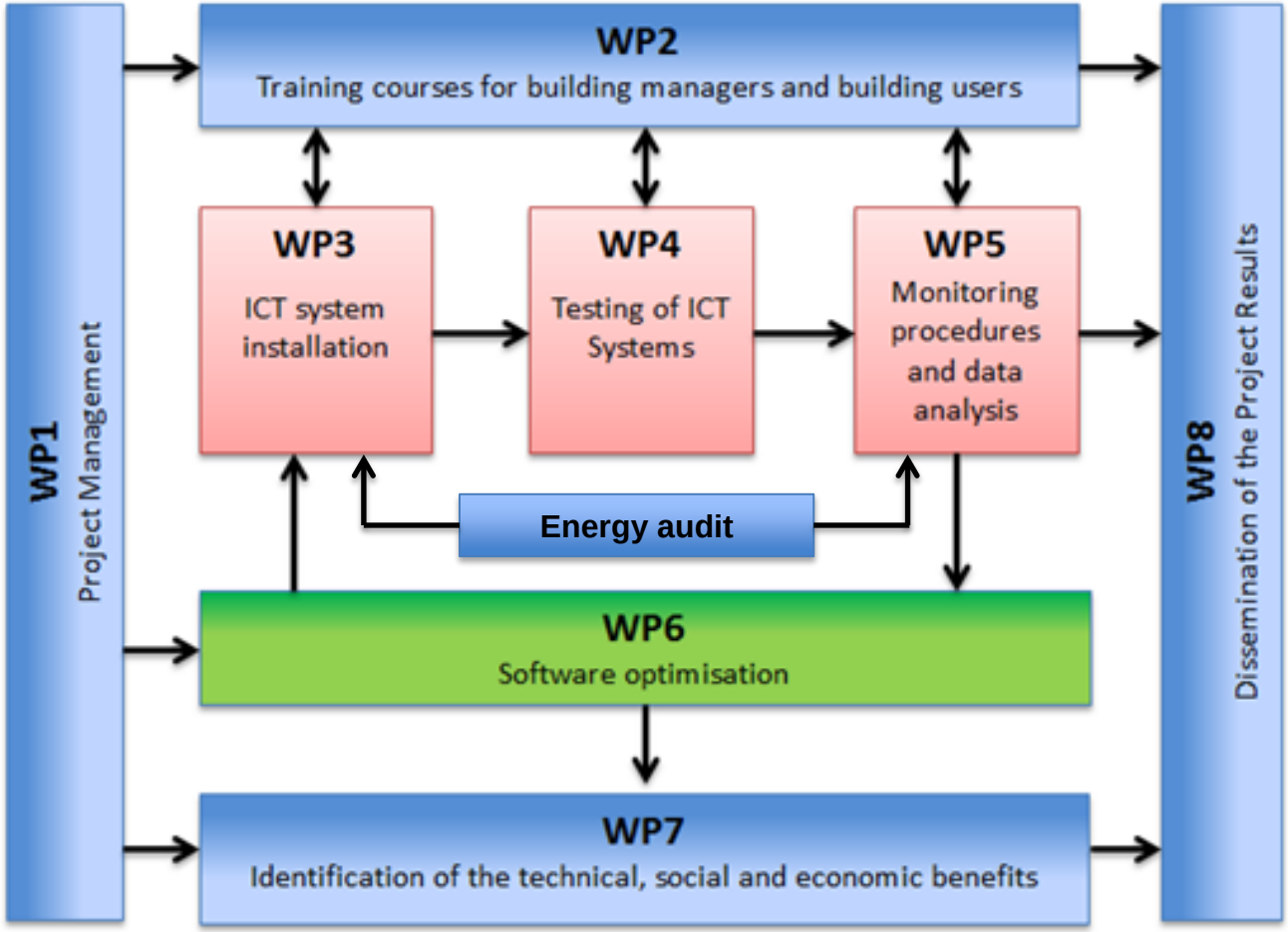
Achievement of energy savings (20% - 35%) in annual energy consumption and reduction **in the peak load (30%)** in public buildings by implementing smart ICT design concepts for energy savings and renewable energy systems integration.

The approach to reach the project objectives:

1. MONITORING PERIOD – ICT for energy monitoring
2. CONTROL AND INTEGRATION PERIOD - ICT for energy savings and renewable energy systems integration

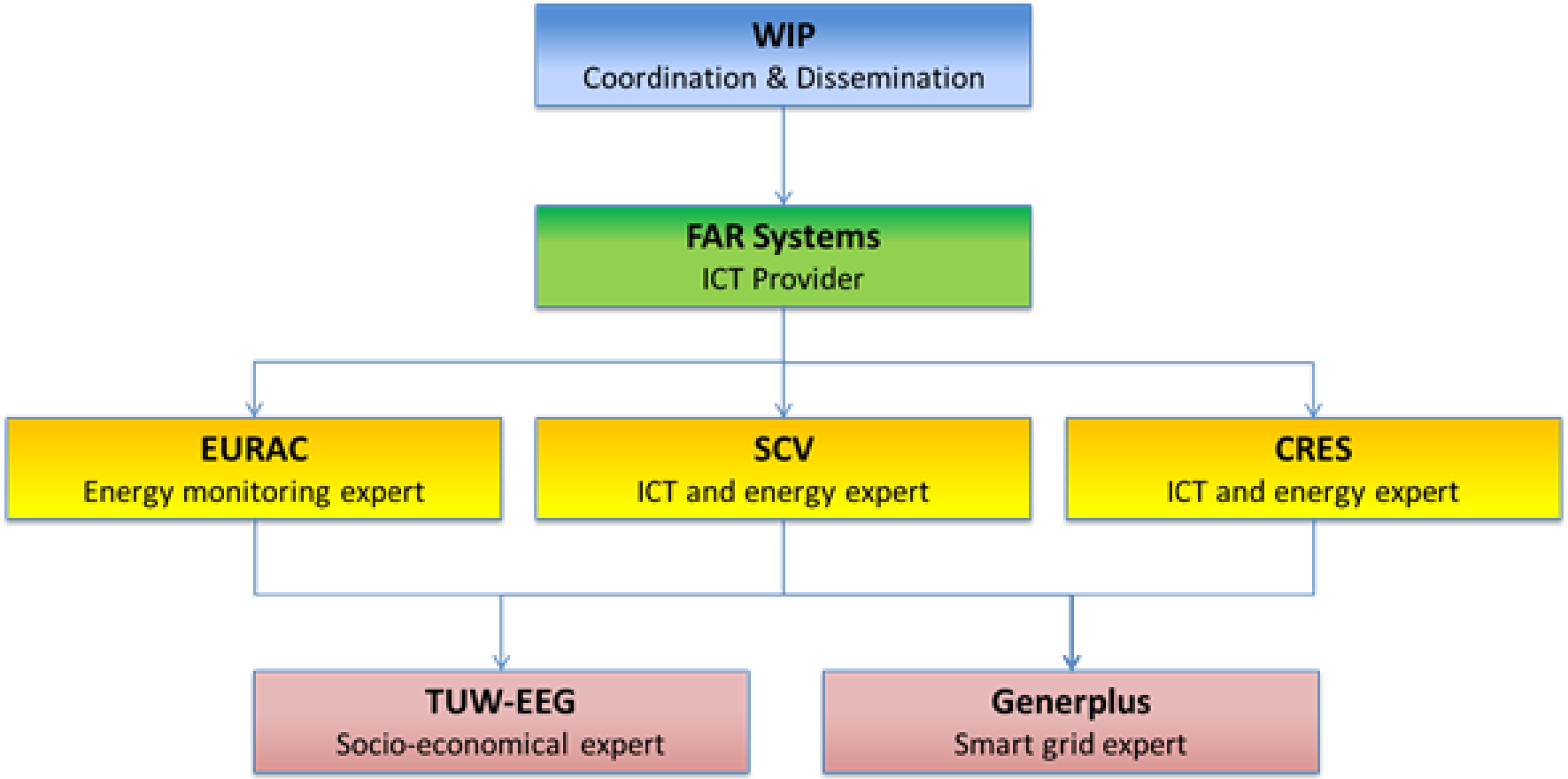
OVERVIEW – SMART BUILD PROJECT

Project structure



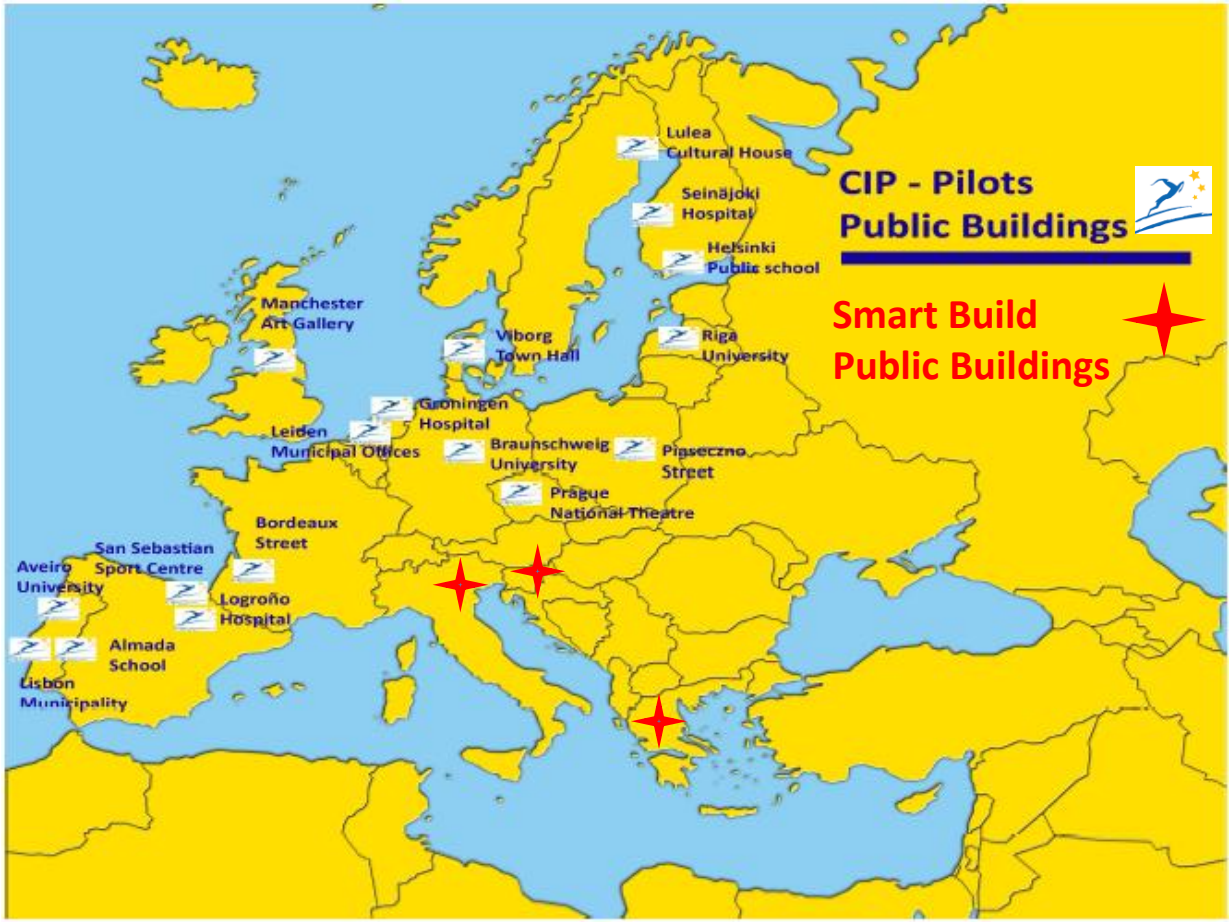
OVERVIEW – SMART BUILD PROJECT

Project Consortium



OVERVIEW DEMONSTRATION SITES

Locations



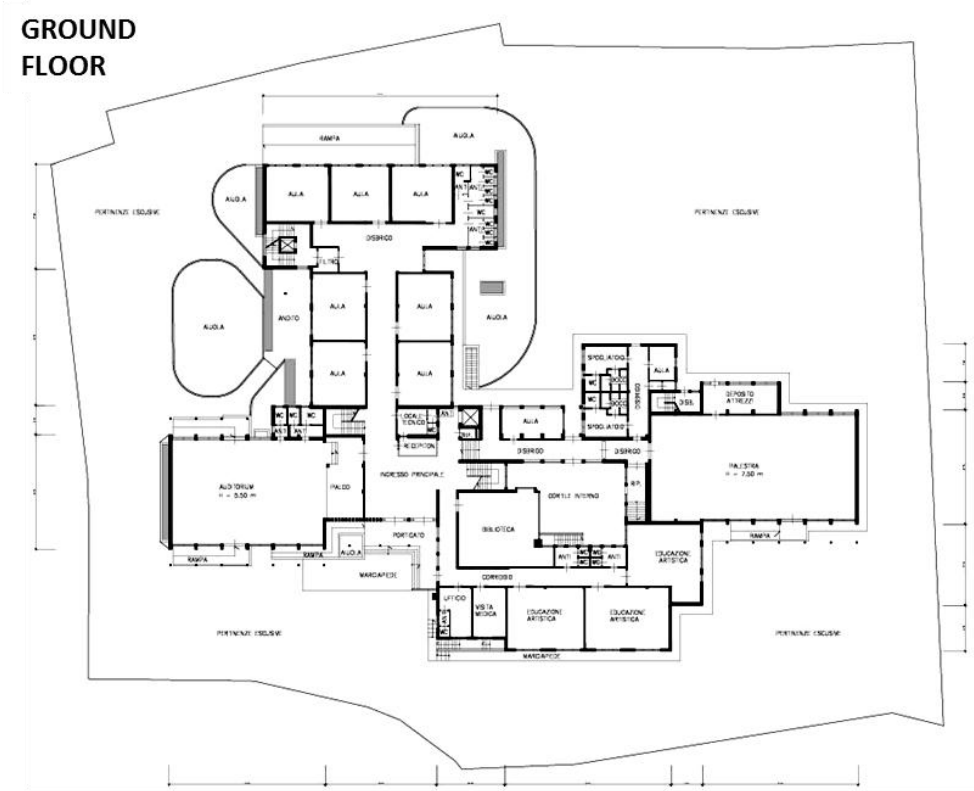
OVERVIEW DEMONSTRATION SITES

Details

Location	Country	Type of building	Demo
S. Michele all'Adige (Trento)	Italy	Office and Laboratory	1
Lavis (Trento)	Italy	School	2
Silandro (Bolzano)	Italy	Hospital	3
Velenje	Slovenia	Gymnasium	4
Velenje	Slovenia	Secondary school - 1	5
Velenje	Slovenia	Secondary school - 2	6
Velenje	Slovenia	Administrative building	7
Velenje	Slovenia	Sport hale	8
Pikermi (Athens) - CRES	Greece	Office and laboratory	9

LAVIS SCHOOL - ITALY

Overview

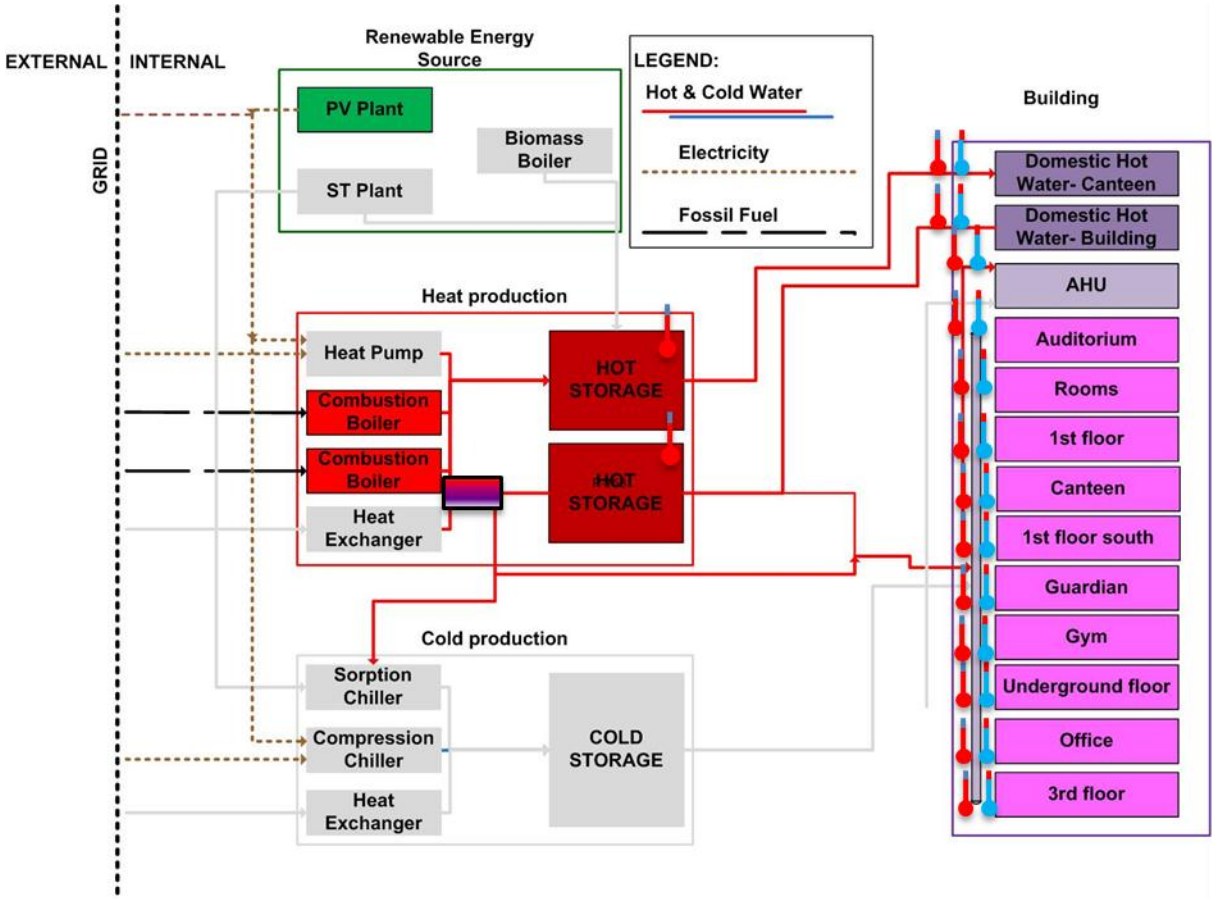


4 floors + Underground floor including:

Classrooms
Offices
Auditorium
Gym
Canteen

LAVIS SCHOOL - ITALY

Thermal plant and measurement point verification



1° level

1 Massflow + temperature

2° level

2 Temperature

13 Power meter (2 temperatures + known massflow)

LAVIS SCHOOL - ITALY

Thermal Plant Details

COMBUSTION BOILERS

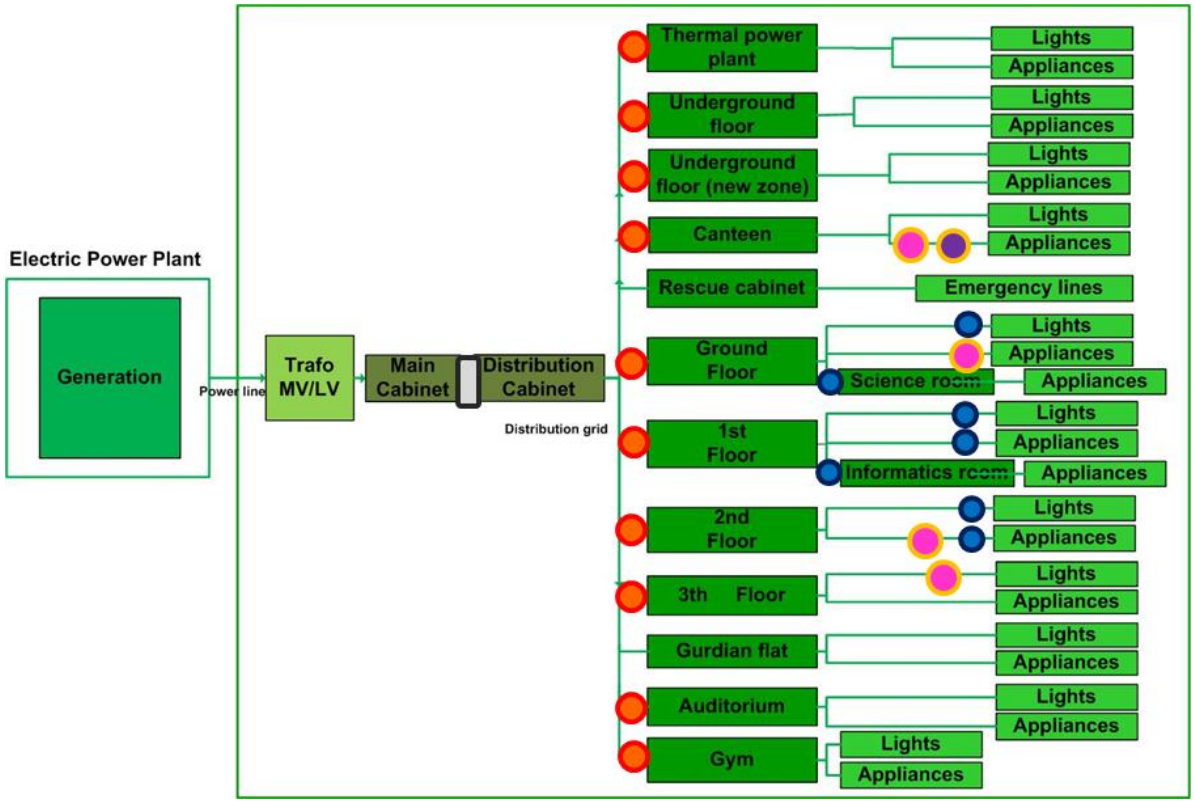
HOT STORAGES

HEATING ELEMENT

Air Handling Unit - AHU

LAVIS SCHOOL - ITALY

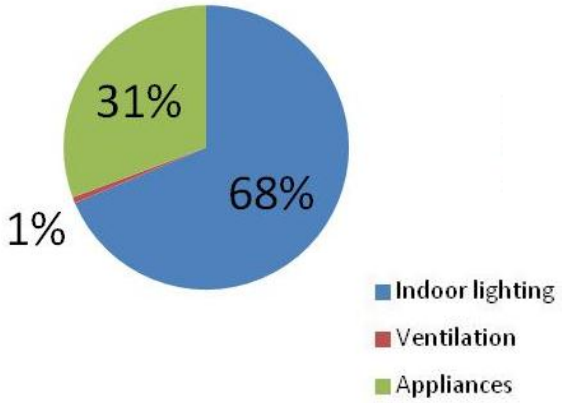
Electric Plant and measurement point verification



Network analyzer

1°	level	9	Counter meters
2°	level	15	Counter meters
3°	level	9	Counter meters
3°	level	5	Mobile meters

ELECTRIC LOAD [%]



PV system on the roof

LAVIS SCHOOL - ITALY

Electric Plant details

PV PLANT

PV PRODUCTION DISPLAY

CLASSROOM'S LIGHTS

FRIDGE

OVEN

WASHING MACHINE

PCs -INFORMATIC LAB

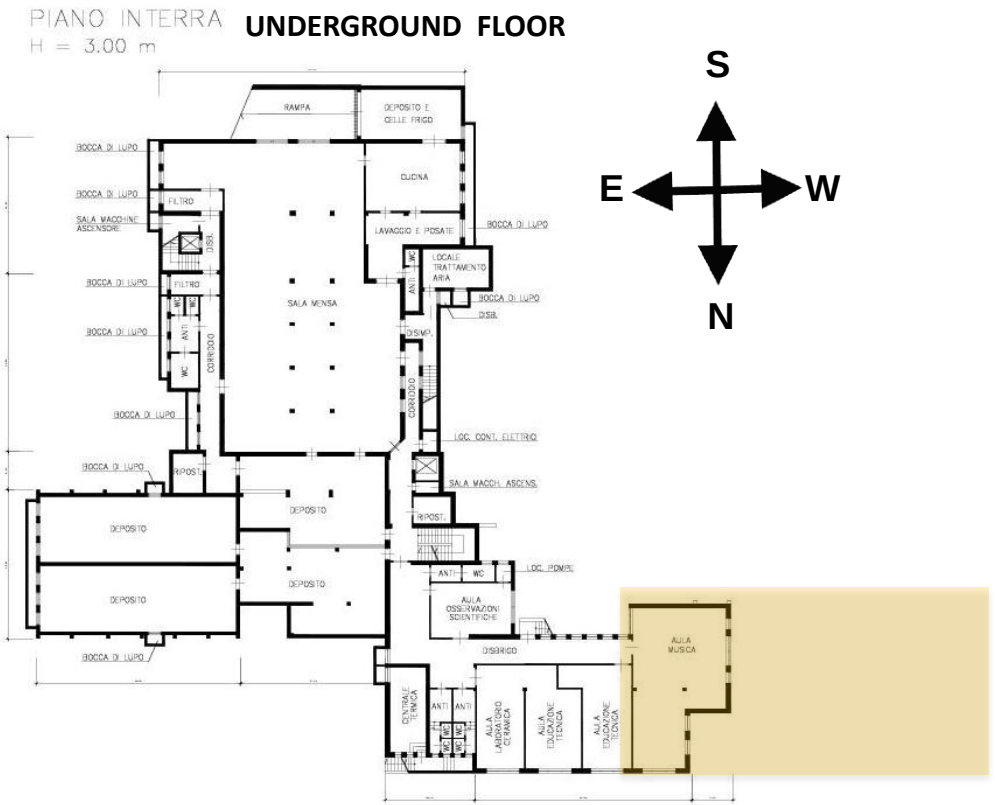
PRINTERS

CORRIDOR'S LIGHTS

LAVIS SCHOOL - ITALY

Indoor comfort and measurement point verification

3	Humidity
3	Temperature
0	CO_2
3	Luminosity
0	Occupancy



According to the occupants:

Lighting comfort -> **good**

Humidity -> **good**

The main problems:

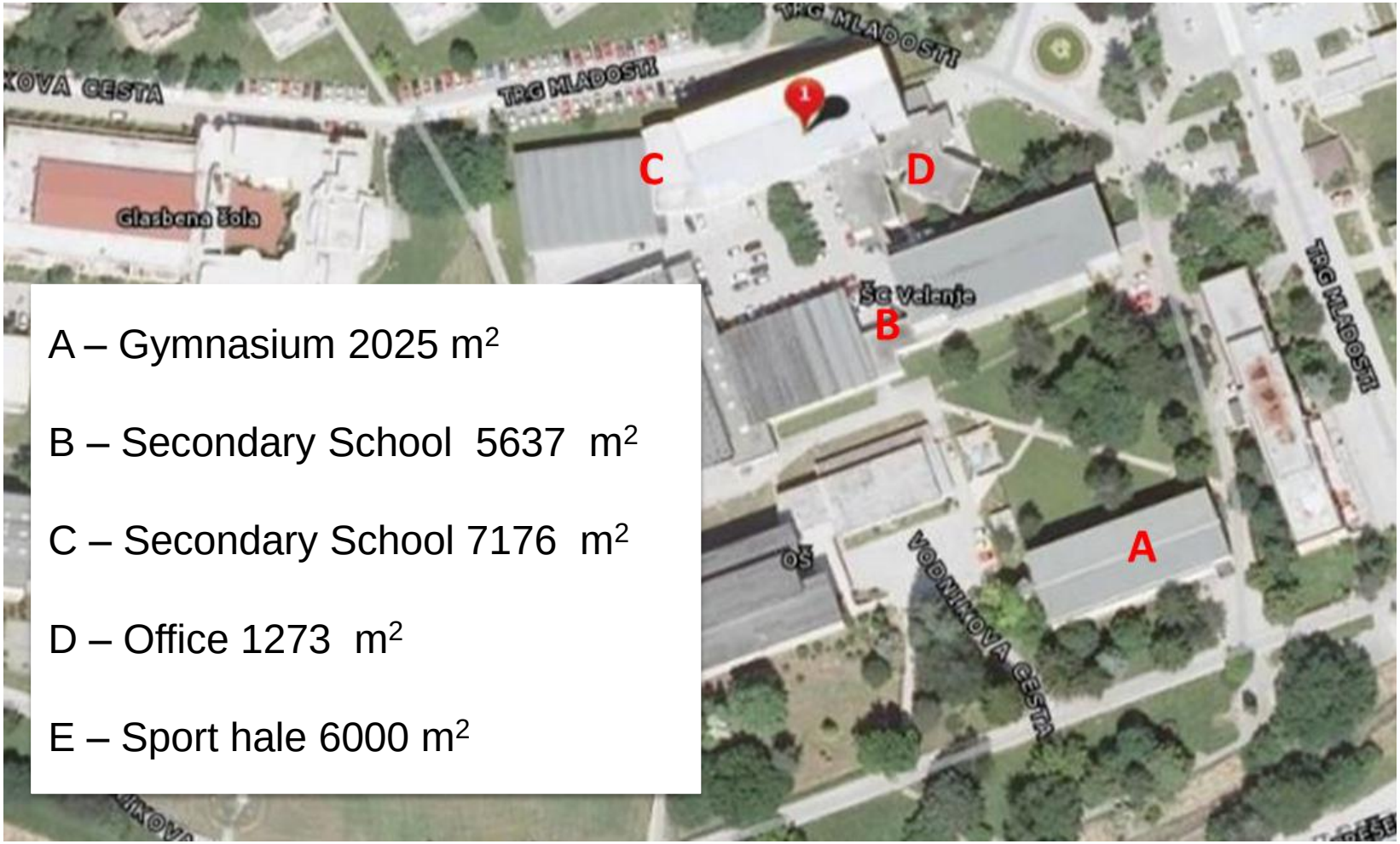
a) **Cold** in winter in the north side of underground floor

b) **Hot** in spring/summer in the third floor

c) No local regulation of temperature

DEMO SITES VELENJE - SLOVENIA

Overview



A – Gymnasium 2025 m^2

B – Secondary School 5637 m^2

C – Secondary School 7176 m^2

D – Office 1273 m^2

E – Sport hale 6000 m^2

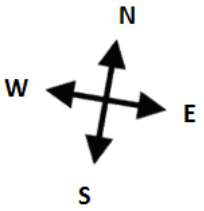
DEMO SITE A VELENJE - SLOVENIA

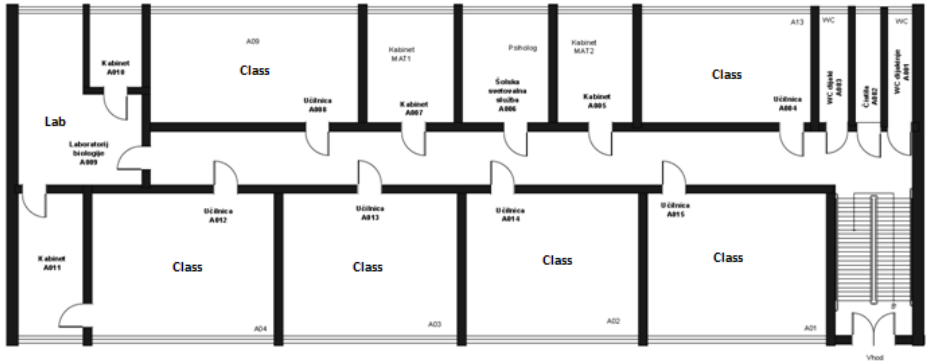
Overview

Building's Floor plan , Figure 3

First floor

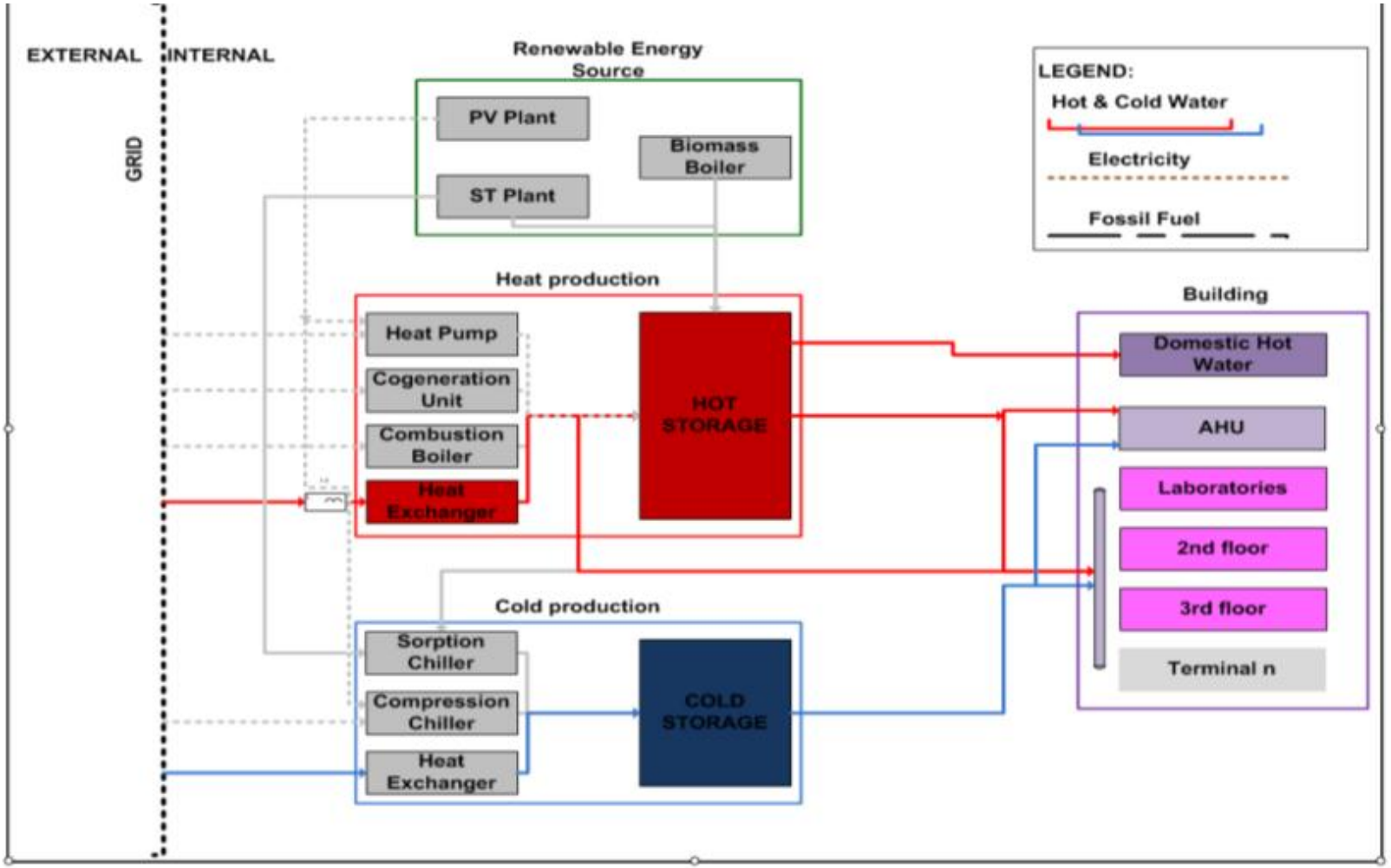
Second and third floors are similar to the first one





DEMO SITE A VELENJE - SLOVENIA

Thermal plant



DEMO SITE A VELENJE - SLOVENIA

Thermal Plant details

HEAT EXCHANGER

Manufacturer	
Model	
Nominal power [kW]	234,5
Primary flow rate [m3/h]	10,1
Secondary flow rate [m3/h]	5
Efficiency	98%
Number of elements	1
Installation Year	2002

Representative picture

Note: Heat exchanger

HOT STORAGE

Brand	GORENJE TIKI
Model	TGV
Volume [m3]	0.005
T range [°C]	60
Pressure [bar]	3
Installation Year	2005
Number of elements	3

Note: Local preparation of hot water. DHW is produced with electricity all year .

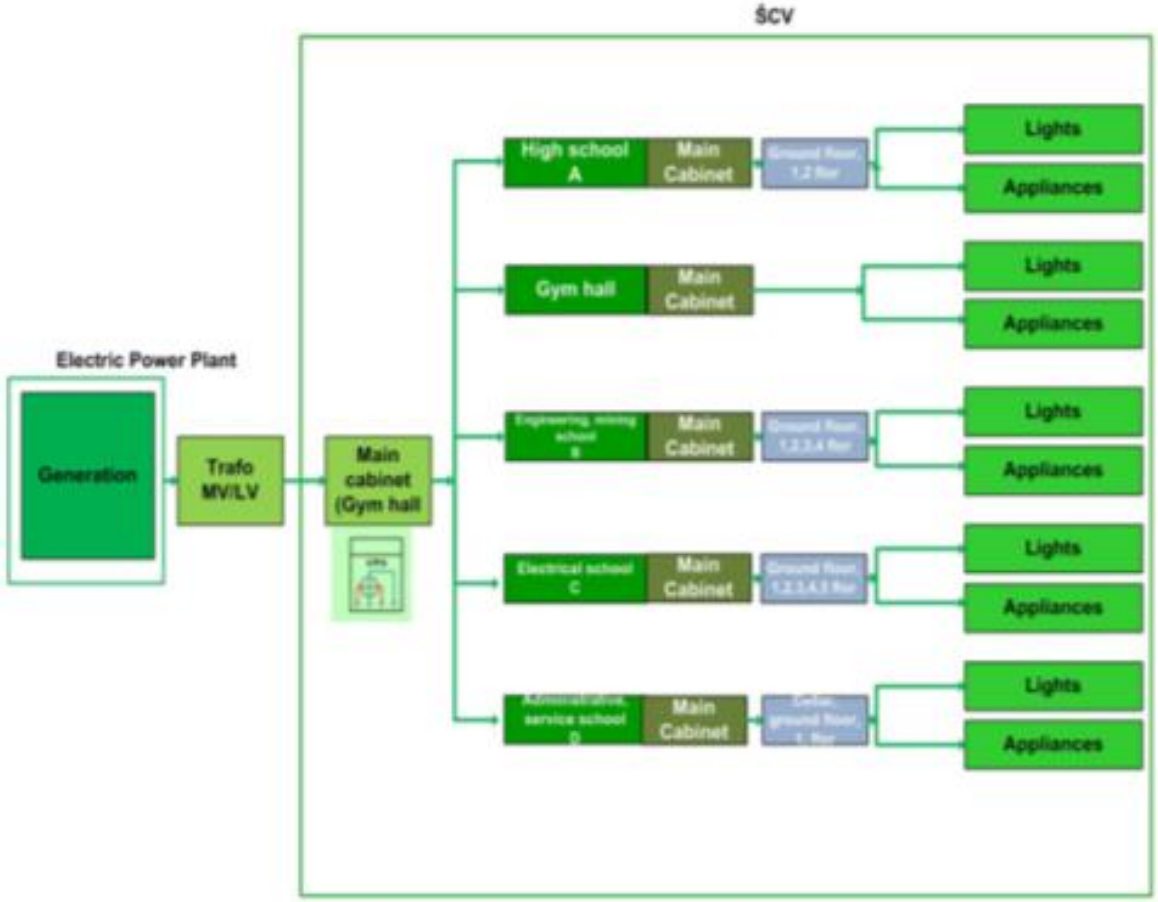
HEATING ELEMENT

Brand	V&N
Model	22 KV
Material	STEEL
Temperature range [°C]	90/70
Control	Centralized
Number of elements	118
Installation Year	2005

Note:

DEMO SITE A VELENJE - SLOVENIA

Electric Plant



PRODUCTION	Nominal Power [kW]	Area [m²]	Annual Yield [kWh]
PV system	None		
Wind generator	None		
Total electric power			

LOADS			
Indoor lighting	Model	N°	Power [W]
Type 1	Fluorescent lamp	9	522
Type 2	Fluorescent lamp	161	9338
Type 3	Fluorescent lamp	124	2232
Type 4	Incandescent lamps	12	900
Type 5	Incandescent lamps	27	4050
Device for energy saving	SELECT		
...	SELECT		
...	SELECT		

Ventilation			
	Model	N°	Power [W]
Type 1	0		0
Type 2	0		53

Appliances			
	Model	N°	Power [W]
Type 1	PC	45	
Type 2	Monitor	45	
Type 3	laser Printer	9	
Type 4	Copier	1	
Type 5	Maker of smoothies	2	
Type 6	Refrigator	2	
Type 7	Stove	1	

DEMO SITE A VELENJE - SLOVENIA

Electric Plant details

Type 1	
Brand	Unknown
Model	
Type	Fluorescent lamp
Power [W]	58
N° bulbs	2
Installation Year	
Control	Manual ON/OFF
Pieces	9

Type 2	
Brand	Unknown
Model	Mirror raster
Type	Fluorescent lamp
Power [W]	58
N° bulbs	2
Installation Year	
Control	Manual ON/OFF
Pieces	161

Type 3	
Brand	Unknown
Model	Mirror raster
Type	Fluorescent lamp
Power [W]	18
N° bulbs	4
Installation Year	
Control	Manual ON/OFF
Pieces	124

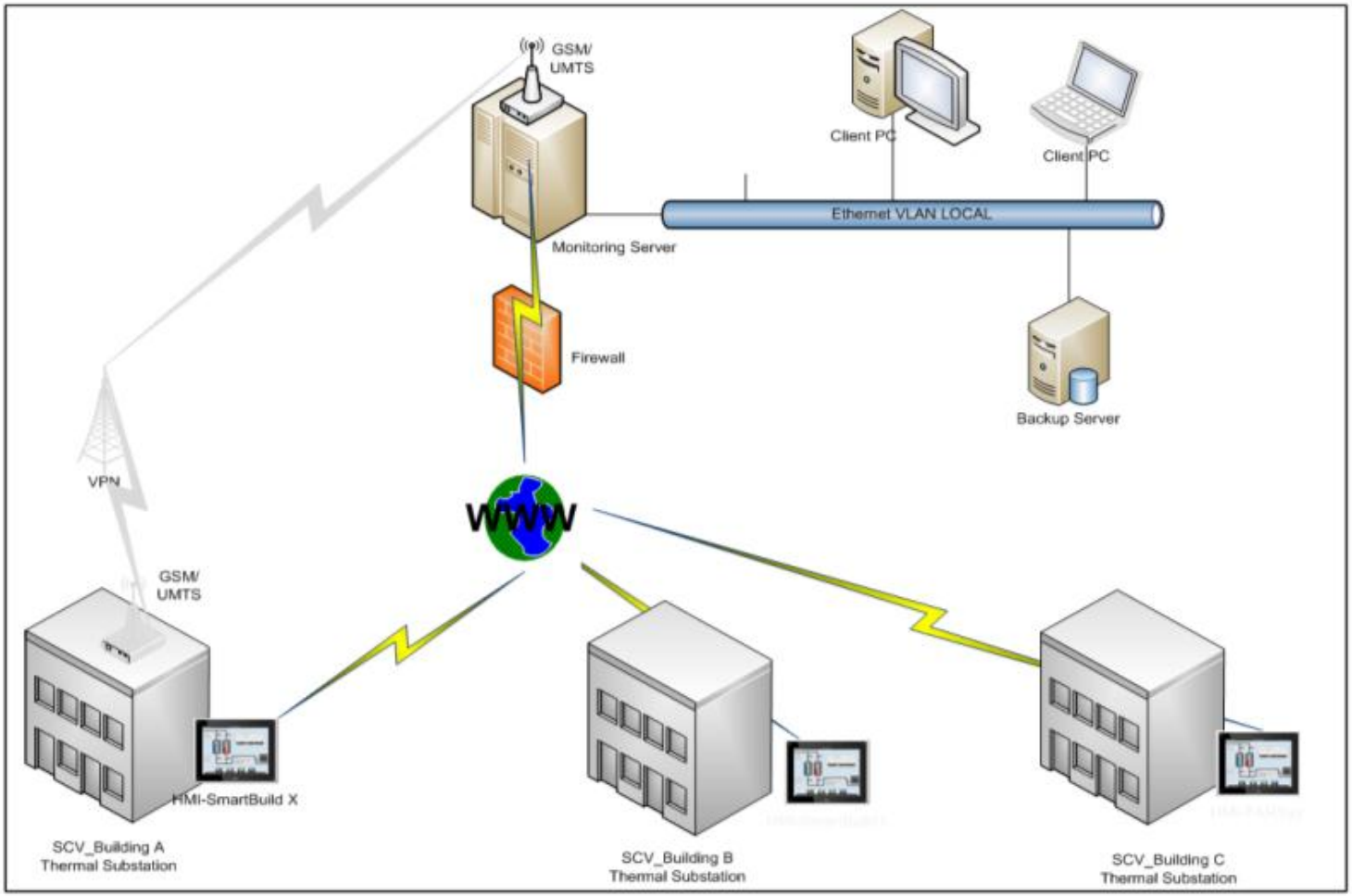
Type 1	
Brand	
Model	
Type	PC
Power [W]	85
Installation Year	
Control	Manual ON/OFF
Pieces	45

Type 2	
Brand	
Model	LCD 17"
Type	Monitor
Power [W]	25
Installation Year	
Control	Manual ON/OFF
Pieces	45

Brand	
Model	
Type	laser Printer
Power [W]	300
Installation Year	
Control	Manual ON/OFF
Pieces	9

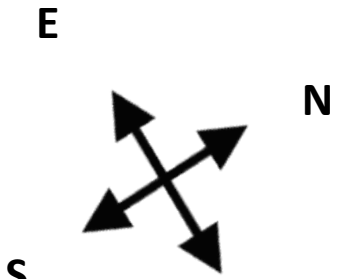
DEMO SITES VELENJE - SLOVENIA

Existing monitoring scheme



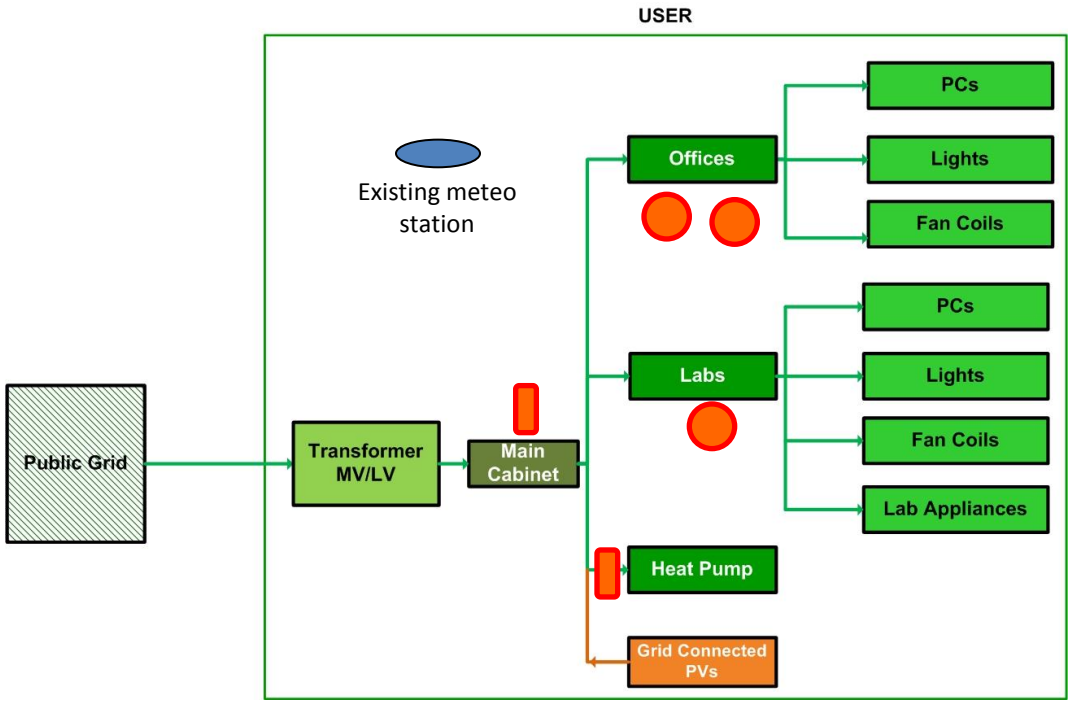
CRES OFFICE AND LABS - GREECE

Overview



CRES OFFICE AND LABS - GREECE

Electric Plant and measurement point verification



Analyser

Temp + Humidity

PV meteo station

Mobile sensor for monitoring the lab:
3 Temperature + Humidity

Connection to the existing **PV meteo station**

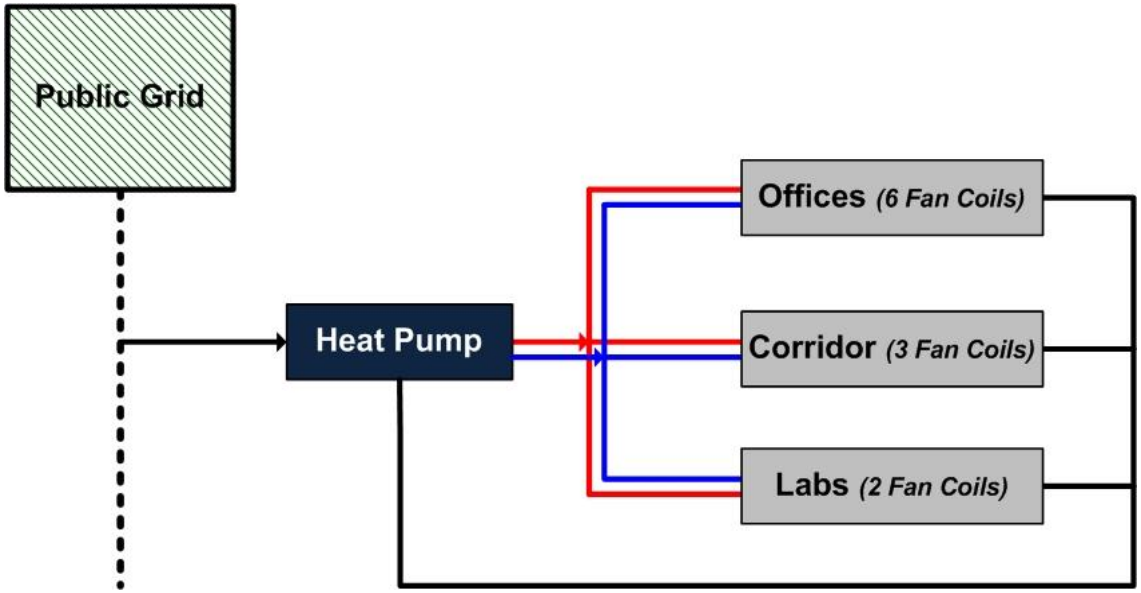
CRES OFFICE AND LABS - GREECE

Electric Plant details

A lot of types of electric loads …

CRES OFFICE AND LABS - GREECE

Heating, Ventilation and Air Conditioning (HVAC) Plant



Heat Pump:
McQuay MHP 22KW, Air to water reverse cycle

DHW:
Does not exist

Monitoring:
Manual on/off

CRES OFFICE AND LABS - GREECE

HVAC Plant details

22 kW heat pump, roof mounted

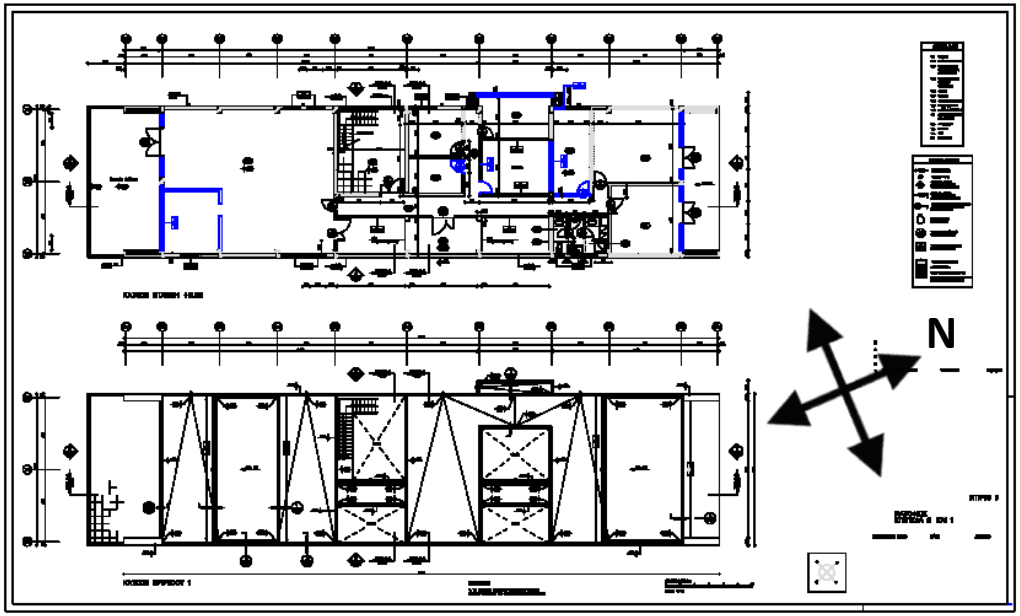
Lab fan coil

Office Fan Coil

CRES OFFICE AND LABS - GREECE

Indoor comfort

According to the occupants:
Lighting comfort -> **very good**
Humidity -> **good**



The main problems:
a) **Cold** on abt 10 days in winter – extra use of electric heaters
b) Fan Coils in lab space not operated due to size and noise

CONCLUSIONS

Benefits of the „Smart Build“ ICT concept

Technical benefits:

- energy savings
- reduced peak demand
- reduction of the stress on the distribution grid
- reduction of the investment needs on distribution grid level

Economic benefits:

- energy and peak demand savings imply monetary benefits, i.e. money savings
- increase of the value of the building and the expected useful life of the building

Social benefits:

Increased comfort of the building of users/occupants

THANK YOU FOR YOUR ATTENTION

Please visit the Smart Build website

www.smartbuild.eu

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