MUNICIPALITY OF CESENA

School of the Future project

Kick-off meeting in Stuttgart:

23 - 25 March 2011

AGENDA

- Brief introduction of Cesena municipality
- Cesena EU project experience and networking
- Short description of the School “Tito Maccio Plauto”
- Renovation:
  - on the building envelope
  - on heating system
  - on RES and light
- Time schedule
- Staff and contacts

CESENA CITY

- Cesena is situated in the heart of **Emilia-Romagna Region**, in the North of Italy.
- Cesena counts **97.056 inhabitants** (at 31/12/2010).
- Together with Forlì it's the capital of the **Forlì-Cesena district** that counts 377.993 inhabitants and 30 municipalities.

CESENA CITY COUNCIL

- Cesena has **30 elected town councillors**, **8 of whom make up the political board**.

- The board consists of the vice-mayor and the **councillors** with responsibilities **for**, respectively, **internal human resources, training and educational affairs, health, culture, public works, environmental sustainability and European projects, urban environment** (covering, for example, street works, public parks, public buildings and spaces), **and public security**.

ADMINISTRATIVE ORGANIZATION CHART

- The municipality has **641 employees**, including 14 executive directors, 1 General Director and 1 General Secretary responsible for 15 departments.
- The city council has responsibility for **a broad range of services** such as education, social services, cultural services and civil protection, environment and sustainability, urban planning, public works and infrastructure and public transport.
- In 2009, the last year for which **complete** figures are available, the council had a **total annual income of nearly 81 million Euros**.

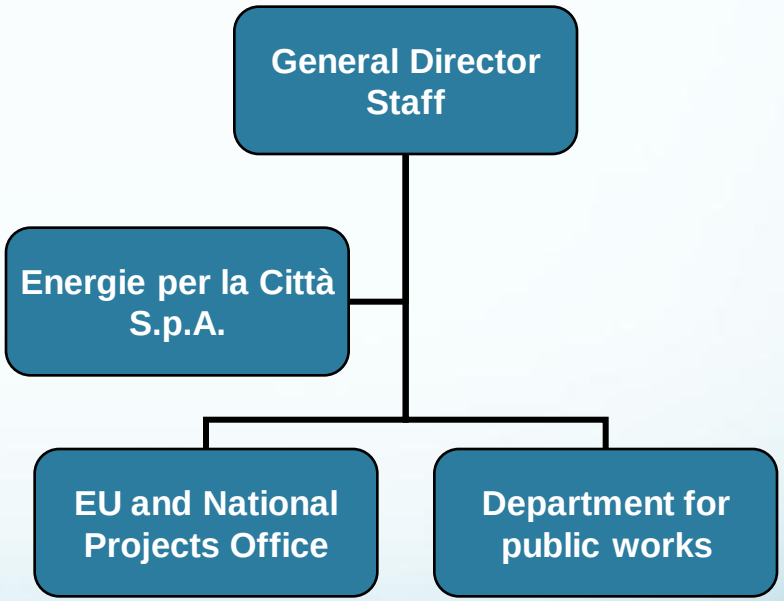
DEPARTMENTS INVOLVED IN SCHOOL OF THE FUTURE PROJECT

The departments involved in School of the future project are:

- **DEPARTMENT FOR PUBLIC WORKS**
- **GENERAL DIRECTOR STAFF**

Moreover the municipality will be supported by the staff of its in house company for energy services:

- **ENERGIE PER LA CITTA' SPA**



DEPARTMENT FOR PUBLIC WORKS

- The Department for Public Works deals with the following activities: 1) design and planning of public works; 2) management and monitoring of construction works; 3) management and maintenance of public buildings

- The Department manages around 150 public buildings (such as the city council building; sporting centers; schools; centers for elderly people; the municipal library; cemeteries etc) and 177 ha of green areas within the city boundaries (249,47 km^2).

- 55 of the managed public buildings are schools

ENERGIE PER LA CITTA' SPA

- Energie per la città Spa is one of the in-house companies of the Municipality of Cesena and is totally owned by the city council;
- Energie per la città Spa was established in January 2011
- The company is responsible for:
  1) managing and monitoring public energy plants and systems;
  2) designing retrofit interventions in public buildings;
  3) developing of solutions for energy production from RES

EUROPEAN NETWORKING AND PROJECT EXPERIENCE

The Municipality is involved in other 3 European projects:

- **ERMIS - *Effective Regional Management of Innovation Systems*.** Funded under INTERREG IVC Programme for territorial cooperation.
- **ZEROTRADE - *A Public Private Governance Model for a Zero Carbon Trade Sector*.** Funded under the mini-programme LoCaRe "Low Carbon Economy Region" (an INTERREGIVC project).
- **HERA - *Improving Police Management on Domestic Violence by Women's Empowerment.*** Recently funded under Daphne III programme.

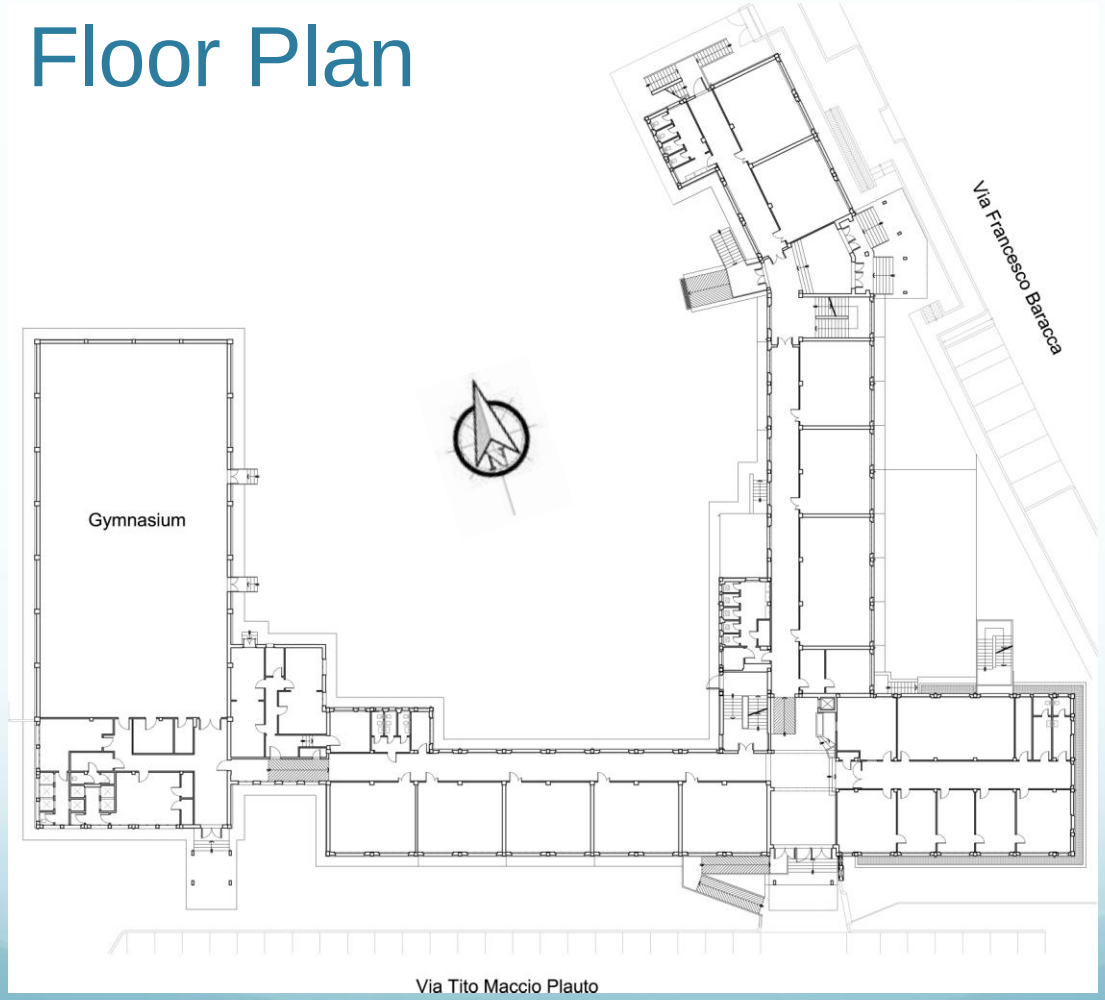
The Municipality was also involved in a European project, now closed:

- **UrSEnE - *Urban Strategies for Energy Efficiency.*** Funded under URBACT II Programme.

The Municipality has joined 2 European networks: **the Covenant of mayors** in 2009 and, as associated partner to Environment Forum, **Eurocities**.

SCHOOL“TITO MACCIO PLAUTO”

SCHOOL“TITO MACCIO PLAUTO”
Ground Floor Plan



SCHOOL“TITO MACCIO PLAUTO”

- The school is one of the most important primary school in Cesena and hosts 17 classes of around 22 students each (389 in total)

- The building was built in 60s with no care about energy efficiency with a structure of pillars, bricks walls and a concrete and masonry roof structure:
  - single glazed windows with iron frame
  - more than 30% of building envelope is a glazed surface
  - poor quality insulation of the walls
  - high amount of heat dispersion points
  - poor indoor environmental quality
  - natural gas boiler installed in 1977 (firebox power 385+385 kW) with radiators in classrooms and fan coil units in the gymnasium

SCHOOL“TITO MACCIO PLAUTO”:
Consumption data – Natural gas

Year	Annual consumption (mc)	Degree Days (DD)	Actual days of heating	Coefficient of Consumption (CC)
2009	72.418	1.933	183	54
2008	78.753	1.832	208	62
2007	75.427	1.821	178	60
2006	76.262	1.947	175	57
Annual average value	75.715			58,3

CC= mc * hi / DD*V
Where
hi = 35,88 * 103 kJ/mc (for natural gas) and V = 24.779 mc

SCHOOL“TITO MACCIO PLAUTO”:
Consumption data – Hours of heating*

Year	Classrooms Area (hours of heating)	Offices Area (hours of heating)	Gymnasium Area (hours of heating)
2009	1.304	1.357	1.631
2008	1.362	1.414	1.533
2007	1.411	1.497	1.480
2006	1.332	1.392	1.648

**measures include simultaneous hours of heating*

SCHOOL“TITO MACCIO PLAUTO”:
Consumption data – Electricity

Users	Annual Consumption (2010)
Lighting	**68.328 kWh**
Lift	
Pumps and heaters	
Offices and laboratory	

SCHOOL“TITO MACCIO PLAUTO”: Renovation Criteria

- Renovation without school activity interruption
- Interventions on corridor walls will not reduce light and ventilation in classrooms during the renovation
- Intervention on North-West corridor walls to improve the energy efficiency of the building
- Consistency with the general aim of the project to have the energy use reduction with limited additional costs of installation and maintenance

SCHOOL“TITO MACCIO PLAUTO”: Critical points

- Difficult installation of controlled mechanical ventilation system because of interferences with lighting system and other fire control devices already installed;
- Ventilation system requires expensive works of architectural integration (countertops, etc.)
- Hard to justify the installation of a solar system for the production of hot water because the gym is not used during the summer months when solar radiation is highter;

SCHOOL“TITO MACCIO PLAUTO”: Renovation on building envelope

N.	Type of intervention	Surface of intervention:	Current thermal tansmittance	Benefits
1	Ground floor intrados slab insulation in the unheated basement (10 cm of polystyrene)	150 m^2	1,33 W/m^2 K	-77% W/m^2 K
2	Ceiling extrados insulation in the unheated attic (20 cm of mineral wool)	1477 m^2	2,31 W/m^2 K	-92% W/m^2 K
3	Gymnasium external walls insulation (10 cm of polystyrene)	358 m^2	1,85 W/m^2 K	-84% W/m^2 K
4	North-West external walls insulation (corridors side) (10 cm of polystyrene)	2233 m^2	1,85 W/m^2 K	-84% W/m^2 K

SCHOOL“TITO MACCIO PLAUTO”: Renovation on building envelope

N.	Type of intervention	Surface of intervention:	Current thermal tansmittance	Benefits
5	Windows replacement with PVC and argon frame and double glazing	1072 m^2	5,71 W/m^2 K	-80% W/m^2 K
6	Walling up of part of the corridors windows with high insulation material		5,71 W/m^2 K	-90% W/m^2 K
7	Gymnasium dressing room ceiling insulation (10 cm of polystyrene)	295 m^2	2,32 W/m^2 K	-88% W/m^2 K
8	Gymnasium ceiling insulation (10 cm of polystyrene)	641 m^2	2,32 W/m^2 K	-88% W/m^2 K

SCHOOL“TITO MARCIO PLAUTO”: Outline of the renovation on energy systems

- The current heating system has a functioning temperature of 75/65°C: this will be reduced to have a better quality of the indoor environment
- A new monitoring system connected with the centralized energy system of the Municipality. This new system will work according to the external temperature and the actual use of the classrooms
- The photovoltaic roof plant may cover up to 100% of the electric annual energy need
- Electric devices: lighting, offices and laboratory computers, heating plant (circulating pumps and gymnasium fan-coil units)
- No need of air-conditioning system because the school activity is off during June, July and August

SCHOOL“TITO MACCIO PLAUTO”: Renovation on heating system

N.	Type of intervention	Benefits
1	Methane gas boilers replacement with condensing and modulating boilers	Increase of the average seasonal efficiency ratio Reduction of heating costs
2	Thermostatic valves installation on radiators	
3	New telematic management of the heating system	Possibility to control all the users from the centralized system No use of pumps and air generators during nights and week ends will reduce energy consumption

SCHOOL“TITO MACCIO PLAUTO”: RES and Lighting Renovation

N.	Type of intervention	Benefits
1	45-55 kW of Photovoltaic plant	Renewable energy production
2	Lighting control system and high efficiency lamps	Regulation of the light intensity according to the natural external light

SCHOOL“TITO MACCIO PLAUTO”: Steps for planning a renovation intervention

- Building inspection and relief of the building structures and installations;
- Relief map showing areas of dispersions and their characteristics (conductivity, thickness, surface, mass, weight);
- Upload of present relief data on a calculation software based on UNI TS 11300 (conventional method of calculation generally used in Italy for energy certification)
- Projection of the future building status after renovation works on the envelope and energy systems;
- Comparison between the present primary energy performance and the future one.

SCHOOL“TITO MACCIO PLAUTO”: Targets of the Renovation

Target 1: results from the comparison between the current status and future one

- Reduction of the heating energy use: **75% about**

Target 2: results from the installation of a photovoltaic plant on the roof

- Electric energy need covered by RES: **up to 100%**

SCHOOL“TITO MACCIO PLAUTO”: Time schedule

Year		Year 1				Year 2				Year 3				Year 4				Year 5			
Renovation on the building envelope	**Design**																				
	Construction																				
Renovation on heating system	**Design**																				
	Construction																				
Renovation for the energy use reduction	**Design**																				
	Construction																				
Commissioning																					
Monitoring																					
Analysis																					

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THANK YOU
FOR YOUR ATTENTION