



PROBIS

**SUPPORTING PUBLIC PROCUREMENT OF BUILDING INNOVATIVE
SOLUTIONS**

Citta' di Torino (Italy - Piedmont) Pilot

PROSPECTOUS



PROBLEM STATEMENT

This Prospectus aims at better specify the context and prospective objectives of the procurement procedure related to the extraordinary maintenance works of a municipal office building located in Torino.

The overall objective of the procurement is to improve the energy efficiency and the overall indoor comfort within this building for all its users, through – at least - an integrated set of interventions affecting:

- the set up of an innovative Building Management System;
- the renewal of existing low efficient lighting systems;
- improvements of the existing climatization systems (including mechanical ventilation).

Indeed, a technical analysis on main building conditions as well as a report based on interviews to building occupants' representatives revealed the following issues:

- High energy consumptions are registered (especially electricity consumption in the summer season);
- the presence of different building occupants with very different needs;
- critical thermal and visual conditions in some building areas (mainly those located in the south facade) are perceived;
- The building is equipped with Central Air Conditioning , without climate control zones.
- There is a need to manage the building as a whole (integrating existing and future central appliances) thus allowing occupants to make some specific energy choices affecting their own comfort and empower them to improve their energy consumption patterns.

PILOT DESCRIPTION AND BACKGROUND

As anticipated, the City of Torino identified as the PROBIS Pilot a huge office building located in the North east area of Torino and namely in Via Bologna 74, Torino.

The building covers about 22.000 sqm and consists into 9 floors above the ground level, which hosts different offices. At the underground level, there is one basement with utility rooms and another one, used as a technical area and garage.

It is owned by the City di Torino and incorporates different municipal spaces with different final uses, including the offices of the Traffic Police and those of the Environment Department.

The amount of employees working in this building is about 820 and corresponds to the 10% of the total staff of the City (excluding the employees of the school division).

The volume of that building is 66.300m³ and the average consumptions (2008-2012) are: Electrical 3.000.000kWh/year, Gas 290.000m³/year and Water 13.000m³/year.

This specific pilot project aims then at consistently reduce energy consumptions – by at least 20% - and improve the overall comfort within the building mainly through soft ICT measures, accompanied by smaller structural interventions related to the lighting and the general climatization/thermal systems.

It is worth to be mentioned, that the electrical and thermal appliances of this building – as well as those of the overall municipal buildings – are managed by IREN Servizi e Innovazione, which is then the main local partner of the City of Torino for any energy efficiency interventions and which will be in charge of carrying out the procurement procedure within the PROBIS project on its account.

The pilot will be carry out in synergy with a wider project which is under development, again in collaboration with IREN Sviluppo e innovazione. The City is willing to realize an highly innovative informative system for the energy management (EnMS) of the overall municipal properties, consisting into about 800 buildings, for a total volume of 7.5 million m³, where the highest share is constituted by schools, offices and sport facilities. The solution should imply unique and usable informative system for all the municipal buildings while real-time monitoring and regulating systems should be tested into a number of sample buildings, in order to prove its effectiveness and provide room for higher replicability.

Basic Facts of the Pilot Building

Table 1: Basic information

Location:	Torino, Via Bologna 74
Type of building:	Office Building, used by the Municipal Police Force (about ¼ of the building and 600 employees), with entrance Via Bologna 74, while the remainder, with entrance from Via Padova 29, is used by the Environmental Dpt (about 220 employees)
Number of floor:	9 floors used as offices, a basement with utility rooms and a basement used as technical local and garages
Total Gross Area:	22.000 sqm
Total Gross Volume	66.000 cm
Built (year):	Rebuilt in 2004
Existing energy consumption (Average consumption 2008-2012):	Electrical Energy 3.000.000 kWh/year; Gas 290.000 m ³ /year
Building Envelope	The building is characterized by a structure in reinforced concrete, with intermediate floors in brick and concrete cover. The exterior windows are made of aluminum frame without thermal break and with double glazing.
Electrical systems	N. 2 power transformers (each: 1,000 kVA nominal power) N. 1 emergency generator 1,540 kVA N. 1 UPS 600 kVA Distribution: technical panels for each zone See the as built drawings for the details.
Lighting Systems	Lighting fixtures use fluorescent lamps without electronic ballast. The as built drawing illustrate in detail type and position of light fixture installed.
Heat System	Production: 2 gas boilers (each: 1526 kW nominal power) Distribution: 2 principal heating circuit (fan coils) + 1 heating circuit for the bathroom (radiators) Heating devices: fan coils + radiators

	See the as built drawings for the details.
Cooling System:	Production: 2 cooler chiller water-water (841,5 kW nominal power) Distribution: n. 2 cooling circuit (fan coils) + n.3 cooling circuit (AHU) Cooling devices: fan coils + air diffusers See the as built drawings for the details.
Ventilation:	Production: 6 air handling unit Distribution: isolated air ducts Ventilation devices: air diffusers See the as built drawings for the details.

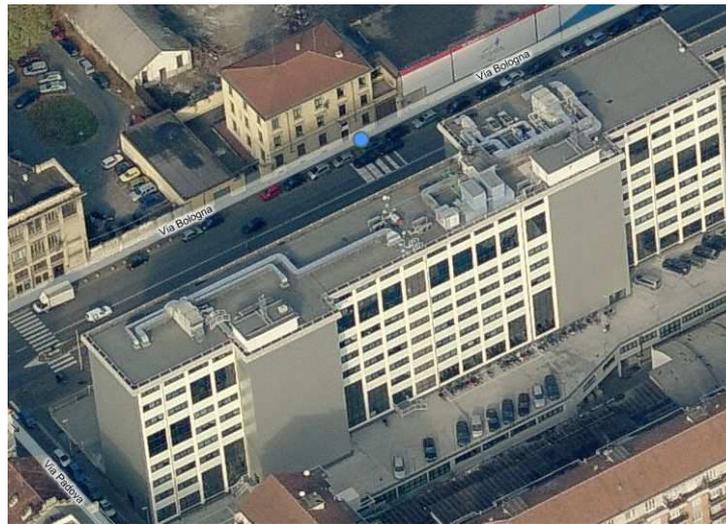


Figure 1: The pilot building

Energy consumption:

Table 2: Average annual energy consumption before renovation

	Before the renovation	
Gas (Average 2008-2012)	290.000 m3/year	237,8 (Tep/year)
Electricity (Average 2008-2012)	3.000.000 kWh/year	750 (Tep/year)
Total		987,8 (Tep/year)

N.B.

1.000 Nm³ Gas = 0.82 TEP

1.000 kWh Electricity = 0.25 TEP

Actual costs

The size of the problem in financial terms, directly related to the pilot building before the renovation can be found in Table 3.

Table 3: Costs before renovation

	Before the renovation
	€ / year (average)
Electricity	500.000 €/y
Gas	180.000 €/y
Maintenance costs	
• Space heating, cooling and hot water systems	100.000 €/y
• Envelope	(order of size)
• Indoor Lighting System	
• Others	
Total	780.000 €/y

DESIRED SOLUTION DESCRIPTION

The desired solutions are:

- **S1.** Equip the building with an integrated Energy Management System (open, scalable, multi-protocol system) combined with advanced multi-variable metering solutions able to contribute to reduce the building's consumptions of thermal and electrical energy use and improve indoor comfort, thus providing tools for allowing improved energy choices (behaviors and investment planning) for all building stakeholders (managers and users). The thought ICT infrastructure should consist in an integrated system, including the following functions:
 - monitoring of energy consumptions and air indoor conditions;
 - elaborations and analysis of the collected data;
 - alarm and warning system to be used in case of anomalies (in the energy management system and behavior's users as well);
 - information to the user in order to induce a sustainable approach or behavior towards energy consumption;
 - reporting for different users (users in charge of energy management as well as for the final user): this project will seek to procure engaging and innovative technologies that might encourage a new way of behaving in workspaces, both in the office and at home, and that require a more active role for the workforce in meeting carbon reduction targets, rather than assuming that their retrofitted office/ house is doing the carbon reduction for them;

- regulation and monitoring of the installations in the buildings.

Moreover, in order to integrate all this functions, it is necessary to dispose a unique and open communication protocol of the required integrated system. For the time being, the technologies having the mentioned properties already exist in the market, but they are not fully integrative.

- **S2.** Solutions for the partialization/zoning of the general thermal/climatization system, including the improvement of the mechanical ventilation system. The objective is to adapt thermal/climatization capacity to the different/homogeneous zones, improving indoor comfort conditions as well as the efficiency of the overall systems.
- **S3.** High efficient lighting systems, in the view to improve the lighting comfort and reduce electrical consumption levels, operating not only with the replacement of existing and low efficient lighting appliances but also equipping lighting systems with solutions allowing different lighting scenarios/adaptation to users' needs in connection with the general EnMS.
- **S4.** Other minor interventions will be evaluated as integrations of the three afore mentioned solutions like solutions to reduce/ optimize solar radiation in targeted building areas.

The focus is on the energy targets:

Target 1: 20% reduction in energy use

Target 2: Improve the overall indoor climate

Owner requirements	Functional Requirements	Performance Requirements
Phases:		
Energy Management System	<ul style="list-style-type: none"> - monitoring, regulation and management of the overall energy consumptions; - regulation systems (e.g. thermostatic valves; motion sensors, etc.) and integrated informative system (BMS) - integration with all existing and future ICT appliances like BMS ; - integration with a composed sensor network, able to monitor and provide intervention inputs related to further climate/environmental conditions (e.g. humidity, temperature, quality of the air, other). - Tools and interfaces for the users 	<ul style="list-style-type: none"> - assure sustainability in terms of management and maintenance costs - interoperable, open, web based, user-friendly and able to activate the user - low invasive and easy to run and to maintain - high reliability of measures provided - overall reduction in energy consumption up to the 20 %
Lighting	<ul style="list-style-type: none"> - Innovative and energy efficient indoor lighting technologies to reduce electrical energy consumption. - Integration of lighting systems/appliances within the general EnMS (Energy Management System). 	<ul style="list-style-type: none"> - optimize the visual comfort as well as lighting energy efficiency in relation to the different building uses - reduction of electrical

	<ul style="list-style-type: none"> - Equipping lighting systems with motion sensors as well as with solutions allowing different lighting scenarios . 	<ul style="list-style-type: none"> - consumption related to lighting by the 20 %
<p>Climatization systems</p>	<ul style="list-style-type: none"> - adapt thermal/climatization capacity to different/homogeneous zones, in order to improve indoor comfort conditions as well as the efficiency of the overall climatization system - to make independent the different areas of the building according to the different final uses of energy and the different needs; - to make independent different heating circuits (air handling units and fancoil circuit). - interaction with the EnMS - Improved mechanical ventilation in targeted building areas . To verify the possibility of installing an air handling unit (AHU) dedicated to the public areas with special problems of air exchange during the summer. - The new ventilation systems has to be the following requirements <ul style="list-style-type: none"> o ventilation heat recovery for energy savings o low noise emissions 	<ul style="list-style-type: none"> - average reduction in energy consumption up to the 15 % - assure maximum indoor comfort for all users in winter and summer seasons: in compliance with D.P.R. 74/2013, during winter season: 20+2°C (50% relative umidity), during summer season: 26-2 °C (50/60 % relative umidity) - low invasive (in terms of works needed to be accomplished as well as in terms of impact on occupants) - offering different heating and cooling scenarios for different building areas. - improve indoor air quality, with special regard to crowded public spaces. - high efficiency ventilation systems - considerably short time installation
<p>Management phase</p>	<ul style="list-style-type: none"> - considerably simple & short time installation possible without evacuation of the users - all the installation with minimal disturbance for the users and no services interruption - safe working area with all needed equipment that support safety of users and workers as well 	<ul style="list-style-type: none"> - The installation phase shall guarantee users safety and assure that they can do their daily job and movement with the minimum restriction/ disturbance as much as possible
<p>Maintenance phase</p>	<ul style="list-style-type: none"> - considerably easy maintenance and reachable heating and ventilation system 	<ul style="list-style-type: none"> - minimum time interference and disturbance to users

	and EMS solutions	<ul style="list-style-type: none"> - minimum maintenance routines per year - ability to respond to any reported failure within h 24 max
Disposal	<ul style="list-style-type: none"> - Equipment, components and devices traded in accordance with Environment Product Declaration (EPD) standards. - Evaluation in terms of life cycle assessment of new installations. 	<ul style="list-style-type: none"> - Removal of obsolete materials and waste, products including the transfer and the disposal at approved center, must be in accordance with the existing law.

User requirements	Functional Requirements	Performance Requirements
Phases:		
Running phase	<ul style="list-style-type: none"> - user friendly solutions - good level of air quality, illumination and thermal indoor comfort - possibility to independent manage some indoor values (like temperatures and illumination levels) 	short time to reach and assure a stable and good internal thermal comfort

KPI and CONSTRAINTS DESCRIPTION

KPI related to the solution performances	
KPI S.1	Reduction in energy consumption up to the 20 %. Measurement: kWh/y/m ² /GG
KPI S.2	Reduction of electrical consumption related to lighting consumption by the 15 %. Measurement: kWh/m ²
KPI S.3	Reduction in energy consumption (electricity+ thermal) up to the 15 % . Measurement: kWh/y/m ² area
KPI related to the refurbishment process	

KPI P.1	Time control of execution of work. Measurement: working days/y
KPI P.2	Impact on the final users. Measurement: % of satisfied users

Constraints related to the solution performances:

The overall budget for the thought solution is estimated in about € 1 million (VAT included).

Below some technical constraints to be taken into account for the deployment of each solution:

S1. Energy Management Systems.

-> Need to coordinate with the overall municipal Energy Management Plan (e.g. the system should be interoperable with the future overall EnMS, with the possibility for instance to operate within the municipal intracom).

S2. Solutions for the partialization of the climatization systems.

-> There is a need to carefully verify:

- the as built of the heating and cooling systems (for instance to modify the climatization system with the inclusion of appropriate valves managed by the future BMS system) as well as the available spaces for any new installations.
- the possibility to operate/integrate interventions on other building structures in order to improve the impact on indoor comfort (e.g. shading/thermal windows, etc.).
- for mechanical ventilation: the possibility of installing an Air Handling Unit dedicated to the public areas with special problems of air exchange during the summer.

S3. Lighting

-> There is a need to verify the as built of the lighting systems, to best adapt innovative lighting solutions.

-> It is worth to coordinate with actions regarding the deployment and integration of sensors.

Constraints related to the refurbishment process

In the acquisition phase, it will be better to first install metering technologies, because of its low invasivity as well as due to the possibility to measure performances from the beginning, giving the tools for gap analysis.

OPEN MARKET CONSULTATION SESSIONS

PROBIS will organize at least 3 open market consultation sessions covering the different pilot areas, as an analysis of the State-of-the-art at least at EU level. The information flow about technical maturity and industry capabilities in EU will be ensured by contact persons appointed by each participating country.

The City of Turin will organize, in collaboration with the other partners, an open market consultation session by the end of June 2015. Date and place of the meeting will be advertised as soon as possible on the local institutional websites as well as on the PROBIS website.

A market consultation involves the proactive analysis of supply markets and provide a pre-information to the market in order to give a congruous time for the preparation of fit-for-purpose proposals. The market consultation will provide crucial input to the procurement plan. The PROBIS market consultation is aimed to these following goals:

- test the viability of the scope of the contracts to be procured (the range of deliverables to be procured under each pilot);
- test the viability of the envisaged solutions/technologies within the given period of time;
- Identify market risks potentially able to endanger business goals and supplier performance;
- Find out whether technologies are commercially available and acquire information about the pros and cons and the level of coverage of the desired functionalities.
- Enable and increase the opportunities for industry to form fit-for-purpose consortia.

The market consultation session will be conceived and organized with due regard to the principles of openness, transparency, non-discrimination and equal treatment, in line with European procurement law.

Participants and prospective contractors are not expected to submit tenders or proposals at this preliminary stage.

The competitive phase of the PROBIS coordinated public procurement procedure will be conducted separately with an open and advertised procurement procedure.

The market consultation does not lead to any obligations on the part of the contracting authorities involved in the PROBIS project or to any rights or privileges for the participants. The contracting authorities involved in the PROBIS project are not legally bound in any way by the outcome of the market consultation.

No advantage or disadvantage will be given to any supplier/group of suppliers to the detriment of others during the market consultation and sub-sequent competitive procedure for the award of contracts procurement.

During and for the purpose of the early market engagement processes, legal assurances is put in place that suppliers' intellectual property rights (IPRs), communicated in written form, will be protected. The market consultation will be conducted in the form of oral bilateral consultations. A written contribution (based on a questionnaire) could be provided by the participants to form the basis for more in-depth State-of-the-art analysis and to assure the confidentiality on the information and solutions provided.