Project location and overview
In the new Unità d’Italia (elementary and middle) school complex in Piobesi Torinese, just outside Turin, an innovative Building Automation solution has been implemented in order to meet three objectives.
- Create an energy saving system which respects the environment.
- Significantly simplify management and maintenance.
- Make the benefits of energy saving plain even to the youngest students.

The system which has been installed represents a technological point of reference for energy-saving buildings, as well as an important tool for future generations’ cultural education.

Description of the work
Centralised control of the systems
The building automation system centralises and integrates management and supervision processes. An easily accessible touch screen user interface is installed in the vestibule, which even the youngest students can understand. The building automation system manages
- All lighting, both internal and external
- Keeping track of energy generated
- Heating
- Clocks and bells
And it interfaces with the other systems, such as the photovoltaic system.

Lighting system. The lighting is turned on and off and its brightness regulated in order to make the best use of natural light and consequently reduce electricity consumption. The automation also manages them at night, when all lighting is turned off automatically, apart from corridor lighting which is reduced to 15% brightness. The outside lights are managed by the supervision system via twilight switches, with evening and night modes (turned on at 50%).

Various technological systems. The sprinkler system in the garden, the lunch/break/lesson bells, the clocks and smoke detectors are all managed by the control system, with operating status and any warning alarms visible on the touch screen.

Solutions employed
Natural materials, innovative technologies, renewable energy sources
In terms of building materials, the use of natural products such as wood, natural hydraulic lime, and vegetable- and mineral-based paints which help to reduce energy consumption were favoured.
The plant technologies used include thermal and PV solar panels, district heating, rainwater collection for the pond and garden sprinkling system, and a building automation system meeting the international KNX Standard. ABB low voltage distribution switchgear, consumer units and Élos series wiring accessories were also installed, ensuring uniformity both from a functional and aesthetic standpoint.

The status of the various systems can be monitored directly from the touch screen in the vestibule. This device is easily understood by children, and as such constitutes an effective educational tool, as it raises awareness of responsible energy use.

The brightness in the various areas is adjusted depending on whether there are people present and on the level of natural light, both of which are detected by dedicated sensors. The lights stay on for three minutes after the last detected movement. The lighting sensor adjusts the brightness of the lights from off to 100% based on the external conditions (sunny, cloudy, dark), ensuring the lighting in the classrooms is always at the required level.

There is also a timer, which at the end of the school day turns off any lights which have been left on and dims the corridor lights to the night-time level of 15%.

The building automation system also manages and supervises the other technical systems in the building. It detects and displays the operating status of the heating system components, for example, indicating any errors or faults. Watering of the garden can also be programmed via the touch screen, controlling the solenoid valves and pumps of the water system.

The small 1kWp photovoltaic system has its panels arranged like the sails of a galleon and is “moored” in the pond. It has been designed to teach the students about the benefits of renewable energy installations. The quantity of energy produced and carbon dioxide emissions avoided can easily be read on the touch screen.

Benefits obtained

**Simplified management, favouring energy saving**

The school control project has met with appreciation from the staff, for whom it has simplified management of the building, as well as generating interest from the students, drawn in by the information available on the touch screen.

The ABB i-bus® KNX system allows the operation of all systems and their energy efficiency to be checked centrally. Authorised users can also turn systems on and off directly from the control station according to predefined scenarios, setting parameters according to their level of authorisation.

The flexibility of the ABB i-bus® KNX architecture also leaves space for future additions to the system, making it easily adaptable to changing educational needs.

The intelligent lighting control, which prevents energy being wasted by lighting left on in infrequently used areas (store rooms and plant rooms), offers a significant reduction in energy consumption. The automatic adjustment of classroom lighting levels based on outside light conditions also guarantees maximum comfort for those inside, as well as further energy saving.

Meeting the educational goal must also be added to the energy efficiency benefits. The information given by the touch screen on the hours of lighting powered by renewable sources instead of mains electricity clearly shows the benefits of a responsible energy policy.

Maximum precision in lesson start and end times is given by the reference clock being synchronised to the Frankfurt DCF77 time signal, which in turn sets the time daily on the other clocks in the common areas.

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