



Building Integration Technologies  
SAET and ABB together for safety  
and Building Automation

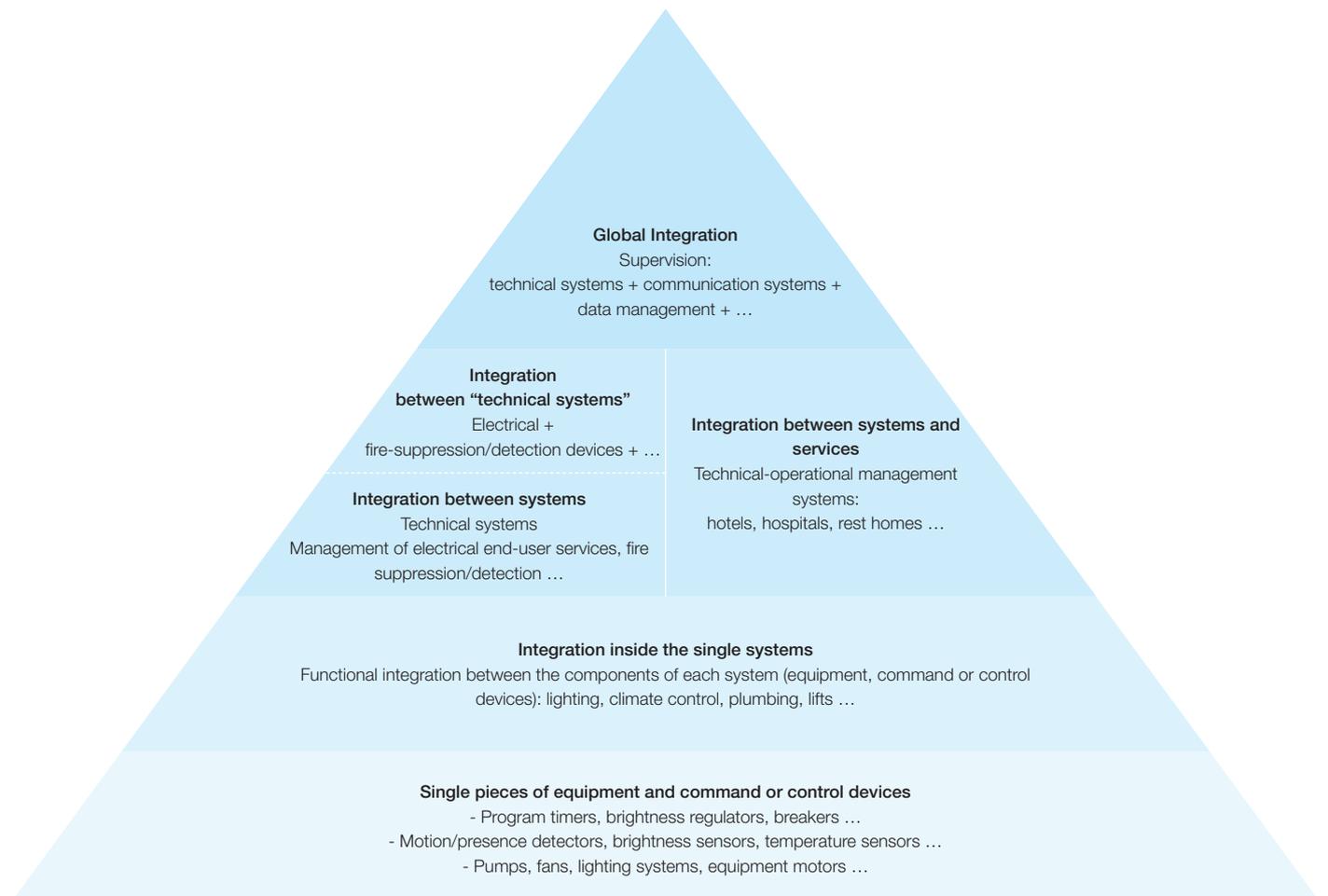
# Towards global integration

## Safety & Security - Building Automation

We are improving quality of life and work and changing personal requirements and expectations; even the buildings constructed to accommodate our daily activities are contributing towards this continuous evolution.

Each building hosts devices destined for automation and monitoring functions: thermostats, anti-theft devices, automatic gates, CCTV etc. The components of this last technology, by now familiar to all of us, are almost always separate and not connected, belonging to different installations without any interaction between them. This situation does not allow all the advantages which their interconnection would allow to be enjoyed. The integration of different devices and different functions is favoured by new SAET and ABB solutions which allow a building's various systems to converge into a single Supervision System,

able to improve the safety and security of the people and possessions inside as well as have a positive effect on energy consumption and thus safeguard the environment, and equally important, company and personal bank balances. As illustrated in the pyramid, integration may be carried out at many levels, starting with the functions and devices of a single system, passing through integration between the different systems of a single structure, right up to global integration of all the management functions of a network of different structures spread over a geographic area.



# Building Automation The KNX Standard



## Architecture

Unlike traditional installations, in which each control device is directly connected to the equipment it manages, in KNX-standard systems all components are connected, directly or through suitable equipment, to a transmission bus which transfers commands and signals containing the information necessary to identify the device and the operation it must perform.

## Benefits

- Great flexibility: modifications to the system's functionality do not require work on the installation's physical structure – the required devices can just be reprogrammed via software
- Great potential in terms of the functions which can be realised – any kind of configuration can be created using modern electronic and computer technologies, even the most complex, without the need for particular technical skills
- Savings on materials and work for cabling, both in the installation phase and in the case of modifications to be made

The KNX standard has been developed in order to create decentralised systems, in which the exchange of signals and controls occurs exclusively at the level of the operational devices. Each component, indeed, has data-processing capabilities allowing it to transmit and/or receive signals and commands directly over the system bus cable.

# From the expertise of SAET and ABB comes the integrated system for security and building automation.

There are often different security and automation systems co-existing in the same building, each one managed by its own specific user interface.

This user interface hardware and software duplication is the cause of inevitable inefficiencies due to functional overlaps and the difficulty in grasping technological advantages. In some cases we reach the paradox where the users themselves give up on using the installed systems and thus their advantages due to the complexity and costs of managing them.

This is where SAET and ABB Building Integration Technologies come in. Thanks to their consolidated experience, these two companies have developed an Integrated Security and Building Automation Solution.

This new solution provides for supervision of the SAET access control, anti-intrusion and fire detection systems to be extended to the ABB i-bus® KNX Building Automation systems, offering the user the GEMSS centralisation package as a unique, powerful and intuitive management tool.

This integration occurs through the ISI interface, which converts the ABB i-bus® KNX messages from the USB interface into SAETCOMM messages which can be understood by the GEMSS software.

An object on an interactive graphical map can be associated with each ON/OFF or analogue input/output from the ABB i-bus® KNX field, to make management immediate and clear for the operator.

The heart of the system is the GEMSS Server, which communicates with the field equipment, informs the Client of status updates in real time and receives from them the commands to forward to the equipment in the field.

Thanks to the reliability of the SAETCOMM protocol across LANs and WANs, it is possible to install the GEMSS Server even at a significant distance from the ISI interfaces and the various field equipment, with secure communications guaranteed through AES encryption.

To ensure the solution is sufficiently modular, allowing development and deployment even in subsequent phases, the GEMSS system has an independent plug-in structure, each destined for specific functions: anti-intrusion, access control, smoke detection, building automation, video surveillance, motion/presence detection and technological control.



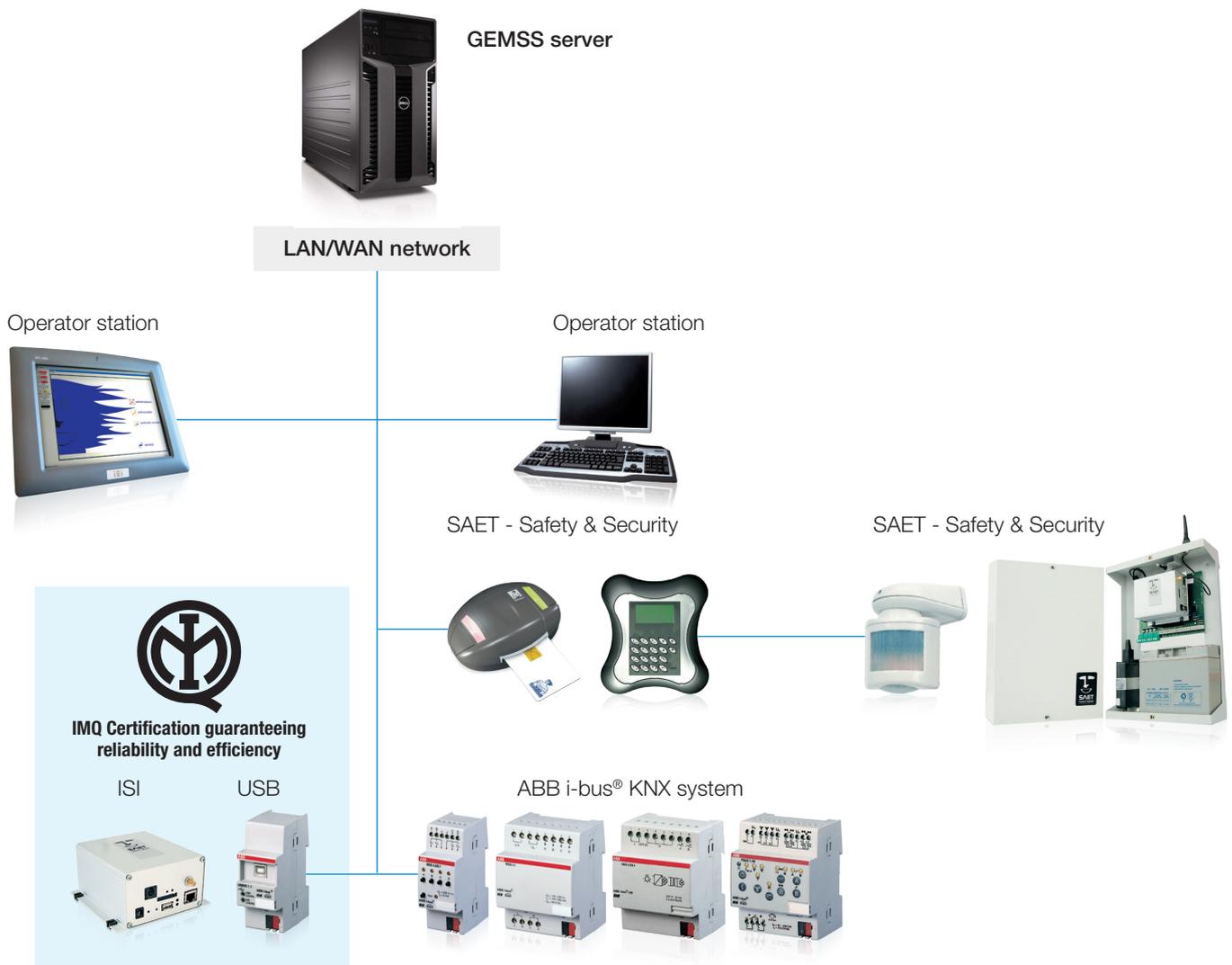
The user has access via PC or touchscreen, according to their specific permissions, to the supervision and management functions (typically navigating the graphical maps and the possibility to send commands to the field equipment via graphical buttons).

**Advantages of the SAETCOMM protocol**

- Native network protocol
- Versatile and lightweight: based on the UDP/IP protocol stack for efficient communications with reduced bandwidth
- Band occupied only in the presence of messages from and to the equipment: event-based communication technology
- AES encryption guarantees communications security
- Back-up lines (analogue, GSM) in case the main line (LAN) goes down.

**Advantages of the ISI interface**

- The GEMSS Server connected to the ISI via the network can be located any distance away (even hundreds of miles over WAN links)
- The GEMSS Server only intercepts messages considered significant by the ISI interface, which acts as a filter towards the LAN/WAN network
- The graphical status of the icon on the graphical map accurately reflects the status of the component
- Integrates the advantages of the ABB i-bus® KNX protocol with those of the SAETCOMM protocol
- The interface between the ABB i-bus® KNX system and the SAET - Safety & Security system is IMQ certified, confirming the total reliability and efficiency of the solution



# The components of an effective and secure technology.

## GEMSS server

The GEMSS supervision system has a Client / Server architecture. The Server (GEMSS Service) is configured as a Windows service, and performs the following functions:

- Communicates with the field equipment
- Manages Clients in real time
- Manages the functions of reading and writing to a Microsoft SQL Server Data Base

## LAN – WAN network

Medium connecting the single Systems to the Supervision Software. The SAETCOMM protocol guarantees the reliability of the communications and the security of the data carried over the network.

## ISI (Intranet SAET Interface)

Protocol conversion device: converts the ABB i-bus® KNX messages from the USB interface into SAETCOMM messages which can be understood by the GEMSS supervision system.

## USB interface

Device which interfaces the ABB i-bus® KNX field, making the messages available on a USB port.

## ABB i-bus® KNX system

- Power supply and system components
- Input/output terminals
- Actuators
- Lighting
- Heating and air conditioning
- Time programming and logic

## SAET Safety and Security

Group of equipment and systems for the Security functions produced and developed by SAET:

- Anti-intrusion
- Access Control
- Technological Control
- Video surveillance
- Smoke detection
- Movement/presence detection

## Operator station

Group of hardware and software components which constitute the user interface with the systems.

- Workstation: commercial personal computer with Windows 2000 / XP / Vista operating system
- Touch screen: thin client with Microsoft XP Embedded OS allowing intuitive navigation of graphical maps and sending of commands to the field equipment by pressing graphical buttons



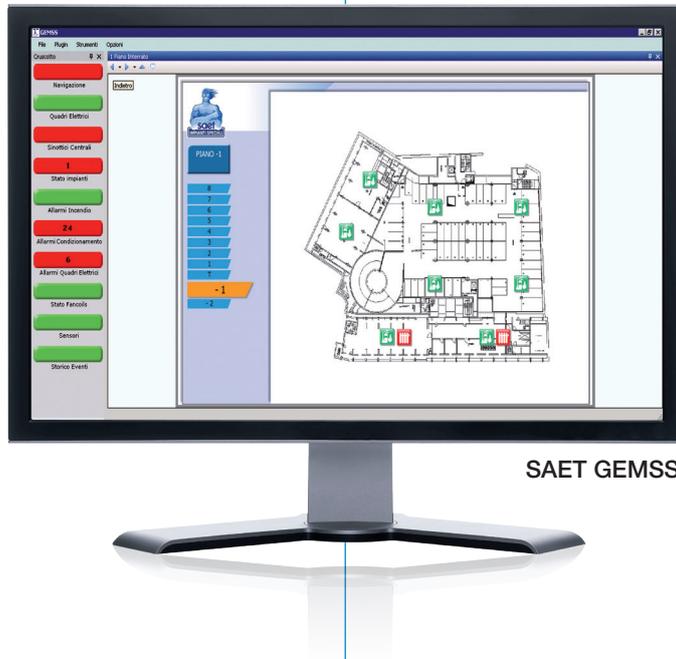
System components



Components for managing temperature regulation



Components for managing lighting



SAET GEMSS

Anti-intrusion



Access control



Smoke detection



Video surveillance



# Field of application

Management of the building Security and Automation systems must be simple and efficient

SAET and ABB offer a global solution for integrated buildings management, with a tool suited to many different environments.

## High-prestige residences

- Anti-intrusion
- Video surveillance
- Sprinkler systems
- Door and window controls
- Emergency calling
- Lighting
- Climate control

## Shopping centres

- Warehouse anti-intrusion and video surveillance
- Climate control
- Control of refrigeration units
- Lighting
- Fan-coils

## Hospitals

- Smoke detection
- Video surveillance of common areas and parking
- Emergency calls management
- Movement/presence detection
- Access Control
- Evacuation management
- Lighting

## Banks

- Anti-intrusion
- Access Control
- Video surveillance
- Anti-robbery systems
- Self-service area access control
- Lighting
- Climate control

## Industry

- Perimeter intrusion detection
- Access control for people and vehicles
- Video surveillance
- Reading analogue inputs for technological sensors/probes
- Temperature regulation
- Emergency calling

## PV panels

- Monitoring status of breakers
- Video surveillance
- Anti-theft systems for solar panels
- Production and performance monitoring

## Hotels

- Room-service management
- Smoke detection
- Access control for rooms
- Lighting
- Climate control
- Evacuation management

## Offices

- Anti-intrusion
- Access Control
- Movement/presence detection
- Lighting
- Climate control



# Building Management and centralised supervision.

In ABB's Santa Palomba facility, a complete building management solution allowing centralised supervision and real-time monitoring of energy consumption.



## Project location and overview

Complete integration of the building automation applications with those regarding security (video surveillance, access control, anti-intrusion). Comprehensive and centralised supervision of the entire site by complete control of every function from PC workstation and real-time monitoring of energy consumption.

## Description of the work

Work at the plant was aimed at creating a complete system for supervising and monitoring the whole installation in order to monitor the various sections of the plant and measure the power consumption in real time together with the energy savings obtained by a series of optimisations performed over the years, in particular regarding the climate-control and aspiration systems in the production units.

## Solutions employed

The technical collaboration between SAET and ABB allowed a complete solution to be realised for Santa Palomba which integrates the safety&security parts with the KNX standard building automation. This integration gives:

- Centralised supervision of the entire production plant, integrated in the building's external security system and including both the measurement and the alert/command part.
- Control of lighting with ABB i-bus® KNX products

A complete energy monitoring system was also installed, with multiple measurement points installed around the plant. The consumption data gathered by these are sent over the KNX bus to the central supervision system for real-time monitoring, analysis and comparison with historical data.

The GEMSS supervision software was upgraded with an "Energy Savings Monitoring" plug-in able to interface with the ABB electrical consumption electricity

consumption monitoring equipment to acquire the data, which it then stores and processes into consumption statistics. This allows energy savings compared to historic values to be viewed, which can be displayed not only in kWh but also in kgCO<sub>2</sub> or equivalent trees. If corrective improvement actions are required this can also be easily seen.

Interaction and integration between the different devices and the various functions are made possible by the KNX bus, active across the entire plant, which manages all the systems and keeps them under control: lighting, monitoring, climate control, compressors, fume aspiration for soldering processes, badge access control and anti-intrusion. This way all the plant's buildings are integrated in a single system which improves personal and work life as well as having a positive effect on electrical consumption.

ABB i-bus® KNX Building Automation



Monitoring energy consumption



HVAC Integration



Low Voltage system monitoring and warning



Anti-intrusion



Access control



Video surveillance

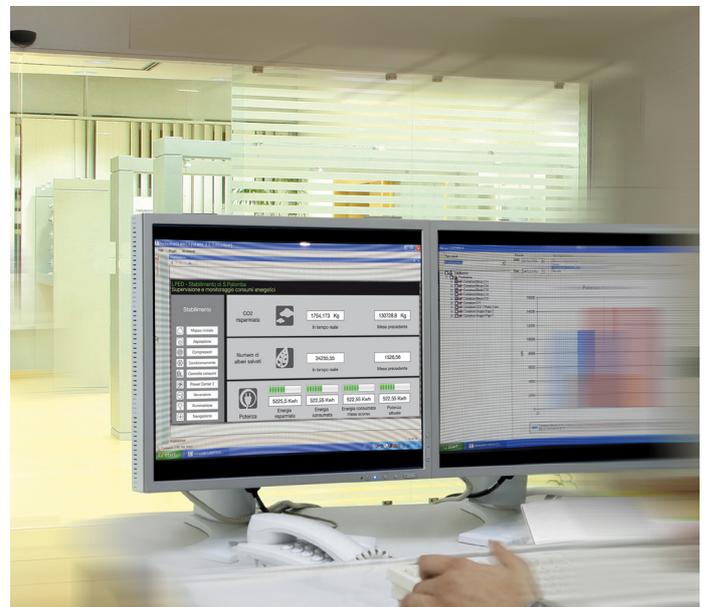


**Benefits obtained**

Integrated control of all parts of the plant from a centralised point using supervision software allows productivity and security to be improved.

Real-time monitoring of power consumption also permits significant education in energy saving, thanks to the plug in for the GEMSS software – its

screens display energy consumption and energy savings together with eco-sustainability indices (number of trees saved, kgCO<sub>2</sub> not released into the atmosphere) on a large display in the entrance hall.



# Supervision. The centre of the system.

SAET and ABB together for the design and realisation of an integrated building automation system – security, efficiency and integration.



## Project location and overview

Creation of a complex building automation system in a management office building.

## Description of the work

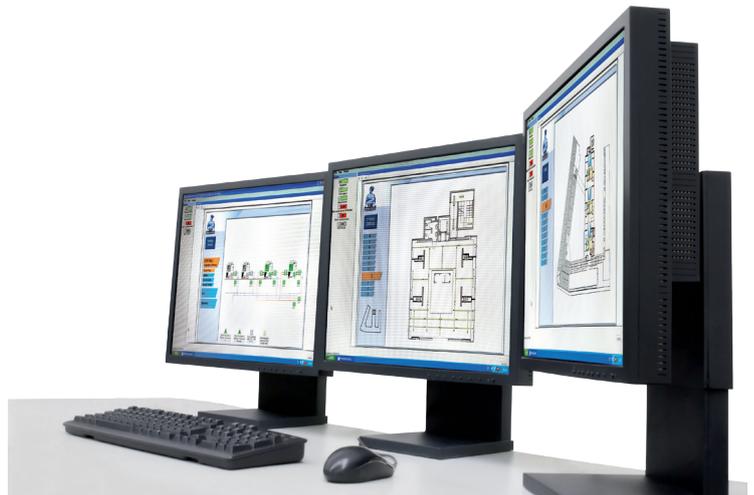
The site, in the heart of Milan and occupied by management offices, is a building composed of two above-ground floors and two basement levels. The supervision functions concern the smoke detection, lighting control, electrical panel breaker command and control and temperature regulation subsystems. A total of more than 6,000 points which are controlled by a single, intuitive user interface which makes management simple and effective.

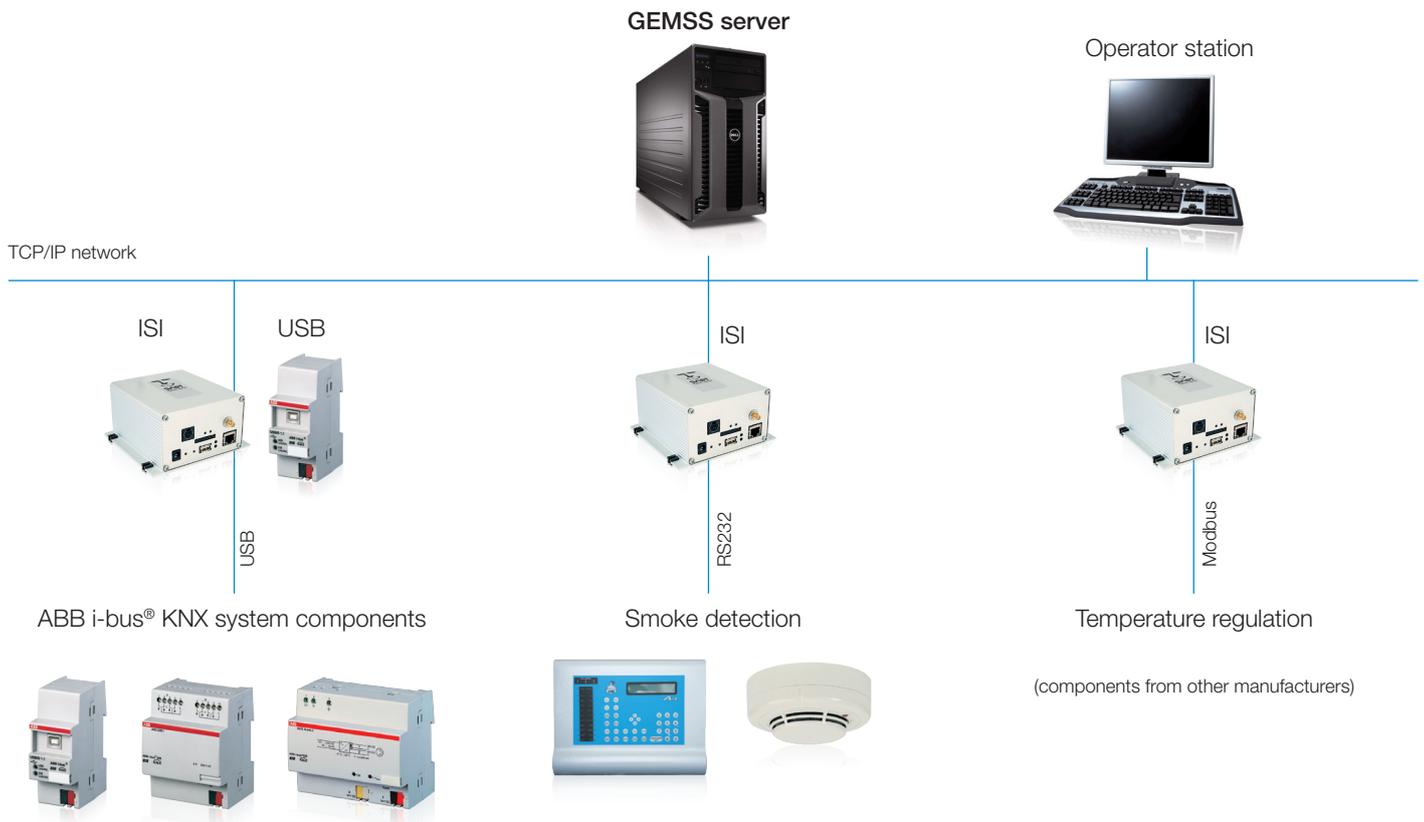
## Solutions adopted and functions

The SAET - ABB solution permits integrated management of the smoke detection, lighting and automation, and temperature regulation systems by interfacing third-party devices with the Modbus protocol. SAET GEMSS is the integrated supervision tool. It is an intuitive multimedia user interface for all building subsystems, able to display the status of all devices present in real time. Thanks

to its interactive geographic map based structure, GEMSS is a system which is easy to use even for those without technical skills. The three monitoring screens give access to the navigation windows for the different floors. The operators of these screens can manage any automatic or manual smoke/fire signals in real time, thus allowing them to activate the building's emergency evacuation procedures in a timely fashion. The smoke

alarm consists of an audible alarm, while the graphic gives its exact position. The operators can also control the building's lighting via the screens, switching them on and off and checking their state. The supervision system's time scheduling functions support the manual controls by regulating the switching on and off of the lighting circuits based on the day and time. This is a great advantage in terms of energy consumption, avoiding wastage.





All temperature alarms are also displayed on the monitoring screens in real time; these must be managed using a specific protocol. Any alarm signals are highlighted with a specific red icon. When this occurs, the operator knows that a set point of more than 3°C above the established base value has been set in a specific office of the building. In this case, since the tolerance of + / - 2 °C has been exceeded, everything is immediately reset to the correct values. This is another important function for avoiding wastage, in this case due to inappropriate temperature adjustments.

**Benefits obtained**

The supervision system is able to effectively support those charged with the plant's management and maintenance activities. The receptionists/porters perform the day-to-day user management activities, despite not having specific technical skills. HVAC maintenance staff can control and monitor the systems they have to manage in real time from the remote screen installed in their location; these can be air treatment units, boilers, refrigeration units, pumps etc. In the same

fashion, electrical maintenance staff can monitor and reset breakers in the panels and check that the smoke detection system is operating correctly, always from their own location. Remote monitoring drastically reduces maintenance costs and response times while giving the end user greatly increased levels of service.



# Security. For everything under the sun.

SAET and ABB's technology and experience for a complete security and automation system for a PV installation: reliability, integration and continuous monitoring.



## Project location and overview

Photovoltaic electricity production installation. The plant, set over a flat area with a perimeter of 4,700 metres, is able to produce 16 MW of power using 69,336 solar panels.

## Description of the work

The complex requirements of managing this site have been fully satisfied through the adoption of an SAET GEMSS Integrated Supervision System. This is able to guarantee simultaneous control of the installation's various subsystems: the anti-theft protection system for the solar panels, the perimeter fence protection system, the underground perimeter protection system, the video surveillance system, the GSE meters and automation devices control system. An example of collaboration and convergence of the solutions adopted and the expertise of SAET and ABB.

## Solutions employed

SAET FV 08 technology was chosen for anti-theft protection of the ground-mounted solar panels, allowing all 3,852 strings of panels to be monitored 24 hours a day. The 1,284 SAET FV 08 sensors, housed in 214 ABB switchboards from the Gemini line, are installed in proximity to each inverter, allowing the removal of even a single panel from the individual strings to be detected. The SAET technology is able to effectively distinguish between atmospheric events and an attempted theft. The system does not require installation on individual panels or strings, being wired upstream of the inverters and not resulting in voltage drops or reduced production of the system. The signals from the SAET FV 08 sensors go to four SAET DELPHI control units. The centralised monitoring and control of the status of the panel breakers, distributed across ten cabinets, is entrusted to devices on a Konnex bus. The existing fibre-optic infrastructure was used to connect the cabinets together. Ten certified GSE meters were installed in order to account for the energy produced. All readings performed

by the meters are received and archived by the GEMSS supervision system in order to store the acquired data and produce comparative reports. These data then serve as a reference for administrative activities of billing and invoicing. All production data (active and reactive power, current, power factor) are acquired by special dataloggers then transmitted to the Supervision System where they are stored in its database. The measurements taken in the field are displayed in real time, with periodic comparisons made and resulting reports prepared.



# Contacts

## **ABB SACE**

**A division of ABB S.p.A.**

**Wiring accessories, Home & Building  
automation**

Viale dell'Industria, 18  
20010 Vittuone (MI) - Italy  
Tel.: +39 02 9034 1  
Fax: +39 02 9034 7609

[www.abb.it/lowvoltage](http://www.abb.it/lowvoltage)

[www.abb.com](http://www.abb.com)



## **SAET IMPIANTI SPECIALI**

Via Leinì, 1/b  
10077 S. Maurizio Canavese (TO), Italy  
Tel.: +39 011 927 5208  
Telefax: +39 011 927 8846

[www.saet.org](http://www.saet.org)

## **EASY TECH S.r.l.**

Via Ramiro Ortiz, 26  
66100 Chieti, Italy  
Tel.: +39 0871 561759  
Telefax: +39 0871 561759

[www.easytech-srl.com](http://www.easytech-srl.com)

The data and illustrations are not binding. We reserve the right to modify the contents of this document on the basis of technical development of the products, without prior notice.  
Copyright 2012 ABB. All rights reserved.