



How sustainable building management can succeed with building automation

AN OVERVIEW OF BUILDING AUTOMATION, POTENTIAL SAVINGS AND THE ROLE OF SMART BUILDINGS, WITH PRACTICAL EXAMPLES

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The building sector plays an important role in achieving sustainability targets. After all, the construction industry is responsible for a third of worldwide greenhouse gas emissions.¹

But how can buildings be planned, operated, or renovated in a way that is energy efficient and saves resources? Building automation is the answer. You will learn why smart building is part of the solution for a sustainable future in this white paper.

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1 ABOUT SUSTAINABILITY IN THE BUILDING SECTOR

Available potential for reducing CO₂ emissions

The construction sector is energy- and resource-intensive, for instance in its production of steel, concrete and cement used to construct buildings. In addition, many buildings, commercial complexes and dwellings are poorly renovated or insufficiently insulated, meaning more energy is required for heating and cooling.

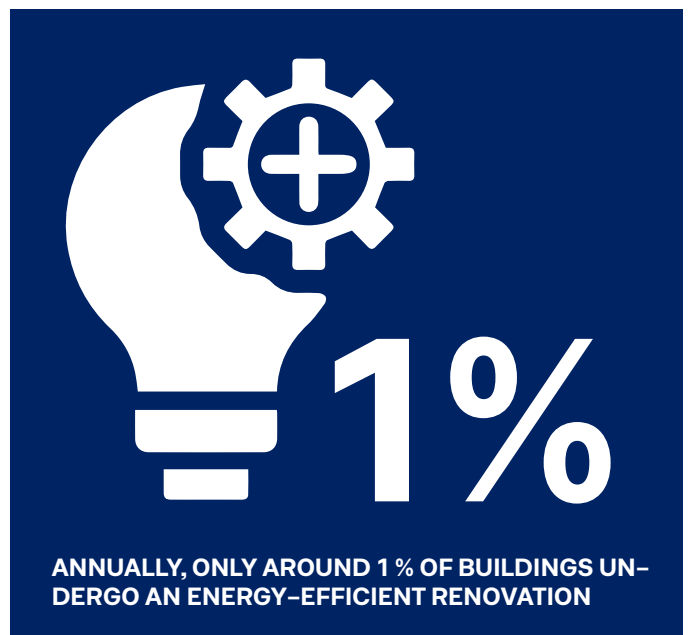
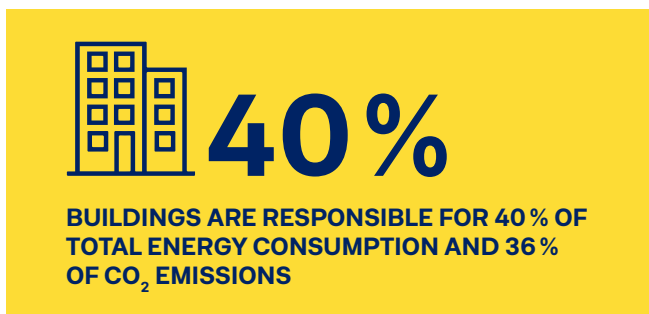
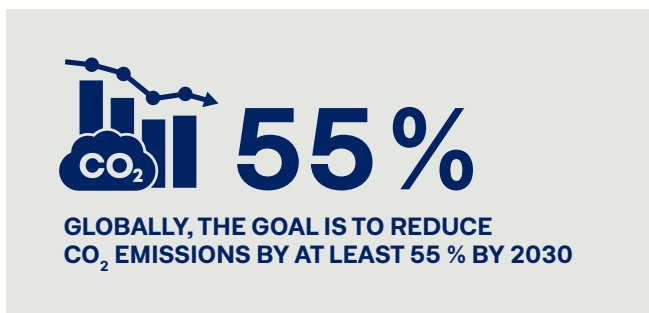
- **Buildings are responsible for 40 % of total energy consumption and 36 % of CO₂ emissions.**
- **Annually, only around 1 % of buildings undergo an energy-efficient renovation.**
- **Globally, the goal is to reduce CO₂ emissions by at least 55 % by 2030.²**

To achieve the targets set forth in the Paris Climate Agreement, existing buildings in the European Union would actually need to be decarbonised by 2050. The only way to succeed in doing so is to transform to a circular economy for more sustainability in the construction sector.

ENORMOUS POTENTIAL SAVINGS THANKS TO BUILDING AUTOMATION

Therefore, to achieve climate targets, we need much more energy efficiency and sustainable materials that would be suitable for a circular economy. Using digital technologies like BIM (Building Information Modeling) and, above all, building automation can contribute to significantly reducing CO₂ emissions.

The potential savings are substantial: in the short to medium term, up to 14.7 million tons of CO₂ emissions can be saved in the building sector by 2030. This represents up to 30 % of the target set forth in climate protection law for the building sector.²



2 THE ROLE OF BUILDING AUTOMATION IN SUSTAINABILITY

How building systems technology makes buildings more liveable and sustainable

No sustainability without digitisation: building automation plays a key role in achieving the maximum potential savings in building operations.



SUSTAINABLE BUILDING, OPERATION, AND RENOVATION:

- The ecological quality of a building starts during the **planning and construction process** – from using energy and resources responsibly to reducing area usage to ensuring minimal environmental impact.
- During **building operations**, the focus is then on reducing building-related emissions due to heating, cooling, lighting, etc.
- In the best-case scenario, the **entire building life cycle** (construction, operation, and demolition) would be environmentally-friendly.
- Existing buildings can be made more sustainable through **renovation and conversion**.

LIVEABLE BUILDINGS THANKS TO BUILDING AUTOMATION

Building digitisation can not only achieve economic savings, but also foster a higher quality of life and improve safety.

1. Reduced energy and operating costs:

Automatically controlled doors and windows make buildings more energy-efficient. This makes it possible to reduce heating costs.

2. Better comfort:

Self-opening doors create a barrier-free environment, and automatically activated ventilation fosters better well-being.

3. Healthy environment:

Intelligent controllers automatically regulate window operation for a better indoor climate. This protects against draughts, mould, and other issues.

4. High building safety:

Automatic access control or fire protection doors improve the safety of hospitals, hotels, residential and office buildings.

5. Lower maintenance expenses:

Building systems technology can also reduce maintenance costs and repairs, since the building management system and smart networking monitors all processes automatically around the clock. This means fewer outages and unplanned faults.

3 THE DEFINITION OF BUILDING AUTOMATION

The meaning of building automation, and what a smart building is

“Building automation” (BA for short) or “building management” as part of technical facility management manages the function, safety, and sustainability of buildings.

Software is used to monitor, control and optimise heating, ventilation and air conditioning (HVAC), lighting, safety systems, access control or door and window technology. The goal is to handle functional processes automatically in an interdisciplinary way, based on specified set values (parameters), or to simplify operation and monitoring.

GEZE FIELD SYSTEMS FOR BUILDING AUTOMATION:

All building services (BS) are connected via intelligent networking so they communicate with one another.

→ This is what makes a building a smart building – and achieves the optimal combination of operation, monitoring and control for better energy efficiency.

BUILDING AUTOMATION COVERS THREE NETWORKED LEVELS, ACCORDING TO DIN EN ISO 16484:

1. The top level is the management level:

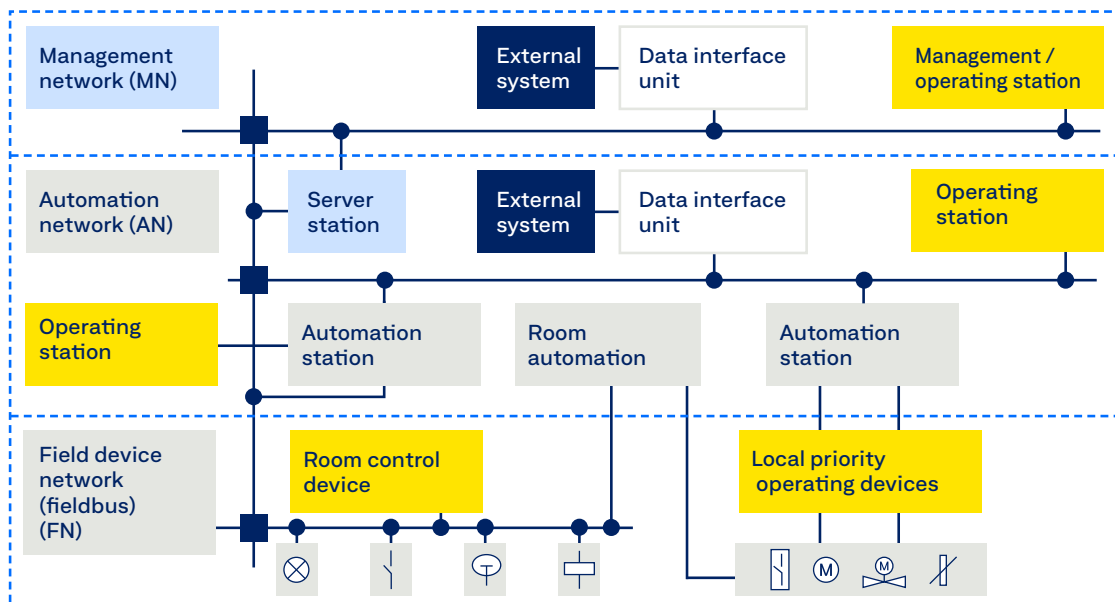
Collected data is visualised in a software programme, the building management system. This allows building operators to operate and monitor the building services. Building operators can also react appropriately to fault messages, for instance.

2. The middle level is the automation level:

Data collected on the field level is used to manage and regulate the building systems. To do so, information is summarised and evaluated on the automation level. Switch and positioning commands are sent back to the field level. However, they can also be transferred to all of the other levels in the management level.

3. The lowest level is the field level:

The building services (BS) like automation, emergency exit systems, smoke and heat extraction systems, hold-open systems, door closers, window technology, etc. are operated with so-called sensors and actuators, like smoke or movement detectors. The sensors collect data like temperature, moisture, smoke or movement, then transmit it to the actuators. The actuators convert the data into switching signals for the systems.



Structural model of the building automation in accordance with DIN EN ISO 16484

4 THE ADVANTAGES OF BUILDING AUTOMATION

How investors, building planners, operators and users can benefit from building management

Building automation can only be successful with interdisciplinary collaboration. However, coordinating multiple interest groups and all components and systems is a complex challenge. Coordination effort does pay off: everyone involved benefits from networked building systems technology, including investors, planners, operators, and users.



INVESTORS:

According to a study at the Biberach University of Applied Sciences ('Ensuring energy efficiency via building automation with respect to DIN V 18599 and DIN EN 15232'), investing in building automation pays off. The average amortisation time for building automation and control systems is just two to ten years. If requirements and consumption are recorded in a comprehensive way, it is possible to estimate potential savings in the planning phase. This can improve the overall value stability of the building.³



OPERATORS:

Energy monitoring allows operators to keep an eye on building operating costs continuously. In addition, building automation allows for ongoing energy assessments of systems and buildings. When all trades are integrated into the building automation and control system, operators also benefit from better operational reliability. In addition, they can adapt the functions of the building and expand communicative systems, resulting in better energy efficiency.



PROJECT PLANNERS:

Project planning coordinates all specialists involved, and handles structured planning. This allows different trades to coordinate early on. If the planning interfaces are clearly defined, the networked overall system can be ready for operation more quickly. Changes can be implemented more easily later on.



USERS:

BA improves overall user acceptance. Users understand the interactions between different functions and their effects, meaning they are more flexible in handling changes in use.

5 THREE APPLICATION SCENARIOS WITH MYGEZE CONTROL

How building automation improves building safety, comfort, and energy efficiency



The building management system as a monitoring solution can be used to handle a variety of application scenarios. myGEZE Control is a standardised, open communication solution that can be used to integrate doors, windows and safety into all areas of building management, regardless of the manufacturer of your building management system, physical security management and CAFM systems. In this way, myGEZE Control facilitates all-around efficient, sustainable and safe building management. Data is output as a standard over the certified BACnet communication interface.



SCENARIO 1: HIGHER BUILDING SAFETY THROUGH BUILDING MONITORING AND NIGHT MODE

The project type:

- Hotels, office complexes or industrial buildings of any size

The components:

- myGEZE Control
- Electric door drives
- Drives for windows and ventilation flaps

The initial situation:

Every night, facility management makes a complete round to ensure all windows and doors in the façade and inside are closed and locked. This manual task takes an enormous amount of work.

The solution:

The facility manager has a complete overview of which doors and windows are open and unsecured, and where lights are still operating, at their workplace, via the building management system software. They can use the central building management system to set the building to secure night mode with just a click. Since cleaning personnel are still in the building, they programme an automatic timer function that will re-activate night mode again later on. The facility manager can also access the building management system through their smartphone at any time.

The benefits:

- Better building safety
- Optimised facility management processes
- Cost reduction and optimisation



SCENARIO 2: MORE EFFICIENT BUILDING OPERATION FOR AUTOMATIC DOORS

The project type:

→ Hospitals, buildings in the healthcare sector, retail, hotels

The components:

→ myGEZE Control
→ Electric door drives

The initial situation:

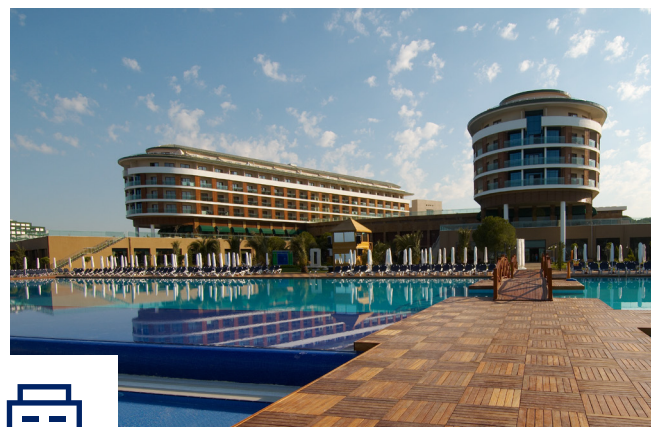
Often, physicians and nurses have to walk long distances inside hospitals. They pass through a large number of doors, since fire protection requirements are high, and many areas are separated from one another for reasons of hygiene and patient safety. To travel to the OR with a hospital bed in case of an emergency, nurses have to stop at every door to press the door opener.

The solution:

Door systems open and close automatically, meaning there is no need for the hospital bed to stop and start. All door systems are monitored by the building management. Facility management can proactively evaluate the function of all doors. Faults are reported in real time and with a complete description via email, SMS or smartphone app. Maintenance is simplified: frequent error messages indicate a failure, and the facility manager can initiate the needed maintenance quickly.

The benefits:

→ More efficient building operation
→ Barrier-free, safe access routes
→ Quicker transportation of goods and personnel through the building



SCENARIO 3: MULTIFUNCTIONAL USE OF SMOKE AND HEAT EXTRACTION SYSTEMS

The project type:

→ Office and industrial buildings, hotels, public and private buildings of all kinds

The components:

→ myGEZE Control
→ Smoke and heat extraction systems, MBZ control unit
→ Smoke detectors, fire pushbuttons, etc.

The initial situation:

Smoke and heat extraction systems are required for most buildings by law due to their size, form and use. Although smoke and heat extraction systems are used only in case of a fire, installation, operation and maintenance are nevertheless cost-intensive.

The solution:

The complete smoke and heat extraction system can also be used to provide natural ventilation. To do so, the building automation and control system exchanges data with a weather station and the layout plan of the building. Parameters for air quality and temperature are defined. If the limit values are exceeded, the automatic window drives are activated for indoor air conditioning to open the windows. Pre-defined night-time cooling is also possible, without using any energy. However, safety is always the priority: ventilation commands are ignored in case of a fire.

The benefits:

→ Climate-optimised building operation
→ Better energy efficiency
→ Enhancement to the building

6 THE GEZE SERVICE AND PRODUCT PORTFOLIO

Which products and services GEZE offers for smart networking

GEZE's portfolio of services includes project management, installation, commissioning and maintenance of building automation and control systems. Close collaboration with other building automation trades helps ensure the interoperability of all systems. GEZE handles project planning, and if desired partial project planning for door and window systems in buildings.

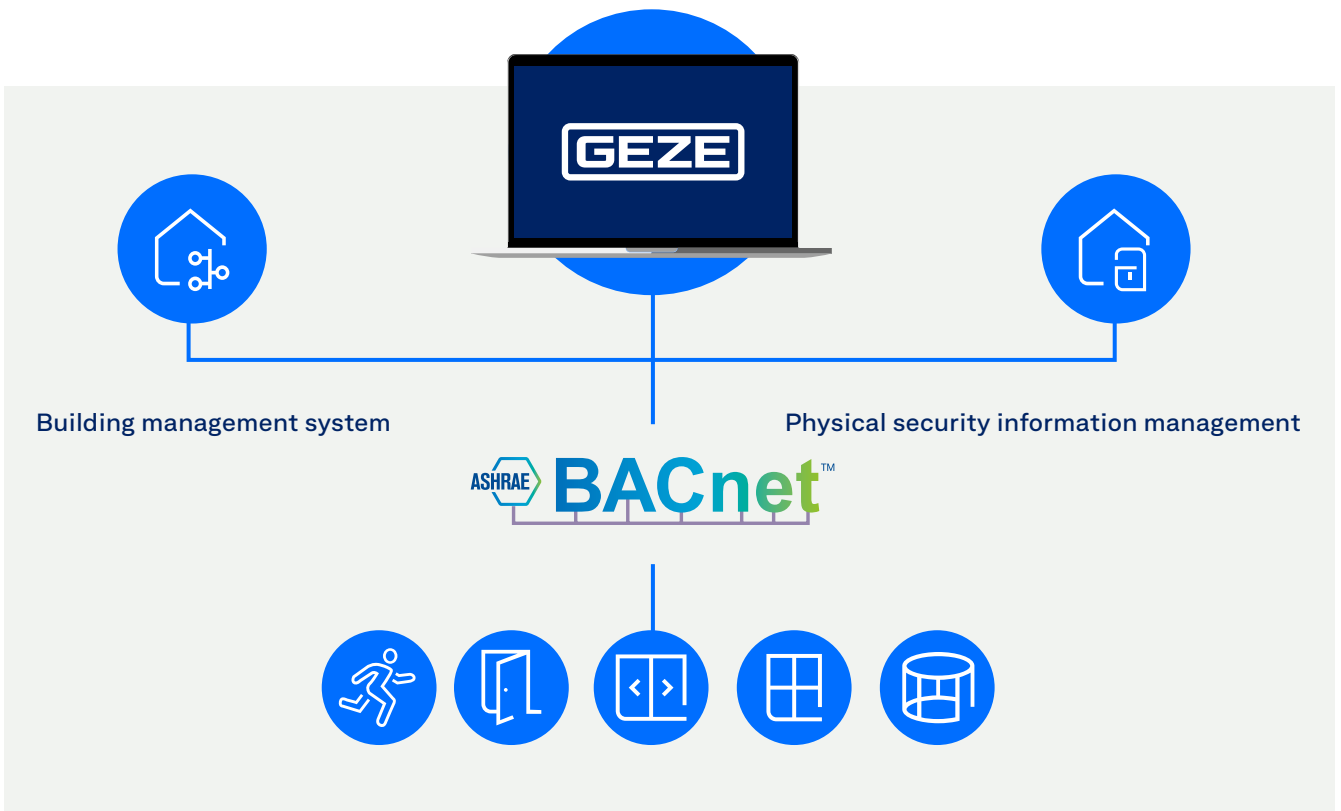
GEZE FIELD SYSTEMS FOR BUILDING AUTOMATION:

- Emergency exit systems (EES): GEZE TZ 320, 321, 322
- Automatic door drives: Slimdrive EMD, Powerturn, TS 325 NT, Revo.PRIME, Slimdrive
- Smoke and heat extraction systems: MBZ 300 (different versions)
- Intelligent window drives IQ windowdrive via IQ Box KNX: Slimchain, Powerchain, F 1200+
- Locking systems
- Additional products via I/O technology

POSSIBLE PROTOCOLS:

- CAN for integrating automatic and safety technology into the building automation
- The fieldbus for KNX building automation for the window technology
- BACnet as the joint communication medium for integration into the building management system

The control technology plays a central role in building management. That is why GEZE combines the two system areas into a building management system (BMS). Open integration ensures the interoperability of door, window and safety technology from GEZE with other parts of the BA.



7 THE FUTURE OF SUSTAINABLE BUILDING

Why building automation is the future of sustainable building

Building automation is a necessary step towards sustainable buildings and towards achieving climate protection targets. Integrating technological systems and controls in buildings helps reduce environmental impacts and promote sustainability. Automating different building functions like lighting, heating, ventilation, air-conditioning, safety systems and energy management makes it possible to operate buildings in a more energy efficient way. This reduces energy consumption, lowers operating costs, and reduces environmental impacts. In addition, user satisfaction and health are improved when automatically adapted lighting levels and temperatures ensure optimal indoor conditions.

Building automation is a promising future technology that combines ecological, economic and social aspects,

- Promoting a sustainable approach to building.
- Buildings are operated more efficiently.
- Their ecological footprint is reduced.
- Building usage is made safer.
- User comfort and well-being are improved.

However, it is important to note that building management alone is not sufficient to ensure sustainable building. It should be considered an integral part of a comprehensive approach which also includes choosing sustainable building materials, an efficient building envelope, good room planning and an awareness of the building life cycle. However, building automation can help achieve sustainability targets and make building operations more efficient and environmentally-friendly.

FURTHER INFORMATION



NETWORKING SOLUTION FOR DOOR, WINDOW AND SAFETY SYSTEMS

<https://connectivity.geze.com/en/>

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SOURCES

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²European Commission (2021), Energy performance of buildings directive, https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en (accessed on: 01/08/2023)

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