A RENOVATION WAVE FOR EUROPE – Greening Our Buildings, Creating Jobs, Improving Lives

Copper makes buildings a climate solution

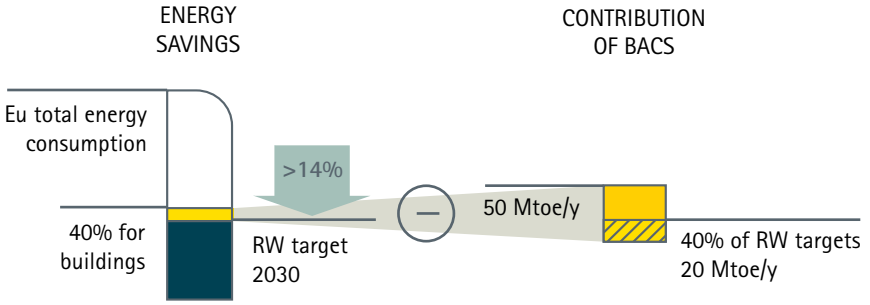
European Copper Institute
Copper Alliance

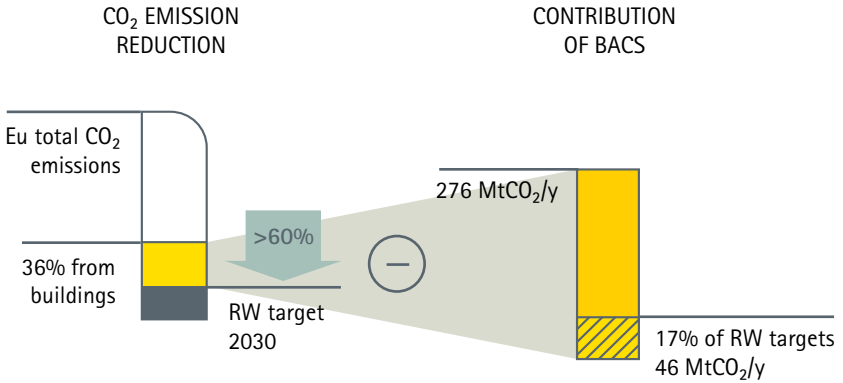
Building Automation: the missing link between carbon-neutral buildings and a smart and secure energy system

Building automation facilitates energy and carbon savings in multiple ways. It complements deep renovation, and it optimises the use of local renewables, of sustainable heating and cooling and of the smart grid.

Building Automation is sometimes called the 'sleeping giant' of the climate change mitigation: its widespread application, through a set of recommended policy measures, would achieve a total of 20 Mtoe of final energy savings by 2030. This equates to a reduction of around 46 MtCO2eq, or 17% of the EU Green Deal 2030 GHG emission reduction target.

The BACS requirements in the EPBD 2018 revision are a first attempt to awaken this giant, yet still too cautiously as many Member States have still not integrated these requirements into their national legislation; and even with all current provisions implemented a large potential remains untapped.





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The 2018 revision of the EPBD was a milestone in the EU's ambition to modernise and decarbonise its building stock: it introduced a mandatory roll-out of BACS functionalities in large non-residential buildings and incentivised them in residential buildings. It also established an optional common Smart Readiness Indicator.

Unfortunately, many Member States have not fully implemented this legislation. If the EU is serious about achieving its EU Green Deal targets, the contribution of its building stock cannot be over-estimated and the EPBD implementation should not be postponed any longer.

Further, the next revision of the EPBD is an opportunity to ensure that all buildings, new and existing, can play their pivotal role as active energy hubs in the smart energy system. The revision should therefore include provisions that

1. **really drive the digitalisation of the building sector**
2. **put buildings at the centre of the wider smart and secure (electrified) energy system**
3. **make electrical safety a prerequisite for a clean and just energy transition**
4. **are supported by standards that move beyond the lowest-hanging fruit options and promote operation-based energy performance.**

What is Building Automation?

- **Building Automation and Control Systems (BACS)** are any type of automated controls, from stand-alone thermostats and time switches to more advanced technologies such as automatic hydronic balancing.
- Stand-alone control systems can be integrated and interact with each other, when combined with appropriate software such as **Home/Building Energy Management Systems (HEMS/ BEMS**).
- Varying degrees of integration and sophistication are used so that the most appropriate system will vary in response to the building and usage characteristics.

Paid back in 2 to 5 years

Building Automation technologies are cost-effective for essentially all buildings. They are typical low capital investments (€30/m^2 in non-residential buildings and €12/m^2 in residential buildings – for procurement, installation and commissioning). The payback period is short: two to five years.

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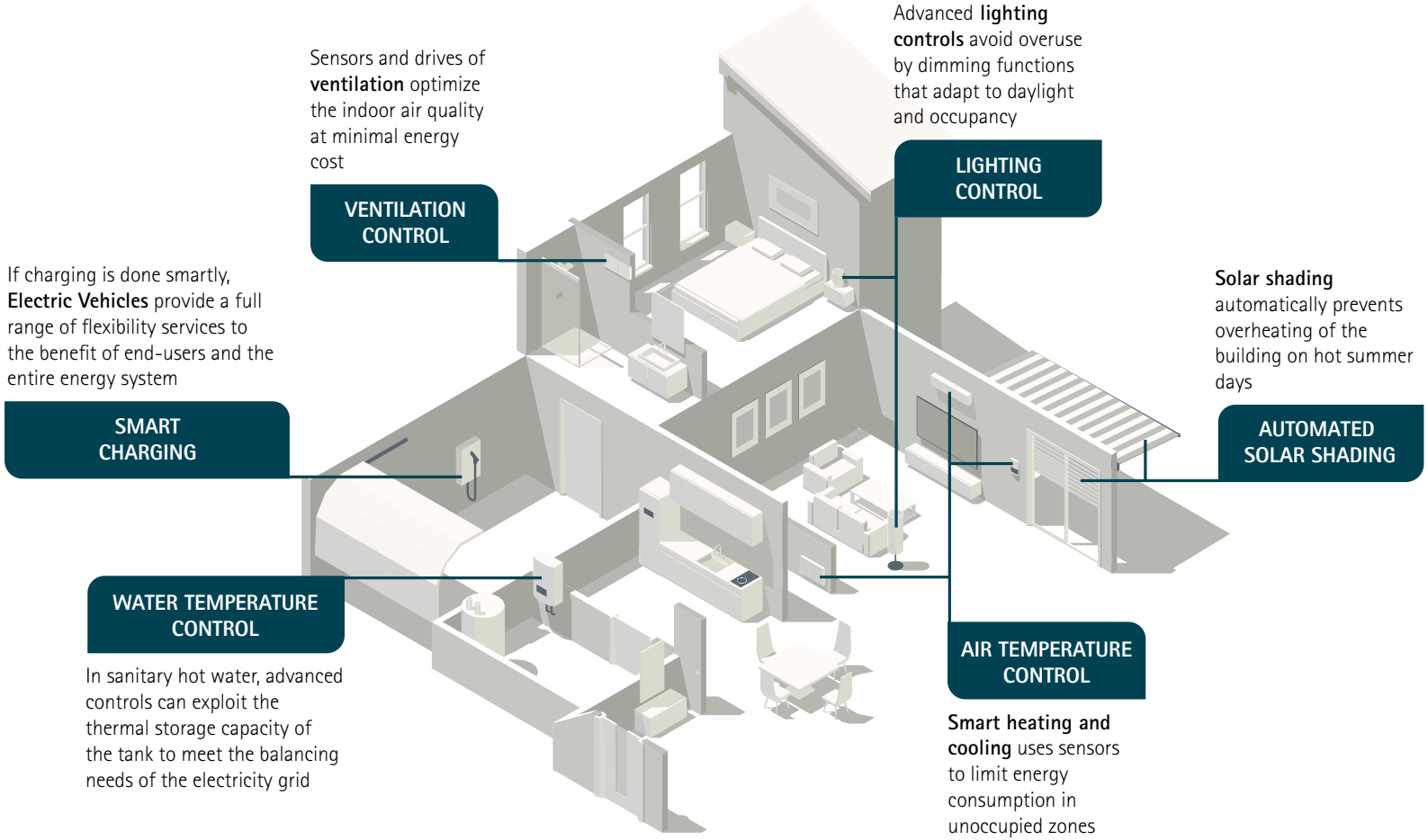
A modern building with various opportunities for energy saving controls



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How does Building Automation save energy?

1. **A centralised, concerted control of energy using equipment in a building ensures that the whole building works at the highest efficiency.** For example by avoiding that energy is wasted when ventilation starts up to cool a space when the heating has not been turned off.
2. **Monitoring and providing feedback encourages occupants to use less energy.** This ensures that the actual demanded energy corresponds to what was calculated based on the design of a nearly zero-energy building.
3. **Manage the load shifting and storage capacity of a building** to optimize on-site renewable self-consumption and to increase grid stability.
4. **Intelligence ensures that equipment only operates when, where and to the extent that is actually required**, such as anticipating weather forecasts, self-detecting user patterns, or tuning to room occupancy schedules.

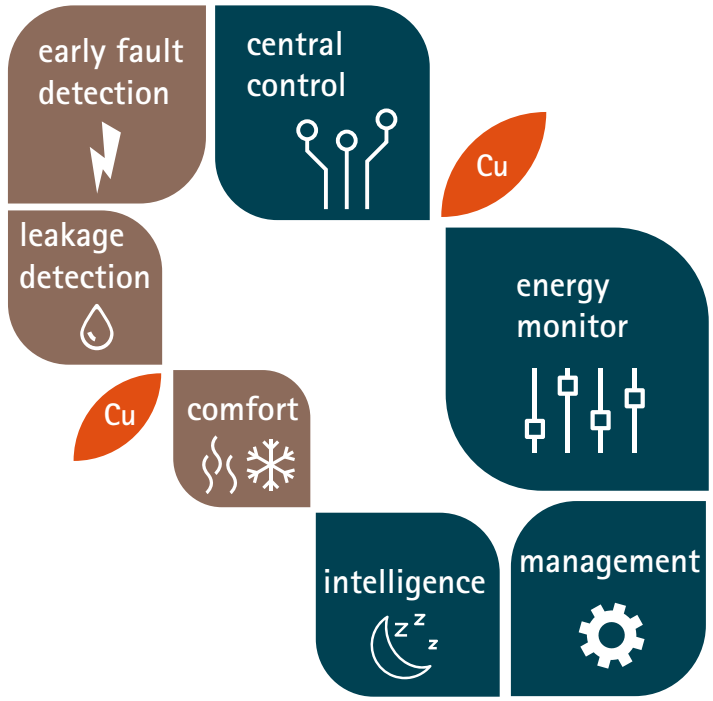
What other cost savings can Building Automation bring?

- Early fault detection reduces levels of wear and tear and the costs of maintenance, repairs and replacement
- Enhanced thermal comfort and indoor air quality increases productivity of occupants while reducing energy bills
- Failure alarms and alerts of wasteful and unintended operation avoids hidden energy leaks

How does copper contribute?

Copper provides reliability, cost-effectiveness, and interoperability to fulfil the functional requirements of a smart building.

Turning buildings into active energy hubs



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When automated, buildings become the energy hubs that play a key role in the decarbonisation of our energy system. They become part of the solution, rather than the problem of climate change. When connected to the smart energy system, buildings offer wider system efficiencies as they are able to flexibly produce, store and use energy.

The missing link in nZEB

Nearly zero-energy buildings (nZEB) require a well mastered equilibrium between minimized energy losses, internal gains and the remaining energy needs – an equilibrium that requires automated control systems to be reached.

Adequate basic infrastructure, such as safe and reliable wiring and connectors, is a foundation for the cost-effective implementation of smart technologies. It should be reflected in the Smart Readiness Indicator for buildings.

Complements deep renovation

All too often, energy improvement in buildings is only focused on the building fabric (such as insulation and glazing) and the installed equipment (like LEDs or high-efficiency boilers), but overlooks the opportunities in more efficient and dynamic operability. This is where advanced controls and automation enter the picture. Building automation can control a building's heating, cooling, air conditioning, hot water, lighting and many more systems more efficiently and so reduce the building's energy consumption and environmental footprint.

The revised EPBD should link renovation financing to deep renovation. Standards are needed that go beyond insulation and glazing. They should ensure decarbonisation of energy demand by live energy performance monitoring.

Deployment of building automation can be rapid and does not require major and inconvenient disruption of buildings.

How smart a building will be, in optimizing its energy use, adapting to occupant's needs and responding to grid signals, depends on the smart technologies and the underlying hardware infrastructure (cabling, sensors, actuators). All these technologies rely on copper as a safe, secure and circular material. The colour of 'smart' is copper.

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Overcoming the performance gap

Energy performance schemes and building codes over-estimate the energy performance of buildings. Building Automation technology bridges the gap between the calculated promises and actual achievements, by effectively controlling the energy using equipment, optimizing operational performance, and avoiding sub-optimal user behaviour.

Frequent updates and more dynamic use of Energy Performance Certificates (EPCs) would improve their value as a tool for end-users, de-risk investing & evaluate policy.

The revised EPBD should drive acceleration of digitalization and smartness of buildings. Inclusion of actual consumption data in the digital energy performance certificate EPC would make them more dynamic and informative, ensuring energy and CO2 savings.

Turning buildings into the cornerstone of smart grid deployment

Building Automation is a complement to smart meters and is crucial in the roll-out of buildings' interaction with the energy market (through onsite energy generation, storage and demand side flexibility).

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The Smart Readiness Indicator (SRI) for buildings is a key to make the EU building stock healthy, efficiency and smart. Member States should act immediately in ensuring the effective, ambitious and consistent implementation of the SRI across the EU.

Accelerate the market uptake of electric vehicles

An electrified car fleet will not only reduce greenhouse gas emissions, it will also enhance air quality in our cities. Most charging of electric vehicles takes place at home and at the workplace, gradually transforming buildings into charging stations for renewable electricity. Controlling demand from EVs in buildings can minimize grid congestion and the consequent upgrade investments, and would therefore speed up this transition.

The existing requirements set in article 8 of the EPBD should be complemented by mandating smart charging capabilities integrated in the BACS for all common new and renovated charging infrastructure in multi-family and non-residential buildings.

The massive roll-out of building automation over the European building stock will not introduce a massive additional copper demand. **In an average dwelling, 5kg of copper is used in sensor and control wires and actuators. But home and building automation is an enabler of copper-intensive technologies:** the smarter the building stock, the faster roll-out of EV, renewables, and electrical storage solutions. All of them relying on copper.