



Energy efficiency in buildings
A must, both economically and
ecologically



Protecting the climate is one of the greatest challenges of our time, and one which will affect the existence of future generations. Increased use of renewable energy is unavoidable, yet we also need to focus on using energy as efficiently as possible – and here there is huge potential for optimization. Today, just 20 % of the primary energy employed is actually used, for example as light or heat. This level of efficiency is far too low and must be improved.



What does “energy efficiency” mean?

Dealing with energy efficiently means:

1. using less energy to achieve the same result
2. using the same amount of energy to produce a better result.

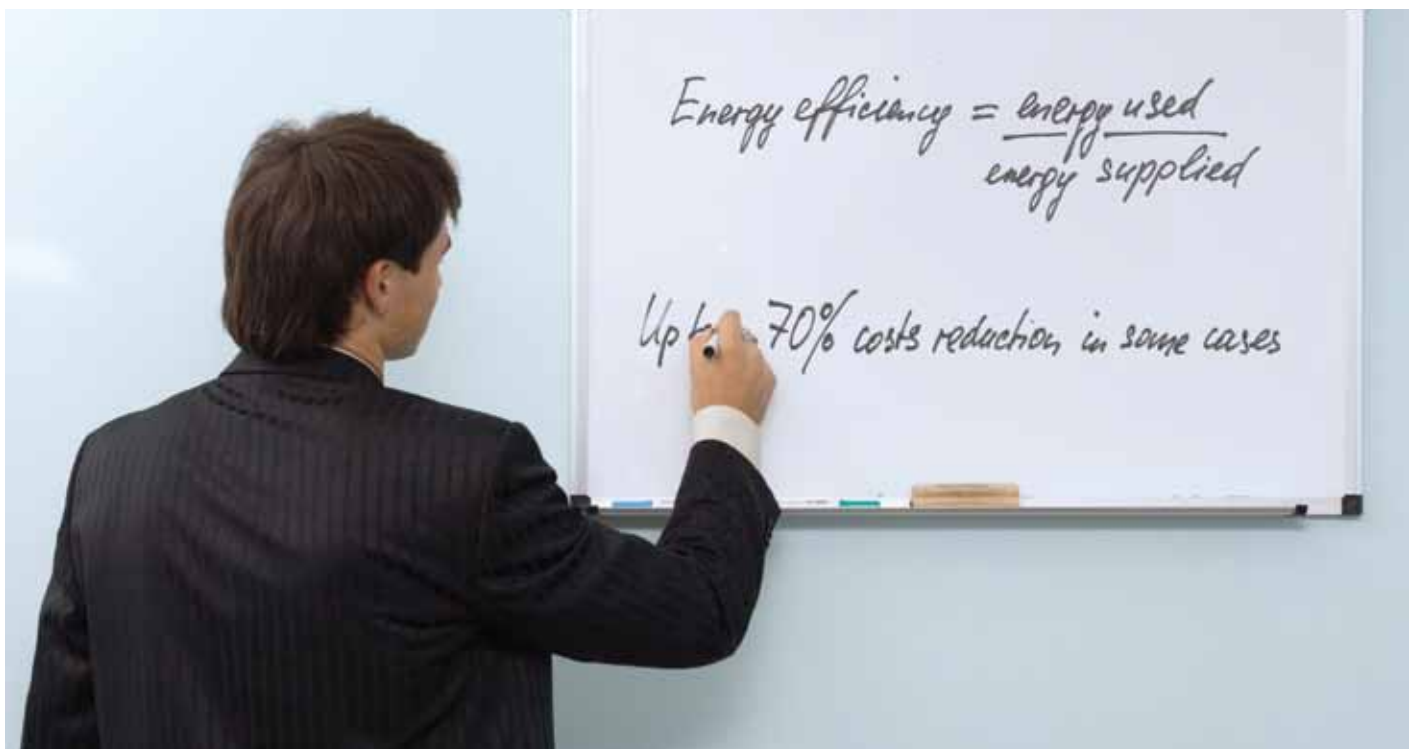
Or, to put it in mathematical terms:

$$\text{Energy efficiency} = \frac{\text{energy used}}{\text{energy supplied}}$$

This formula and its consequences are also becoming increasingly important from an economic viewpoint. The costs for electrical energy will increase considerably in future, both in private buildings and in commercial and functional buildings. As such, investments in energy efficiency will depreciate faster and faster through lower running costs.

ABB is one of the leading global specialists in the efficient use of energy. We give competent answers, from generating electricity through transfer and distribution, to consumption control in industry and buildings.

This brochure gives a specific overview of the last points.





Lighting and shading

Where there's a lot of light, there can also be shade

The energy-saving potential for electrical energy in buildings can be tapped with modern electrical installation systems.

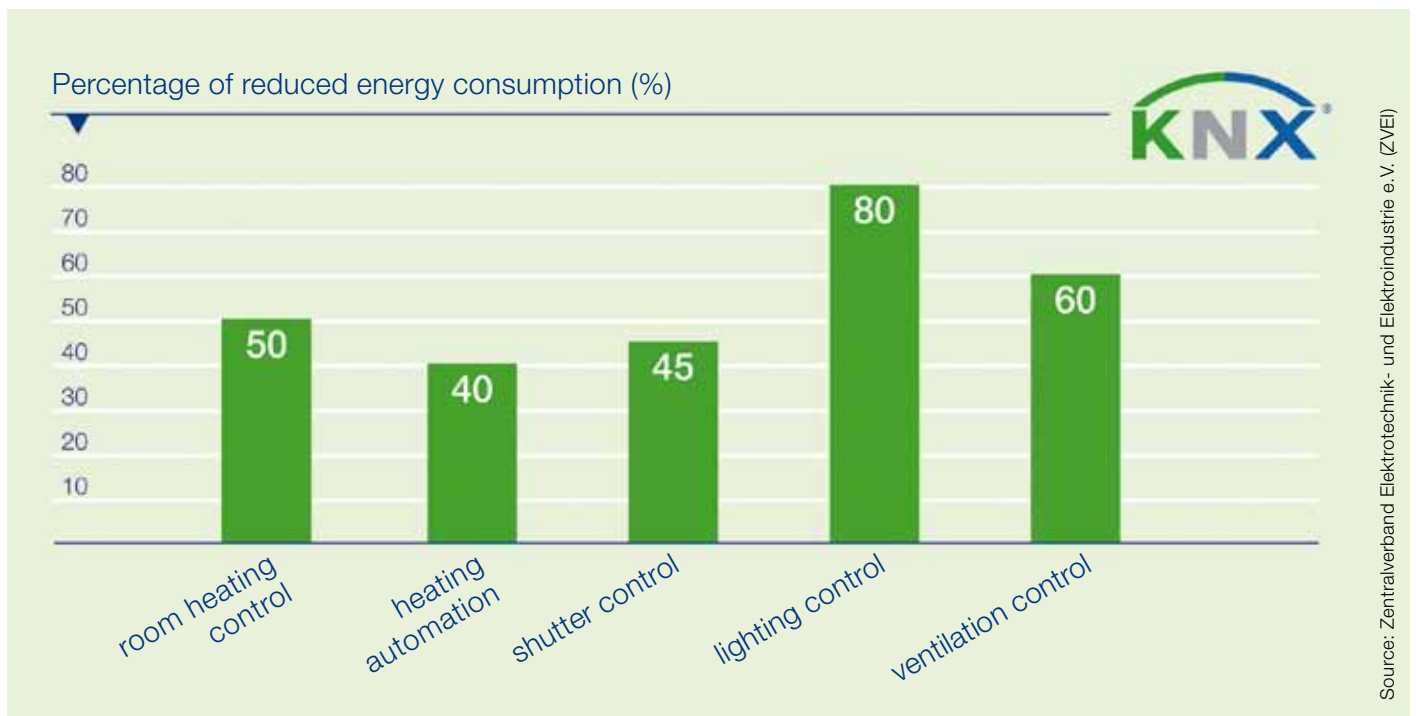
And this technology is already available in the form of the standardised KNX bus system (the global open standard for house and building installations) – tried, tested and efficient throughout the world.

The topics of “lighting/shading” and “heating/ventilation” can make particularly significant contributions to energy efficiency through ABB i-bus® KNX technology.

Bright ideas for energy savers

According to a ZVEI (Association of the German Electrical Industry) study, energy consumption for building lighting can be reduced by up to 80 % using intelligent building systems (KNX). Results of this magnitude can also be achieved in functional as well as larger commercial buildings.

Reduced energy consumption by using home and building control systems



Lighting control options

Occupancy-dependent lighting:

The simplest way to control lighting to meet your requirements depends on the presence of users in the room. The room is only lit automatically when someone is there.

Natural light-dependent control:

Light sensors detect the level of light outside; the indoor lighting is then adjusted to the desired level via a dimmer.

Combination of outside light, indoor light and blind controls:

An ambitious solution, but one which is highly effective in terms of energy conservation. Blinds are controlled to provide the room with light and shade as required depending on the outside light. When outside light levels are low, indoor lighting is automatically switched on.

Saving energy with blind control

During the heating season, the blinds are lowered at night to conserve the valuable warmth in the room. In summer, they close to keep out the strong sun and reduce the need for air-conditioning. At night, the blinds open to release heat.

Lighting and blind control are of prime importance in the KNX systems from ABB. We supply all necessary actuators, dimmers, detectors, light sensors, automatic switches, timer switches and operating elements.



KNX-flush-mounted motion detector



Heating and ventilation

Energy saving is warmly recommended

The second major consumer of energy in buildings is heating. And ABB can demonstrate impressive figures in this area, too.

The annual energy consumption for heating and ventilation can be cut by up to 45 %.

The simplest method is individual room temperature control combined with moderately reducing the room temperature. Energy savings of up to 6% can be made by lowering the temperature by 1°C depending on heating requirements and occupancy.



Room thermostat

Multiple possibilities...

There are several options available in addition to individual room temperature control:

- Time-dependent heating control
- Occupancy-dependent heating control
- Heating control dependent on the outdoor temperature
- Heating control dependent on the window position

... for control

Opening windows when the heating is on really burns up energy. You can put an end to this by monitoring the window position and incorporating this into the temperature control for each room.

A basic control mechanism for the heating in the building records the different heating requirements of the individual rooms and keeps the temperature constant in keeping with the time of day and requirements.

The measures are controlled and monitored via a user-friendly "on-board computer".





Lowering energy costs

Acting for costs and the environment

Drives and motors

In the last twenty years ABB has supplied millions of AC drives all over the world. One of the biggest benefits of using AC drives is the energy saving opportunity presented by using fixed speed motors or conventional speed control methods. The use of drives also enhances process control and improves air quality and convenience in buildings.

Some 40% of total electricity consumption in buildings is used in motor applications. The vast majority of these motors are employed in HVAC (heating, ventilation and air-conditioning) applications, mostly in fans and pumps. ABB AC drives used in HVAC applications can produce a remarkable improvement in energy efficiency and reduce energy consumption by as much as 80%.

For example, the ABB class IE3 motor – which is ranked in the top category for motors sold in Europe – wastes less energy in the form of heat and can operate at a much lower temperature than other systems. That's good for your pocket and the environment.





Technology optimises costs

Running at the right speed

Motors

The hallmark of ABB motors is reliability, efficiency, their long service life and lower maintenance costs. All this adds up to lower operation costs and a fast return on investment or payback.

The highly efficient 4-pole, 90 kW class IE3 motors from ABB (corresponding to IEC 60034) are an excellent example of this: they emit approx. 17.5 fewer tonnes of greenhouse gases than a motor with the lower IE2 efficiency rating. This is important for the environment. They are easier on the pocket, too. The purchase price of the motor corresponds to just 6 to 12 weeks of electricity consumption, while the capital costs represent merely around 1% of the total life cycle costs. In other words, ABB class IE3 motors ensure a fast energy payback time.





Saving by investing

Driving down the costs

Drives

Often motors run constantly at a fixed speed or with stop and start as power demand varies. This is not efficient! For example, stop-start consumes large quantities of start-up current. At ABB we offer the Variable Speed Drive Control for electrically-driven systems such as pumps, fans and compressors. These controls enable motors to run efficiently at optimal speed as it is required. In this way the machine speed is adapted to actual needs and that means energy consumption is optimised, with costs being lowered as a result.

ABB drives are famed in the industry for their reliability and cutting-edge technology, which often result in remarkable cost savings due to their improved energy efficiency. The energy savings achieved by ABB drives in pump and fan applications are typically at least 20% to 30%, whereby even a 20% reduction of motor speed leads to a 50% saving in the energy bill. The scale of these savings means that the payback time for the investment is relatively short, typically less than a year.

The ABB standard drive for HVAC is the AC H550, which is specially designed for use in HVAC applications in buildings. This drive offers pre-programmed user macros and assistants for several HVAC applications.

ABB offers energy-saving PC tools for calculating energy costs and the investment payback time. The ABB standard drive for HVAC comes complete with inbuilt energy calculators for easy monitoring of the savings made throughout the drive's service life.



Moreover, it is the only drive on the market to meet the new European standard for electromagnetic compatibility and limited harmonics. The result is more than 300,000 sold worldwide. And that means a lot for the pocket and more for the budget.

Finally, a mini-case-study to put things into perspective: recently a manufacturer installed an ABB drive on one of his fans and found that he could achieve a speed reduction of approx. 20%. This lowering of the speed resulted in a saving of power from 118 kW to 51 kW. And that means an annual energy saving of 586920 kWh.



Contact

Your ABB partner



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