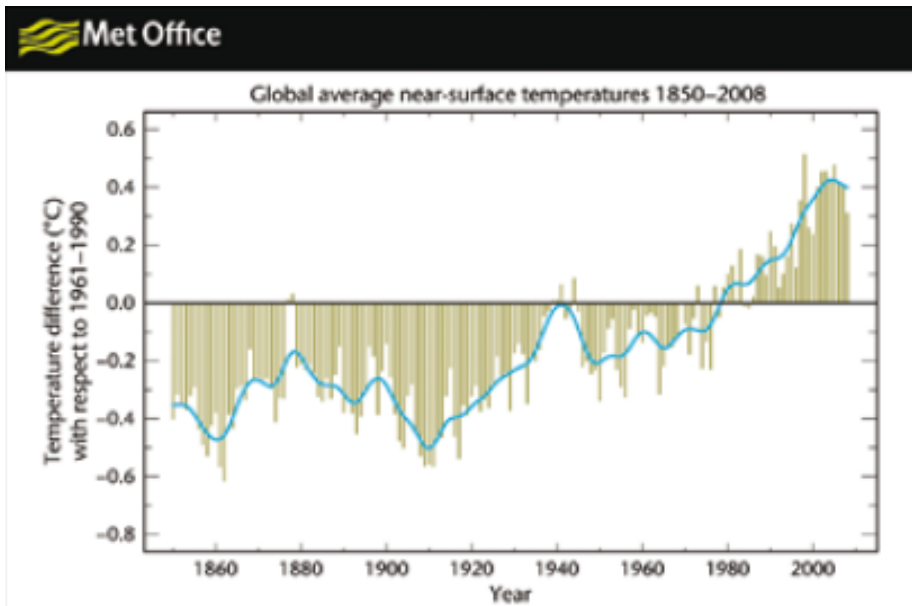




Smart Home and Intelligent Building Control (KNX) Energy Efficiency in Buildings

Energy Efficiency in Buildings

Energy Efficiency – a key factor for Climate Protection

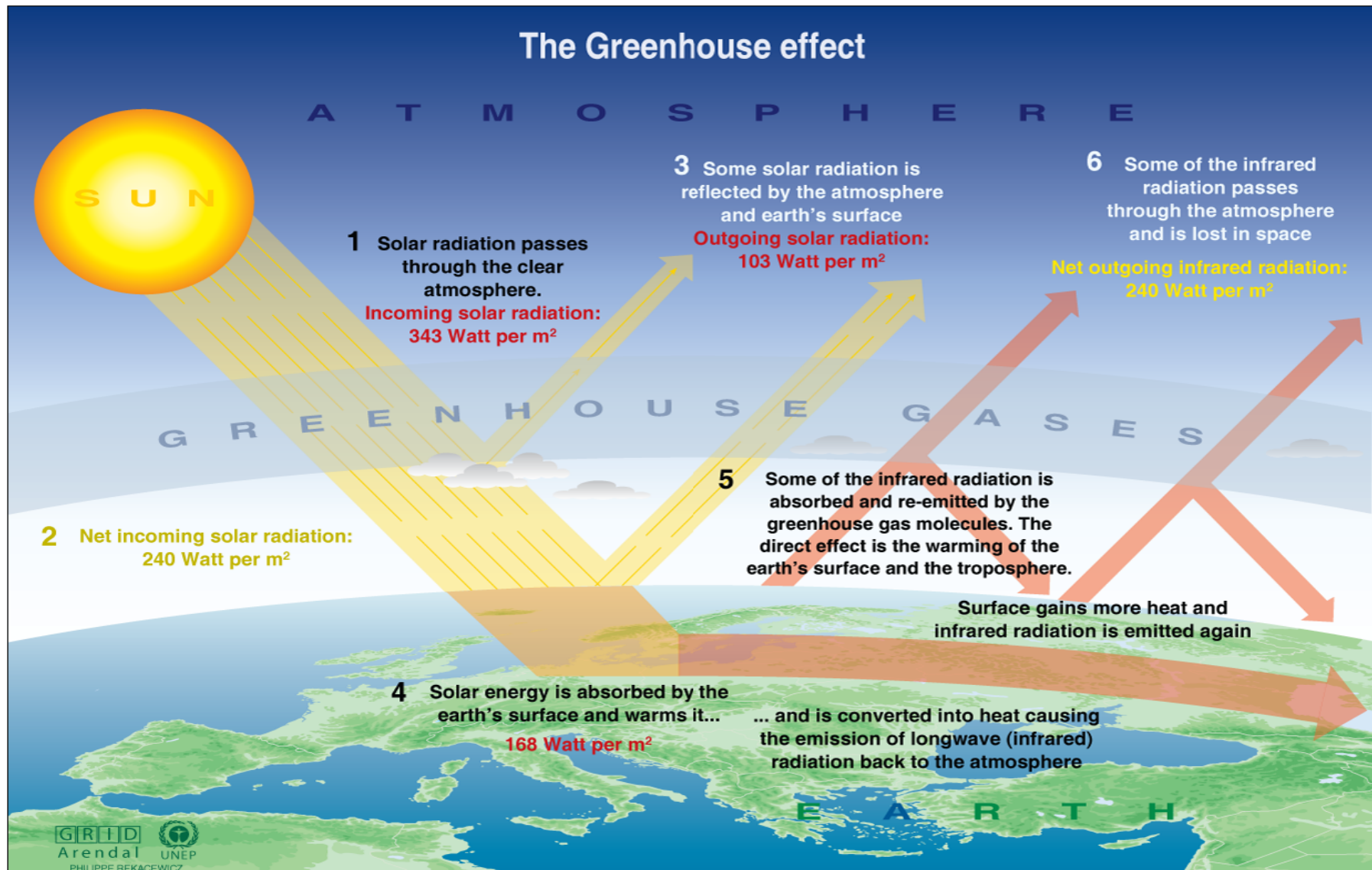


Source: Hadley Center for Climate Protection and Research

- Global warming represents presently the biggest threat to mankind
- At the heart of Global Warming lies the so-called greenhouse effect, caused by the emission of greenhouse gases.
- CO₂ with 50% is the biggest contributor to the greenhouse effect and is generated when burning fossil fuels (coal, oil, gas etc.) for the generation of energy

Energy Efficiency in Buildings

The Greenhouse Effect



Source: UNEP United Nations Environment Program

Energy Efficiency in Buildings

Natural Disaster as a consequence of Climate Change?



Heavy rain and storms



Extremely hot and dry periods



Source: Mediathek N-TV.DE

Energy Efficiency in Buildings

Climate Change- the World's most endangered Countries

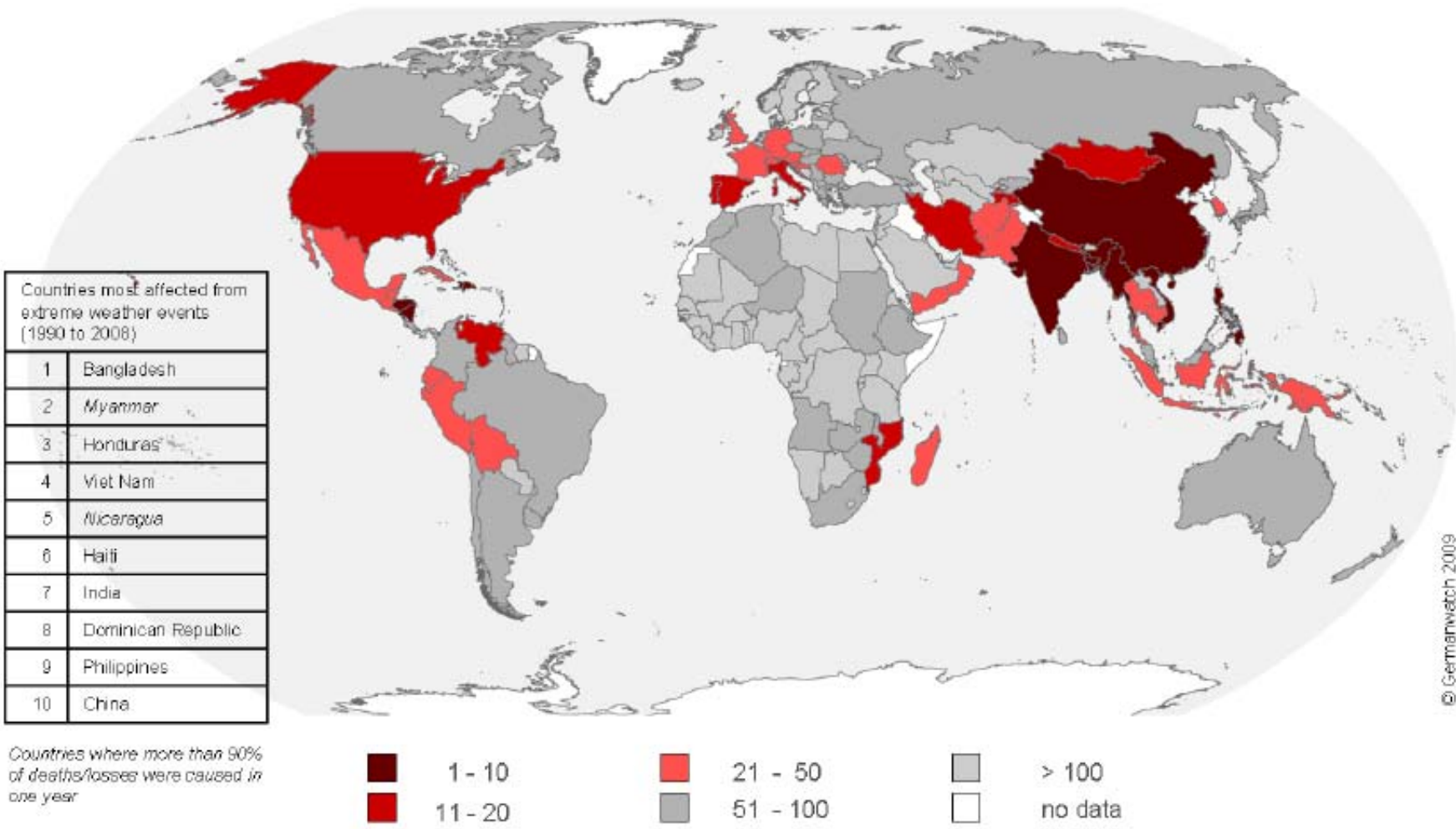
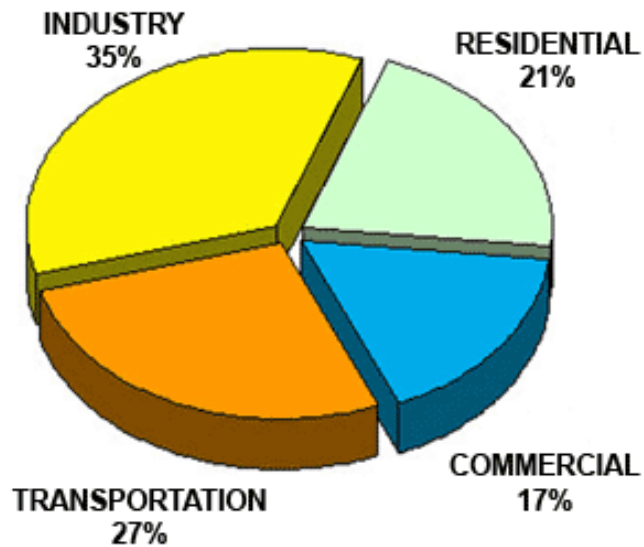


Figure 1: World Map of the Global Climate Risk Index 1990-2008
 Source: Germanwatch and Munich Re NatCatSERVICE®



Energy Efficiency in Buildings

How to counteract global warming?



Source: www.architecture2030.org

- CO₂ is responsible for 50% of manmade greenhouse effect
- Buildings have the biggest share of the worldwide primary energy consumption
- Depending on local conditions the 'Energy-Share' values range from 38% in the USA up to more than 50% in Singapore
- 50% of the distributed electricity is used in buildings
- Electricity generation today represents 31% of total global fossil fuel use and around 40% of all energy-related CO₂ emissions
- As such, measures to increase the energy efficiency of buildings can make a considerable contribution to energy saving and global climate protection

Energy Efficiency in Buildings

The Driving Forces behind Energy Efficiency

- Kyoto Protocol, reduction of CO2 emissions (until 2012 reduction by 5% in comparison to 1990)
- Decision of EU in 2007 to reduce CO2 emissions until 2020 by 20%
- Target of the German federal government to save 20% of primary energy in the next 10 years and 9% of final energy until 2016
- Worldwide „Green Building“ initiatives, e.g. LEED (Leadership in Energy and Environmental Design) in USA, CRC (Carbon Reduction Commitment) in UK, etc
- National/regional standards, e.g. European Standard EN 15232 Energy Performance of Buildings, “Impact of Building Automation and Controls” or EU’s Energy Performance of Buildings Directive (EPBD)
- Economic pressure to save energy due to increasing prices for oil, gas, electricity as well as to protect the environment

Energy Efficiency in Buildings

Measures to increase Energy Efficiency in Buildings

- 1)** Constructional measures to the building shell of existing buildings
 - Big savings, but long payback period
 - typically 10 ...40 years

- 2)** Modernization of Heating / Cooling Systems
 - Savings in the medium range
 - Payback period typically 5 ...15 years

- 3)** Application of Intelligent Building Control Systems with ABB i-bus[®] KNX
 - Savings in the two-digit %-range
 - Payback period typically 1 ...5 years

Energy Efficiency in Buildings

What do we mean by Energy Efficiency in Buildings?

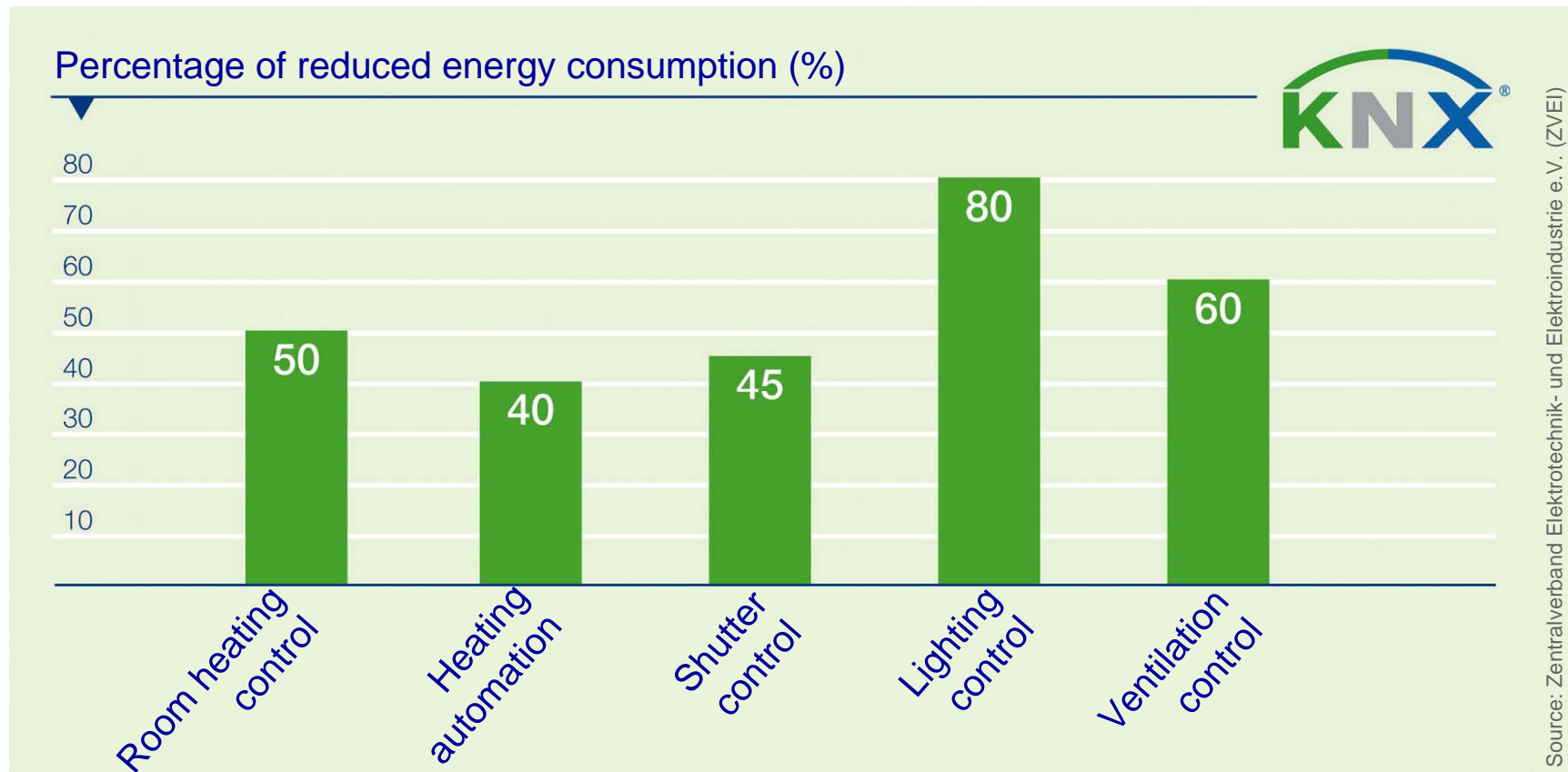
- 1) Use energy only when really required
-> e.g. by means of presence detectors

- 2) Use only that amount of energy that is actually needed
-> e.g. by constant light control

- 3) Promote 'desirable' and minimize 'undesirable' external factors affecting the energy balance
-> e.g. by shutter control

Energy Efficiency in Buildings

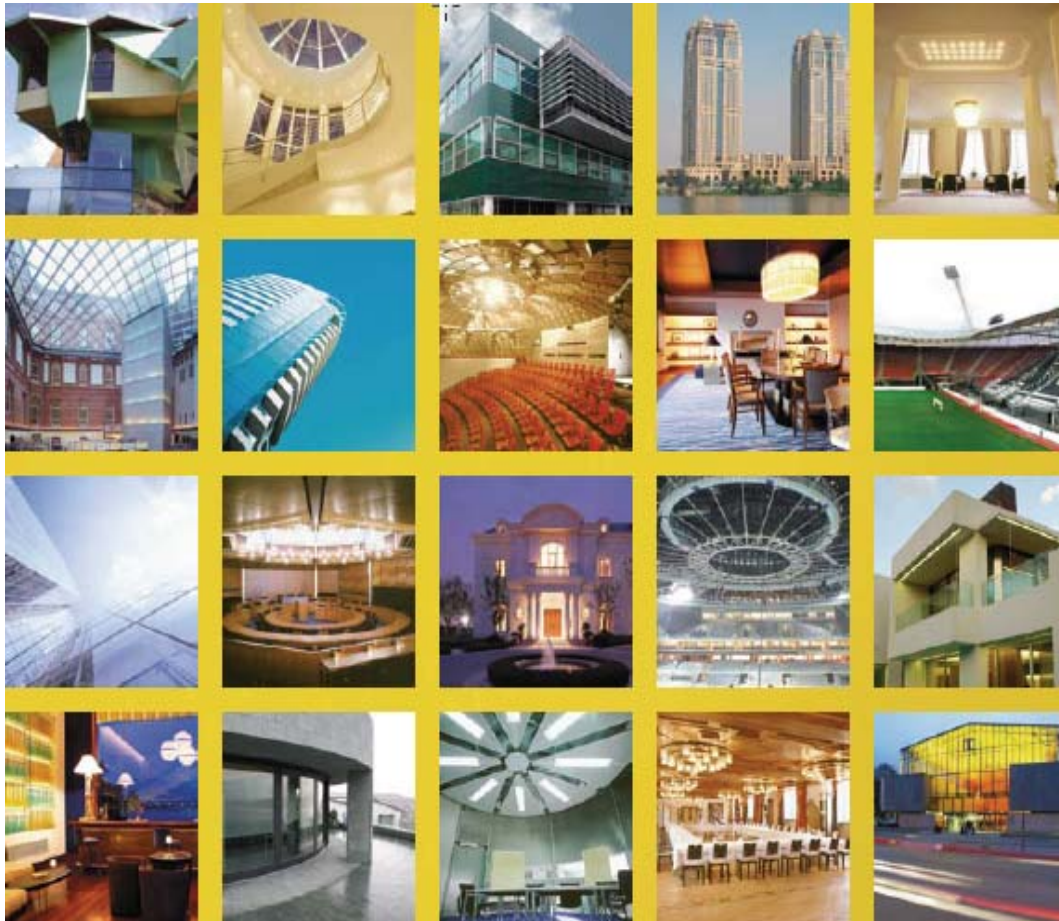
Possible Savings with KNX Intelligent Building Control



Literature research of the University of Applied Science Biberach on behalf of the German Electrical and Electronic Manufacturers' Association (ZVEI FA 7.12)

Energy Efficiency in Buildings

Building Types



- Office Buildings
- Apartments/Villas/Flats
- Hotels/Restaurants/Hospitals
- Exhibition Centers
- Sport stadiums
- Museums / Churches
- Schools / Universities
- Banks
- Airports
- Industrial Facilities
- Shopping centers

Installed worldwide in thousands of projects in more than 60 countries

Energy Efficiency in Buildings

Application Areas



- Lighting control and regulation
- Control of heating, ventilation, cooling
- Blinds and shutter control
- Security and monitoring
- Energy and load management
- Visualization and operation
- Central automation
- Remote control / maintenance
- Interface to other control systems
- Movement detection

Energy Efficiency in Buildings

ABB i-bus[®] KNX Product Range



Energy Efficiency in Buildings

ABB i-bus[®] KNX Product Range



Energy Efficiency in Buildings

ABB i-bus[®] KNX Product Range



Energy Efficiency in Buildings

ABB cuts energy costs in Singapore

ABB i-bus, has helped several landmark buildings in Singapore cut energy consumption and win industry awards for energy efficiency and low environmental impact.

Several of these installations have recently won best-performance awards for energy efficiency and environmental friendliness from the Singapore Government and ASEAN (Association of Southeast Asian Nations).



For the occupiers they have brought massive energy savings estimated at 17 percent or around US\$ 370,000 a year.

The 59,000 square meter National Library building, Singapore.

Energy Efficiency in Buildings

Secondary School in Bezau, Austria

Depending on the daylight, shutter actuators control in the class rooms the louvres and presence detectors switch on the lighting partially or in total. The set points of the room thermostats are controlled by timers according to the occupancy.



Shutter control in combination with the ventilation system maintains a comfortable ambient temperature, which even in summer will not exceed 21°C.

By using ABB i-bus[®] KNX in combination with the refurbishment of the building shell the total energy consumption could be reduced from 160kWh/m² p.a. to ca. 25 kWh/m² p.a.

User/Investor: Gemeinde Bezau
Specifier/Consultant: Elektro Willi

Energy Efficiency in Buildings

School Center Neckargemünd, Germany

The school center – built in 2003 – has total floorplan of 14,000 square meters. 525 KNX devices control the lighting depending on the outside brightness and the presence of persons. If a room is not used, the blinds remain open in winter and closed in summer time to increase useful thermal transfer



By structural measures and the usage of an intelligent and networked lighting and blind control the energy consumption in the new building was reduced to 1/3 of the previous value.

User/Investor: Stadt Neckargemünd
Specifier/Consultant: Gantert & Braun

Energy Efficiency in Buildings

ABB-Building in Odense, Denmark

The building comprises in total of 123 rooms on three floors. The KNX installation consists of 14 lines with a total of 645 devices. Besides the automation of the heating and cooling system (presence and timer controlled) special emphasis was put on constant light control.



In the open-plan offices a 'before and after' comparison of the consumption measurements showed savings of 13% in the electrical energy used for lighting purposes.

User/Investor: ABB/Ejendomsaktieselskabet Goyernes Gaard
Specifier/Consultant: Lillibaelts Gruppen

Energy Efficiency in Buildings

Museum „Arte Moderna“ in Rovereto, Italy

The museum forms part of the most important exhibitions of modern art in Italy. KNX technology is mainly used to control the lighting according to time and outside brightness as well as to easily activate so-called light scenes.



User/Investor: APE

Specifier/Consultant: CUnEdI der Universität von Trient

The comparison before (2006) and after the KNX installation (2007) shows energy savings of approx. 28%. The consumption of electrical energy has been reduced by more than 38,000kWh per month.

As such within the first year of using the KNX system the museum had already saved around 80,000€.

Energy Efficiency in Buildings

Conclusion

- Energy efficient buildings can contribute significantly to energy savings and thus global climate protection.
- ABB is a leading company in the area of Smart Home and Intelligent Building Control based on the KNX-Technology
- ABB i-bus[®] KNX is based on the worldwide standard ISO/IEC 14543 (HBC) as well as on EN 50090 (HBES) and comprises of all relevant products necessary to enable a sustainable decrease of the final energy consumption in new and existing buildings.
- ABB has in the last 25 years gained a wealth of experience from thousands of successfully realized projects in more than 60 countries worldwide

Energy Efficiency in Buildings

Further information

Further information about Energy Efficiency in Buildings with ABB i-bus[®] KNX is available from

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