Energy Efficiency Drivers in Europe

Regulations and other instruments open new horizons for Energy Management in buildings

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HOMES programme

Schneider Electric

HOMES is a four-year research programme (2008-2012), supported by OSEO and coordinated by Schneider Electric.

It brings together 13 industrial and research partners.
Together, they will build energy efficiency solutions for:
> Tertiary (offices, businesses, hotels, etc.) and residential sectors
> New, existing and renovated buildings

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Executive Summary

As a leader in Energy Management, Schneider Electric has an important role to play in meeting the critical energy efficiency challenge facing our society. To succeed, we must be fully aware of existing and future energy efficiency drivers in order to develop and market compliant solutions that will help achieve the goals that have been set.
This White Paper provides an overview of present energy efficiency drivers, their implications and perspectives for the future.

Curbing climate change and global warming will be one of the major challenges of the 21st Century. The very survival of our society could be at stake. Greenhouse gases including CO_2 have been identified as the culprits and the vast majority of industrialised countries have agreed to cut emissions drastically over coming decades. Buildings account for nearly 40% of the energy used in most countries and are responsible for a similar level of global CO_2 emissions. Energy efficiency in buildings is therefore one of the keys to reducing greenhouse emissions.

The main driving force to achieve the ambitious goals that have been set for the reduction of greenhouse gases will come from energy efficiency regulations, building codes, standards, labels, certifications, obligations and incentives, all of which have been multiplying steadily over recent decades.

International institutions are rolling out energy efficiency directives and standards that set minimum requirements for buildings. They are gradually being taken into account in national regulations and building codes. Today, most energy efficiency regulations concern building design. They hardly touch on Energy Management aspects that can generate major operational gains with relatively low investments and quick payback.

Beyond regulations that focus on minimum requirements, environmental performance labels use building rating criteria that can take energy efficiency much further. They offer a practical way of assigning value to energy efficiency and in this way represent powerful market drivers. Moreover, the important benefits of Energy Management can be easily integrated in the rating criteria of these far-reaching schemes.

Indeed, through effective building measurement, monitoring and control systems, Energy Management is one of the keys to rapidly reducing carbon emissions and achieving climate change targets.

Context

Energy efficiency: we must act quickly!

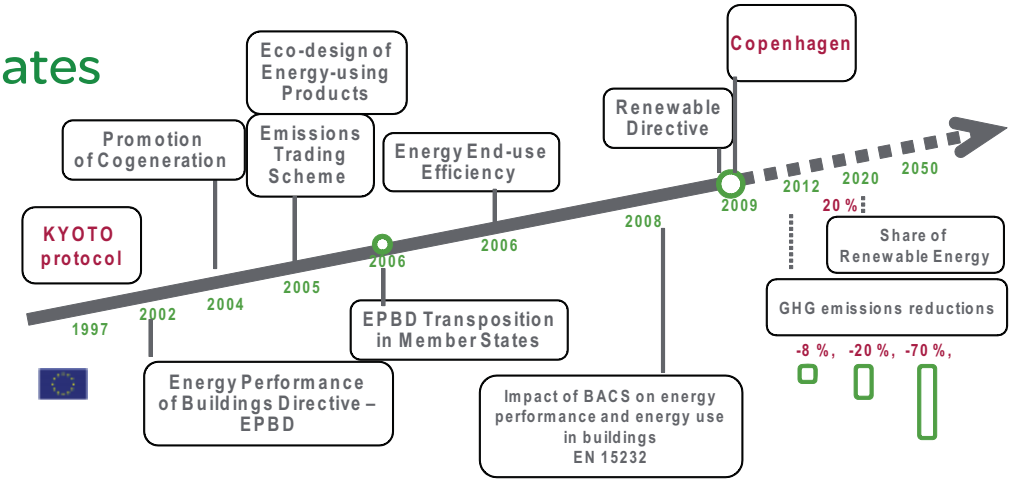
In the 1990s, gradual acceptance of the need to reduce greenhouse gases to avoid global warming and ratification of the Kyoto Protocol by many countries put energy efficiency on the agenda for inclusion in building codes and dedicated standards - just like building safety and occupant health.

On a broader scale, the European Union began an Emission Trading Scheme in 2005, the first concrete action taken towards achieving the greenhouse gas emission caps for the 2008-2012 period set by the Kyoto Protocol.

The 2009 Copenhagen Conference of the Parties (COP15) organised by the United Nations represents a crucial milestone in the battle against climate change, the last chance for governments to agree to a new climate protocol in time for approval and ratification before the Kyoto Protocol expires in 2012. The United Nations-led "Seal the Deal" initiative aims to galvanise political will and public support to reach a comprehensive global climate agreement during the conference.

It also comes at a time when the Intergovernmental Panel of Climate Change (IPCC) has stressed the need for quick action in their last report. We will be counting on governments to react and follow through with consistent new and tougher measures to reduce energy consumption, in particular in buildings.

Key dates



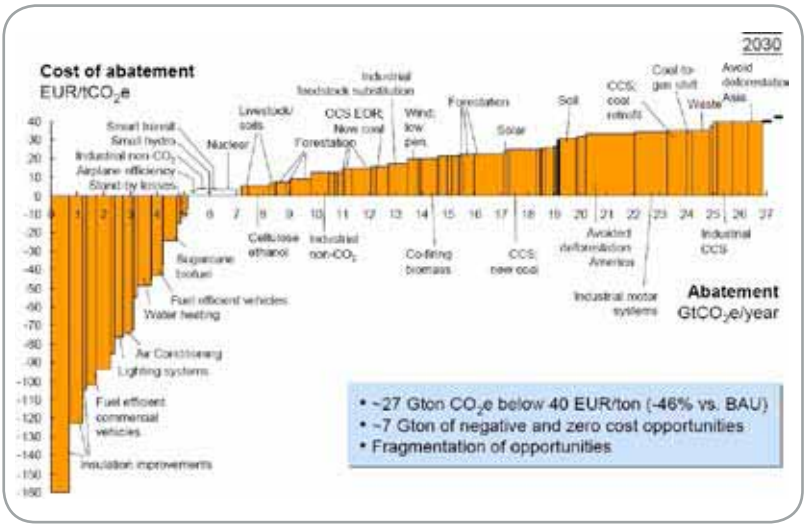
Focus on buildings

Commercial and residential buildings are widely accepted to account for about 40% of the world's energy consumption and a similar level of global CO_2 emissions.

The Fourth Intergovernmental Panel for Climate Change Assessment Report identified buildings as having the highest greenhouse gas mitigation potential of all economic sectors reviewed.

40%

of energy is consumed by buildings.



The illustration represents the cost of a 1 tonne reduction in CO_2 by different kinds of measures. Note that solutions concerning buildings all have a negative cost, i.e. the resulting savings over the period considered cover the required investments.

Source: McKinsey for Vattenfall, 2007

Over and above the present economic uncertainties in everything from energy prices to investment opportunities, a number of factors act as barriers to energy efficiency improvements. Moreover present directives and most regulations focus on building design aspects and omit the gains that can be achieved throughout the operational life of the building by improved Energy Management.

Note that the required measurement, monitoring and control systems call for relatively low investments and offer a quick payback.

Barriers:

Examples include conflicting interests, lack of information, lack of incentive, policy distortions and psychological factors.

What can be done

The main drivers that lead the way to improved energy efficiency are:

- Regulations including national building codes and standards along with international directives and standards that drive and harmonise their national counterparts.
- Energy labels and certifications for low energy and green buildings
- White certificates and legal obligations placed on energy suppliers
- Other incentives including loan support, grants or direct subsidies and fiscal measures such as tax reductions.

We will now take a closer look at each of these drivers to assess their present status, the degree to which they take Energy Management into account and their perspectives for the future.

Driving forces:

> Regulations

> Energy Labels and Certification

> White Certificates

and Energy Supplier Obligations

> Incentives

> Regulations

National building codes and standards

In the past, building codes and standards were implemented at a country, regional or local level to ensure construction safety, fire safety and a healthy environment for occupants. Prior to the 1973/74 oil crises, energy efficiency regulations existed mainly in the building regulations of the northern countries and dealt essentially with insulation levels. Since then, energy efficiency measures have been included in the building codes and standards of most developed nations, either to reduce energy consumption or to reduce CO_2 emissions in response to the Kyoto Protocol or other targets often set by international directives or standards. Today such regulations are being increasingly implemented in developing countries, in particular India and China, in order to increase comfort or reduce energy consumption.

Some countries favour the integration of energy efficiency in general building codes, others in separate energy standards or a combination of the two. **In all cases, these regulations stimulate the development and marketing of new products and techniques which are in turn used by builders in their projects.**

Policy/regulation developments regarding buildings and appliances

Region	Important developments
Europe	EU Directive on the Energy Performance of Buildings 2002: requires energy pass which will increase transparency on energy use by tenants
	Specific measures announced in several European countries (France: goal to double the number of buildings renovated each year).
	Eco-design directives: include labelling requirements and minimum energy performance standards for appliances and other energy-using equipment
	EU plans to ban the sale of ordinary incandescent light bulbs by the end of the decade.
US	US 2005 Energy Policy Act: incentives e.g. credits for high-efficiency air conditioners or insulation and sealing.
	Energy Independence and Security Act (2007): reduction of light bulb energy use: 25-30% by 2012-2014; 70% by 2020
Asia	"Comprehensive Action Plan for Energy Saving and Emissions Reduction" by Chinese NDRC (June 2007): better enforcement of building codes, energy conservation level of residential and public buildings targeted to be close to or reach modern medium developed countries level by 2020

Unfortunately, few countries have yet set up the necessary inspection means to ensure that energy efficiency regulations are complied with. This is true for building design aspects intended to reduce energy losses, such as improved insulation, glazing, etc., **and even more for Energy Management measures aimed at reducing energy consumption through measurement, monitoring and control of energy usage.**

International trends in energy efficiency requirements for buildings

Over the past decade, supranational energy requirements and standards have seen the day in all parts of the world, for instance the International Energy Conservation Code for residential buildings in the US and Canada or a number of directives of the European Union that will be discussed below. These requirements and standards drive national building codes and standards and contribute to the harmonisation of action taken.

A good example:

The 2000 version (RT2000) of the French RT thermal regulations that cover wall insulation, ventilation, heating, air-conditioning, hotwater heating and lighting reflected French standards and practices that existed at the time. The present version (RT 2005) was updated in 2005 to cover the requirements of European directives. The next phase (RT 2012), is presently in preparation and will go even further in this direction.

European Directives: a framework for building regulations

The directives define energy efficiency mechanisms and principles that must be implemented by each Member State, providing a framework for building regulations. However, given the urgency of the necessary action against climate change and the variety of climatic conditions, technologies, practices and legislative structures throughout Europe, the way they are implemented is left up to each country. That being said, many Member States already use the related European standards to some extent and all expect that it will be possible in the future to refer their national legislation to the European standards.

They provide a set of reference standards that oblige the different countries to include energy efficiency in their regulations and update them regularly based on technological progress while at the same time harmonising the national regulations towards a European system.

EU Energy Performance of Buildings Directive

The most important EU directive for energy efficiency in buildings is that on the Energy Performance of Buildings (EPBD 2002/91/EC).

The main objective of the EPBD is to define a holistic approach to promote cost-effective improvement of the overall energy performance of buildings.

http://www.buildup.eu/

EPBD requirements

The present EPBD sets three types of requirements that must be implemented by EU Member States:

- **Minimum energy performance requirements** for new buildings and for large existing ones that undergo major renovation with the aim of achieving improved energy performance, thermal comfort and lower energy bills.
- **Energy performance certification** that provides information on the energy needs of a building and on what can be improved. It should be presented to potential buyers/tenants so that they have an independent assessment of the energy-use aspects of the buildings, enabling informed decisions to be taken. An energy performance certificate is required only when buildings are newly constructed, sold or rented out and is valid for a maximum of 10 years.
- **Inspection** of medium- and large-size heating and air-conditioning systems at regular intervals so that their energy performance can be monitored and optimised. On the basis of this inspection, which shall include an assessment of the system efficiency and sizing compared to the heating / cooling requirements of the building, advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions shall be provided.

Scope	New build		Existing buildings		Public Buildings	Energy Management
	All	> 1000 m²	All	> 1000 m²	> 1000 m²	Heating & air-conditioning systems
Requirement	- Minimum requirements - Certificate	- Minimum requirements -Consideration of alternative systems -Certificate	- Certificate (when sold or rented out)	- Minimum requirements (for major renovation) - Certificate	- Displayed certificate	- Regular inspection depending on size - Advice on improvements to users

EPBD: Holistic approach towards energy needs in buildings

EPBD tools

The EPBD specifies the various aspects that the method used to calculate the energy performance of buildings must take into account. The Directive allows Member States to develop their own national calculation methods covering the above aspects. They concern mainly the design of the building and do not take into account performance improvements that can be achieved during the operational life of the building through Energy Management measures such as measurement, control and monitoring systems.

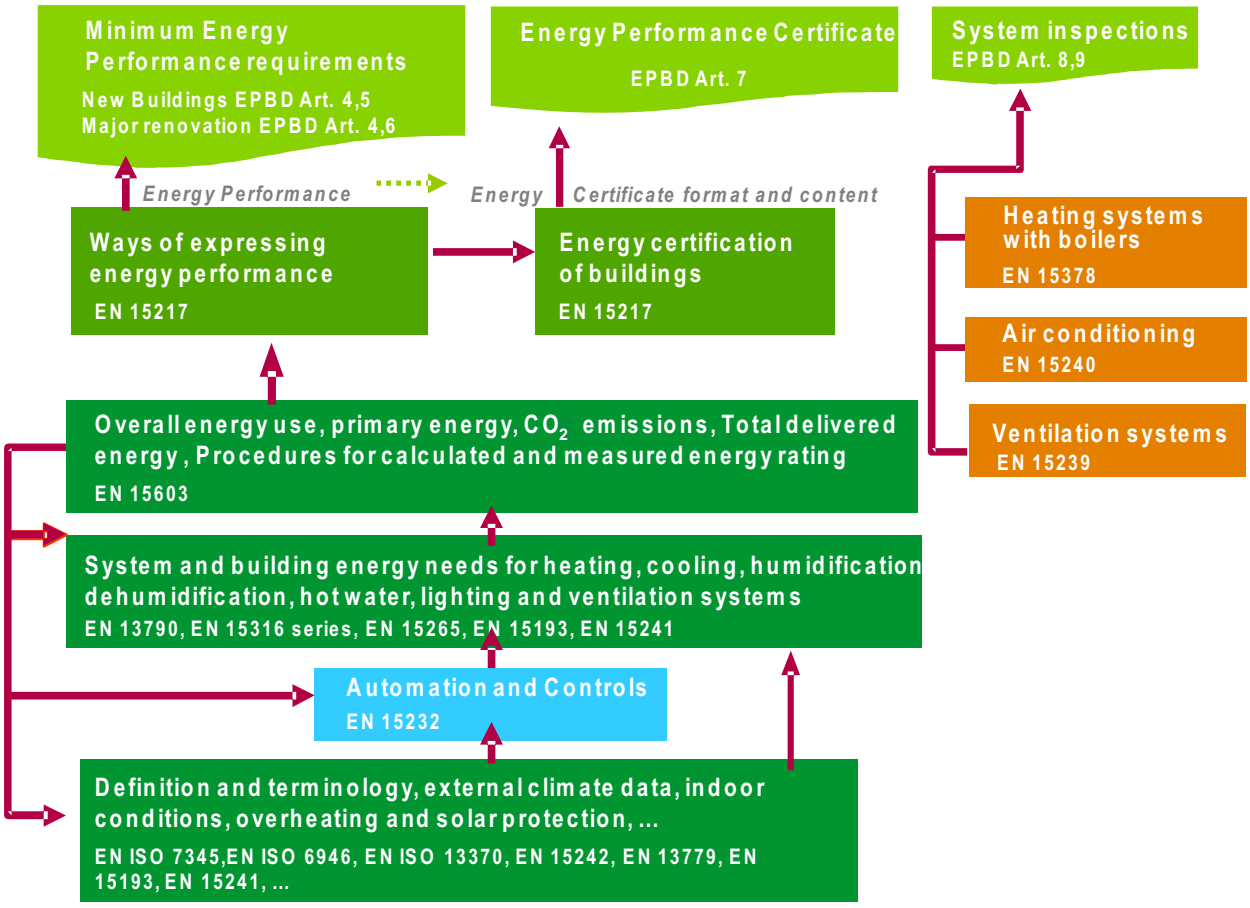
Aspects to be taken into account in energy performance calculations

Aspects to be included in energy performance calculation methods:
● thermal characteristics of the building (shell and internal partitions, etc.), including air-tightness
● heating installation and hot water supply, including their insulation characteristics
● air-conditioning installation
● ventilation
● built-in lighting installation (mainly the non-residential sector)
● position and orientation of buildings, including outdoor climate
● passive solar systems and solar protection
● natural ventilation
● indoor climatic conditions, including the designed indoor climate
Aspects for which the positive influence should also be taken into account where relevant:
● active solar systems and other heating and electricity systems based on renewable energy sources
● electricity produced by CHP
● district or block heating and cooling systems
● natural lighting

To facilitate this task for the Member States, a package of more than 40 standards for calculating the energy characteristics and performance of buildings has been prepared by CEN, acting on a mandate by the European Commission.

The key standards are:

- EN 15603 which defines a calculation methodology for energy performance
- EN 15217 which defines minimum energy performance requirements for buildings and certificates
- EN 15232 which defines different methods of calculating the impact of building automation control systems (BACS) and technical building management (TBM) on energy performance and energy use in buildings. Although these Energy Management measures are not yet part of national regulations, the new requirements of the upcoming recast of the EPBD should stimulate countries to apply this standard. EN 15232 is also soon to become an ISO standard.



CEN standards supporting the EPBD

EPBD time frame

The EPBD was passed by the European Parliament in 2002 and gave Member States until 2006 to transpose the Directive into national law. Since then, the EU Commission has decided to recast the Directive to clarify it and strengthen certain requirements, while redefining minimum thresholds for the implementation of the Directive.

New measures to be included are:

- All new buildings to be zero energy by beginning of 2019
- Member States to set percentages of existing buildings to be zero energy by 2015 and by 2020
- Enhanced requirements for existing buildings when undergoing major renovation including new minimum energy performance requirements, replacement of building components and technical building systems such as boilers or air conditioning systems, installations of smart meters, etc.
- A number of measures favouring a**ctive control systems such as automation, control and monitoring systems**

The new provisions are expected to reduce EU energy consumption by 6 to 8% by 2020 and reduce CO_2 emissions similarly.

Other European directives and regulations

Apart from the EPBD, there are a number of other complementary directives dealing with energy aspects in the buildings context or relevant provisions on buildings.

For instance, the Energy End-use Efficiency and Energy Services Directive (ESD) sets targets for national energy savings. As a direct result, the French government, for example, has set up an action plan on energy efficiency. Note that this plan cites the government-funded HOMES programme as an example contributing to reaching these energy efficiency targets.

Similarly the Eco-design of Energy-using Products Directives should improve the energy performance of products, which will in turn contribute to reaching the targets set by the ESD.

Although these Directives and others are not explicitly mentioned in the EPBD, they are an inseparable part of a mix of tools to promote sustainable construction and use of the EU buildings stock.

Examples of European directives and regulations complementary to the EPBD

Designation	Purpose
Energy End-use Efficiency and Energy Services Directive (2006/32/EC)	Provides the necessary targets, mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections for the efficient end use of energy.
Eco-design of Energy-using Products Directive (2005/32/EC)	Establishes a framework for setting Eco-design requirements, for all energy using products.
Directive on the Promotion of Cogeneration (2004/8/EC)	Presents a substantial potential for increased energy efficiency and reduced environmental impacts.
Directive on the Promotion of the Use of Energy from Renewable Sources (EU 2008 directive proposal)	Lays down the principles according to which Member States need to ensure that the share of renewable energy in the EU final energy consumption reaches at least 20% by 2020, and establishes national overall targets for each Member State.
Construction Products Directive (89/106/EEC)	Intended to replace existing national standards and technical approvals with a single set of European-wide technical specifications for construction products.
EU Emissions Trading Directive (2003/87/EC)	The largest multi-country, multi-sector Greenhouse Gas Emission Trading System world-wide.
EU Eco-label regulations	Awarded to products on environmental criteria set by the European Union.
Energy Efficiency Action Plan (COM(2006)545)	Outlines a framework of policies and measures which provide the means to cut energy consumption by 20% by 2020.

> Energy Labels and Certifications

Energy labels and certifications encourage the use of best practices and the development of energy efficiency solutions that go beyond the minimum requirements stipulated by standards and regulations.

The various energy efficiency labels that already exist for buildings correspond to different levels of energy efficiency performance.

Standard Buildings

A Standard Building is constructed to meet only minimum building energy efficiency requirements.

Low Energy Buildings

Although definitions or interpretations vary among European countries, Low Energy Buildings generally offer better energy performance than a standard or typical new building i.e. significantly better than what is required by national building regulations.

In many countries, support for the development of Low Energy Buildings is provided by incentives such as loans with low interest rates offered by governments or private investment organisations. Other possibilities include tax breaks for low energy buildings or the introduction of CO_2 taxes. Furthermore mandatory certification schemes are expected to promote very Low Energy Buildings in some countries by introducing grades or classes restricted to buildings with very high energy performance.

Requirements for Low Energy Building labels such as the BBC-Effinergie low consumption building label in France enhance the energy performance of buildings against regulations. They are often good indicators of upcoming building regulations. They represent quality marks

for building companies and are used in the French HQE green building assessment methods.

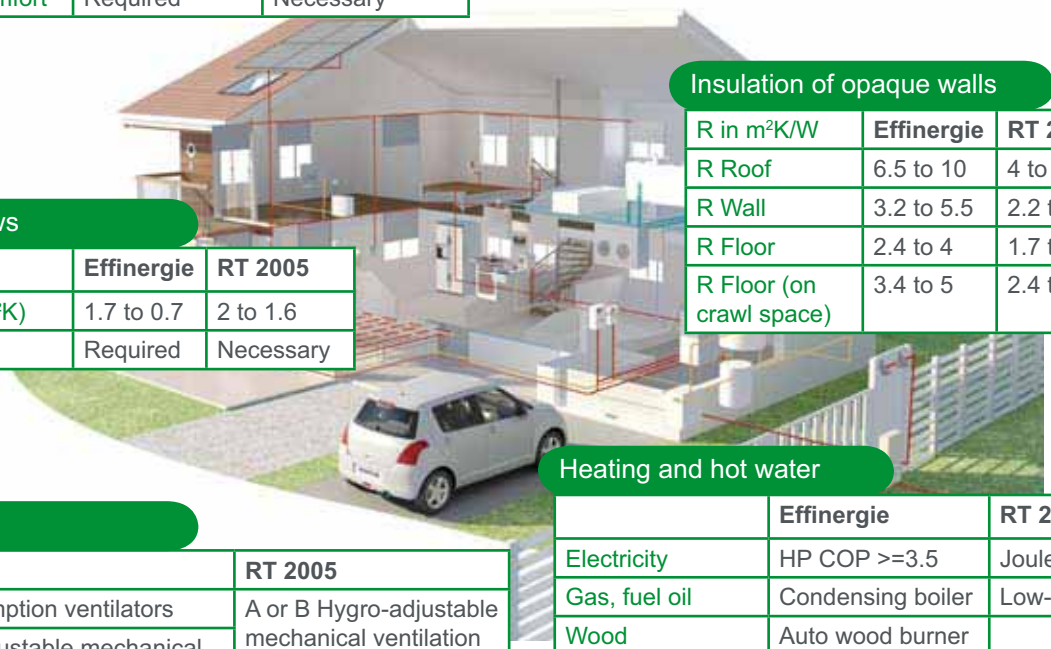
It remains to be seen how the benefits of measurement, monitoring and control systems can be tangibly incorporated in these schemes, especially given that the latter are often defined with respect to the requirements of building regulations which for the time being do no take Energy Management into account to any great extent.

Architectural Design

	Effinergie	RT 2005
Compactness	Recommended	Not considered
South exposure	Recommended	To be considered
Summer comfort	Required	Necessary

Solar Power

	Effinergie	RT 2005
Solar Hot Water	Recommended	To be considered
PV	To be considered	Rare



Insulation of opaque walls

R in m^2K/W	Effinergie	RT 2005
R Roof	6.5 to 10	4 to 6
R Wall	3.2 to 5.5	2.2 to 3.2
R Floor	2.4 to 4	1.7 to 2.9
R Floor (on crawl space)	3.4 to 5	2.4 to 4

Bay windows

	Effinergie	RT 2005
Uw (in W/m^2K)	1.7 to 0.7	2 to 1.6
Blinds	Required	Necessary

Heating and hot water

	Effinergie	RT 2005
Electricity	HP COP >=3.5	Joule effect (radiant)
Gas, fuel oil	Condensing boiler	Low-temperature boiler
Wood	Auto wood burner class 3	

Ventilation

Effinergie	RT 2005
Low-consumption ventilators	A or B Hygro-adjustable mechanical ventilation
B Hygro-adjustable mechanical ventilation Mechanical ventilation with an exchange output > 80%	

Zero Energy Buildings

Although no common term or definition exists, Zero, Positive and Plus Energy buildings as well as Energy Neutral and Zero Carbon buildings generally must produce more energy than they use in a year. This means that each building will produce its own energy on-site, either to use or to sell to the grid, and have maximised energy efficiency.

By the start of 2019, all new buildings in the European will be required to be Net Zero Energy. A number of nations have already established targets for such buildings.

Energy management through measurement, monitoring and control systems should play an important role in reaching these targets.

Examples of countries with targets for Zero Energy buildings

Country	National target	By
France	Energy Positive Buildings	2020
Germany	Buildings to operate without fossil fuels	2020
The Netherlands	Energy-neutral buildings	2020
Norway	Passive house level	2017
UK	Zero-CO_2 (heating, lighting, DHW & all appliances)	2016

Green Buildings

Green buildings, also referred to as intelligent, sustainable or reduced ecological footprint buildings, all satisfy a number of environmental performance criteria. These of course involve increased energy efficiency, but also reductions in water consumption, use of materials and impact on health and the environment. Other criteria such as resources, indoor air quality and the use of local materials may be considered as well.

The definition for Green buildings therefore varies around the world but some countries have set up standards that are used to assess the environmental performance of buildings and award labels, certificates or ratings.

They assess buildings by considering a wide range of environmental and sustainability criteria. One or more points or credits are assigned when specific levels of performance are achieved and the total score determines the rating, ranging for example from Pass to Outstanding for BREEAM, Certified to Platinum for LEED or Basic to somewhat less exciting “Very High” for HQE.

The different rating systems are of course based on different standards and regulations and have been designed to take into account the needs of different climates, supply chains and resource bases, depending on their country of origin.

Different versions are often available for different types of buildings. To work towards providing transparency between these building assessment rating systems while at the same time recognising the need for genuine regional and national differences, the SB Alliance was founded jointly in 2008 by a number of organisations including UNEP-SBCI, BRE (UK), CSTB/QUALITEL (France), CNR-ITC (Italy), VTT (Finland) and FCAV (Brazil). The objective is to develop a framework that will allow comparisons between the different systems that exist, providing the basis for mutual recognition of the corresponding organisations.

Green Buildings standards:

HQE - *France*

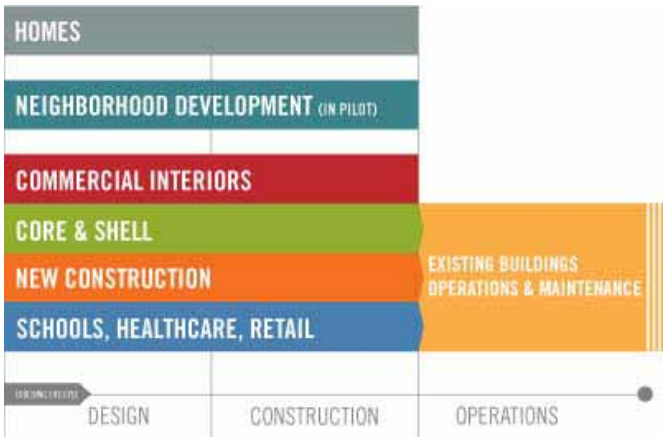
BREEAM - *UK*

LEED - *USA*

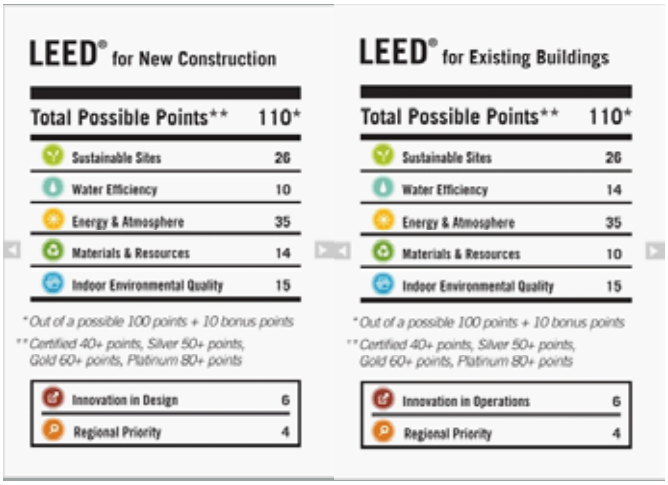
CASBEE - *Japan*

DGNB - *Germany*

The LEED standard



LEED rating systems



LEED credits

Because they are based on tangible rating systems, such certification schemes represent a practical way of assigning value to the environmental performance of buildings. In this way, building energy efficiency may be starting to influence real estate prices, an important source of motivation to all building stakeholders including designers, builders and owners. This fills a gap with respect to building code energy efficiency regulations that cover only minimum requirements and are in most cases extremely difficult to verify once the building has been constructed.

Note that such rating schemes ensure that the perceived “greenness” of the building is not limited to clearly visible elements such as solar panels, but also includes the less visible elements such as measurement, monitoring and control systems that can make just as big a contribution to energy efficiency and thus environmental performance.

For instance, in some schemes, lighting control systems based on available daylight, building occupancy, time programming, etc. can earn points towards higher ratings, especially when associated with the addition of sensors.

The same is true for HVAC control systems. Other schemes assign extra points for sub-metering and trend-logging systems that make it possible to analyse energy use in different rooms, departments or tenants.

The possibilities for taking Energy Management benefits into account in these rating systems are virtually endless and will hopefully be increasingly integrated in all such schemes.

> White Certificates and Energy Supplier Obligations

White certificates and other measures aimed at energy suppliers stimulate energy efficiency by obliging energy companies to improve the way their final customers use the energy.

This is most often done through tradable certificates or straight-forward obligations.

Countries imposing White Certificates or other energy efficiency obligations on energy suppliers

Country	Obligated Company	Eligible Customers	Target set by	Administrator
Belgium-Flanders	Electricity distributors	Residential and non-energy intensive industry and service	Flemish Government	Flemish Government
France	All suppliers of energy	All except EU ETS	Government	Government
Italy	Electricity & gas distributors	All including transport	Government	Regulator (AEEG)
UK	Electricity & gas suppliers	Residential only	Government	Regulator (Ofgem)
Ireland	Electricity (ESB)	All except transport	Regulator	Regulator (CER)
Denmark	Electricity, gas & heat distributors	All except transport	Government	Danish Energy Authority

Source: European Experience on White Certificates (ADEME-WEC, 2007).

White certificates place a legal obligation on energy suppliers, retailers and/or distributors to encourage investments that will produce energy savings on their customer's premises.

Example in France

The French White Certificates, referred to as CEEs (certificat d'économie d'énergie) were set up in July 2006 to implement the new French energy policy law passed in July 2005. It places an obligation on suppliers of electricity, gas, domestic fuel (except for transport), LPG, cooling and heat to produce energy savings in their own installations or those of users in their residential and commercial markets.

Over the period July 2006 to June 2009, there is a national target of 54 TWh life time savings of final energy. The target is shared out between the obliged energy suppliers and can be reached either by implementing end use energy savings or by buying energy saving certificates from others. If the target is not met, a penalty of 2 eurocents must be paid for each missing kWh of life time savings.

Note that many of the measures considered to produce energy savings involve heating and lighting control systems and hopefully other Energy Management measures will be added in the future.

> Incentives

In most countries, various incentives, generally of a financial nature, exist to encourage investments that reduce building energy consumption and CO_2 emissions. They apply to energy efficiency measures such as improving insulation, replacing equipment by more energy efficient equipment, installing renewable energy products and installing monitoring, measurement and control systems. The financial aid can take a variety of forms including tax reductions, grants, soft loans or the avoidance of penalties.

Depending on the country, its areas of greatest potential for energy savings, as well as government funding structures, certain solutions may be given priority. For example, solar water heaters are one of the priority targets in Spain. In France, starting in 2010, tax cuts will be available for the purchase of homes that consume less than 50 kWh/m²/year.

Once again, it is important that such incentives increasingly apply to Energy Management measures that can contribute widely and at a relatively low cost to higher energy efficiency and lower CO_2 emissions.

Existing energy efficiency incentives in four countries

Country	Type of buildings
France	
Preferential Loans for Domestic Energy Conservation Projects	Existing residential
White Certificate Trading – 2006 to 2009	Existing residential and commercial
OSEO Innovation for SMEs	Commercial
Financing for Energy Efficiency Investments	Commercial
Government Crediting and Loan Guarantee for Energy Efficiency and Renewable Energy Investment (FOGIME)	Commercial and industrial
Germany	
KfW bank Build Ecologically Programme	New residential
KfW bank Housing Modernisation Programme	Existing residential
KfW CO_2 Building Rehabilitation Programme	Existing residential
Spain	
Energy Saving and Efficiency Plan 2008-11	Public, residential and commercial
Grants for Energy Efficiency in Buildings 2008 to 2012	Existing residential and public
Building Technical Code / Solar Panel Requirements	Existing residential and commercial
UK	
Community Energy Saving Programme – 2008 to 2011	Residential
Carbon Emissions Reduction Target – 2008 to 2011	Existing residential
Stamp Duty Relief for Zero Carbon Homes – 2007	New residential
Low Carbon Buildings Programme	Residential, commercial and public

Conclusions

Energy efficiency in buildings is clearly one of the keys to reducing greenhouse emissions, a major challenge that we must meet and beat to avoid the catastrophic consequences of climate change and global warming. Over and above rising energy costs and growing public awareness, the main drivers that will help us achieve bold emission reduction targets are energy efficiency regulations, building codes, standards, labels, certifications, obligations and financial incentives.

We have seen how international energy efficiency directives and standards are multiplying and are gradually being taken into account in national regulations and building codes, not only in Europe but increasingly around the world. We have also seen at the wide variety of labels, certifications, obligations and financial incentives that exist in different countries.

The targeted giant leap forward in energy efficiency in buildings will require concerted action on two fronts corresponding to Building Design (insulation, exposition, etc.) and operational Energy Management through building measurement, monitoring and control systems.

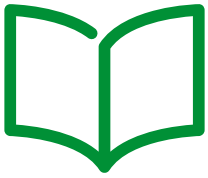
Although many of the drivers focus on Building Design, relatively few touch on Energy Management aspects that can produce major operational gains with relatively low investments and quick payback.

As leaders in Energy Management, we at Schneider Electric recognise the opportunity facing us to help win the race against global warming and climate change. We fully understand the issues involved. We have building measurement, monitoring and control products that can significantly and quickly increase the energy efficiency of buildings. To ensure that this enormous potential is put to full use, we must be totally familiar with current energy efficiency drivers to effectively identify existing opportunities.

At the same time, we must strive continuously, at all levels, to demonstrate this potential and make Energy Management solutions an essential and inherent part of these and future drivers.

By investing in the future of our company in this way, we invest in the future of our planet.

Bibliography



Information papers, reports and magazines

● Zirngibl, J., 2009. *Information paper on Energy performance of buildings* – Overall energy use and definition of energy ratings – Calculated energy rating.

● Lautsen, J., 2008. *Energy efficiency requirements in building codes, energy efficiency policies for new buildings.* International Energy Agency Information paper.

● Julien A., 2009. Assessing the assessor BREEAM VS LEED in SUSTAIN magazine v09 i06

● Bosseboeuf, D., 2009. *Energy efficiency policies: a world-wide panorama by the World Energy Council* in IOP Conf. Series: Earth and Environmental Science 6.

● Lees, E., 2007. W*EC-ADEME project on energy efficiency policies* - European Experience of White Certificates.

● Haydock, H & Arbon, J-A., 2009. *European Parliament, Policy Department - Economic and Scientific Policy*. Study on energy performance of buildings.

● UBS Wealth Management Research. Investment Theme - *Socially Responsible - Investing Energy Efficiency*, June 2008.

● *Low-Consumption Building: The Achievement of a Project* - Effinergie. http://www.effinergie.org

Europa Web sites

● <http://ec.europa.eu/energy/index_en.htm>

● <http://www.buildup.eu/>

European projects Web sites

● Cense: <http://www.iee-cense.eu

● Asiepi: <http://www.asiepi.eu

French Web site on building thermal regulations

● <http://www.rt-batiment.fr/>

Green building Web sites

● LEED: <http://www.usgbc.org>

● BREEAM: <http://www.breeam.org>

● HQE: <http://www.assohqe.org>

● CASBEE: <http://www.ibec.or.jp/CASBEE/english/index.htm>

● DGNB: <http://www.dgnb.de/en/>

● SBAlliance: <http://www.sballiance.org/>

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Energy Efficiency Drivers in Europe

Regulations and other instruments open new horizons for Energy Management in buildings

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