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# STRATEGIC ADVISORY BODY ON ENVIRONMENT (SABE)

## 1 FOR INFORMATION

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## 2 SUBJECT : Eco-buildings: lack of data and measurement standards

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## 3 BACKGROUND :

***Lack of data on eco-buildings 'hinders investments'***
*ENDS Europe, Wednesday 14 April 2010*
*The lack of data and metrics on green buildings to demonstrate their attractiveness to investors compared with conventional buildings fuels uncertainty over their profitability, a Deutsche Bank research paper has found.*
*The problem is particularly true in Europe, which has "yet to see a single major study demonstrating the financial performance premiums of green buildings," according to the paper. All other major studies to date have focused on the US, the authors note.*
*There are also no harmonised standards for green buildings, they add. Definitions vary across regions and even within countries. This inhibits investments as investors "fear acquiring assets with green credentials that lack widespread market acceptance."*
*The research paper also reviews national building regulations. It shows Scandinavian countries have the strictest rules. And it shows certification systems vary from a country to another. All the major ones do contain criteria on the efficient use of energy and water.*
**The European Commission has announced the winners of its GreenBuilding initiative, which rewards green building projects in the EU. The 13 winners, from a pool of 286 participating buildings, come from eight countries and range from corporate and public projects, to new and refurbished buildings.*

Attached you will find the quoted Deutsche Bank research paper and the European Commission announcement.

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## 4 PROPOSAL:

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## 5 RESP : DD

Deutsche Bank Research

# Green buildings

## A niche becomes mainstream

April 12, 2010

The building sector has immense environmental impacts. It accounts for 42% of the EU's final energy consumption and for about 35% of all greenhouse gas emissions. The residential sector, with a share of 26% of overall energy consumption, has more potential for improvement than the commercial buildings sector.

Green building techniques save resources. These techniques are especially relevant to reducing the energy consumption used for heating, lighting and cooling. Energy savings for green buildings average 30% over conventional buildings. In addition, green buildings use less water and offer lower maintenance costs.

Several compelling factors drive spread of green buildings. Growing tenant demand due to lower operating costs, higher worker productivity and reputational issues forces the real estate sector to adopt efficient building techniques. Overall, operating costs for leadership in Energy and Environmental Design (LEED) certified buildings are 8-9% lower than for regular buildings. Over the life cycle of a building these savings pay for higher initial costs. Investors also seek more socially conscious investments.

Building codes and regulation becoming stricter. Having recognised the advantages of green buildings, national governments and the EU have mandated higher efficiency standards for new construction and renovations with the EU Energy Performance of Buildings Directive of 2002 (EPBD 2002). EPBD 2010, the follow-up directive, is likely to make "near-zero" energy buildings mandatory by 2021.

Limiting factors remain. The real estate industry lacks a universal definition of what constitutes a green building as well as consistent data sources and metrics on green buildings. These deficits make an assessment of the profitability of green building investments difficult and therefore hold back stronger investor interest. Potential misalignments between landlord costs and tenant benefits also hinder faster adoption of green building standards.

Certification systems send market signals. The number of certification systems has surged in the last decade, although their usage remains limited outside the UK and the US. Nonetheless, they help facilitate the move to greener buildings by enhancing the transparency of building operating costs and other sustainability metrics.

Green buildings will become ubiquitous. Tenant demand and the superior environmental performance of green buildings are major driving factors in making green buildings mainstream. However, stricter government regulation in the EU is likely to be the main reason for green buildings to become the de-facto standard for new and renovated buildings in 10 years. The transformation of the whole building stock will take longer but is also foreseeable.

www.dbresearch.com

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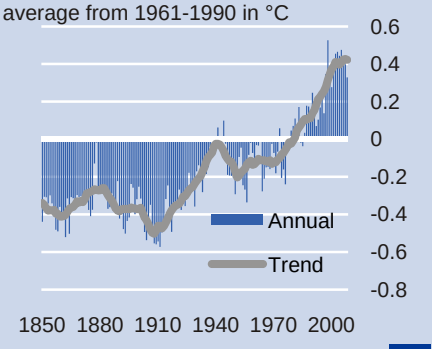
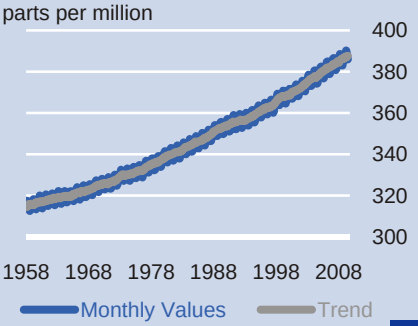
The Earth is getting warmer
Global temperature deviation, relative to average from 1961-1990 in °C



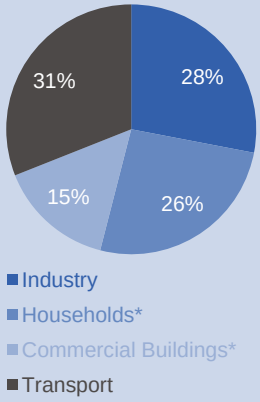

Source: Climate Research Unit 1

$CO_2$ concentration has been rising
$CO_2$ concentration in Mauna Loa (Hawaii), parts per million




Source: Mauna Loa Observatory 2

Large green potential in EU real estate sector
Million tons of oil equivalent, 2006




*Heating, lighting and cooling account for large share of total energy consumed.

Source: Deutsche Energie-Agentur 3

## Introduction

Global climate change has become more apparent over the last few decades. Although the pace, extent and concrete outcome is uncertain, the direction of climate change is clear: temperatures are likely to rise globally, rainfall patterns are likely to change and extreme weather conditions are likely to occur more often. Most climate experts agree that the humans, at least in part, cause this development. The experts are calling for immediate and far-reaching action to fight global warming and remedy its consequences. One of the most important tasks is to reduce greenhouse gas emissions. An increasing concentration level in the atmosphere is said to be the main reason for rising temperatures. For instance, the $CO_2$ concentration in most industrialised countries has increased by more than 20% in the last 60 years. At the same time global temperatures have been rising considerably.

The ever higher degree of $CO_2$ in the atmosphere reflects rising global consumption of wood, coal, oil and natural gas. It is evident that the high degree of utilisation of these resources will eventually lead to scarcity and therefore to increasing prices. Expanding the use of renewable energy sources and using energy more efficiently in general, is thus desirable for both ecological *and* economic reasons.

### *The world's public has recognised the need to act ...*

Not only climate experts have become more aware to global warming, increasing emissions and high resource prices. The general public as well as companies are focusing on this issue. They have noticed the immense cost-saving potential of enhancing energy efficiency.

### *... and politicians encourage addressing climate change*

Current market mechanisms alone do not seem likely to accomplish a sufficient degree of energy efficiency and resource savings over the coming years as they often ignore the negative externality caused by $CO_2$ emissions. Externalities lead to a discrepancy between the so-called private costs a person faces and the social costs a society faces. Many countries and politicians worldwide therefore seek strategies to encourage greater energy efficiency and more efficient resource utilisation through political measures such as subsidies and tax cuts for renewable energies. Growing attention from all angles has made climate change a major policy concern.

### *Immense environmental potential in real estate sector ...*

Buildings over their life cycle account for a large share of global greenhouse gas emissions. The European Commission reports that buildings are responsible for the largest share of the EU's final energy consumption (42%) and for about 35% of all greenhouse gas emissions.[1] Consequently, sustainable buildings and energy refurbishments hold enormous saving potential. This is confirmed by a McKinsey study. It finds that insulation measures are among the many steps with negative abatement costs. This means implementing them saves money over the life cycle of the investment.

Already, a multitude of measures affecting the real estate sector has been implemented. For example, many governments in Europe subsidise the use of renewable energy sources and support actions

[1] European Commission (2007a).

to improve insulation. Most European countries have also tightened environmental regulation for new buildings and refurbishments of old buildings. Buildings complying with high energy-efficiency and other environmental standards decrease $CO_2$ emissions and are often referred to as “green buildings”.

***... and the problems in realising the potential***

**Building green faces obstacles**

First and foremost, there is not one uniform real estate sector as far as the environmental potential is concerned. The commercial, residential and public real estate sectors all face different incentives and trade-offs in implementing green goals, and there are significant variations within each sector as well. There are, among others, issues of differing investment cycles, varying building codes and uncertain gains from more efficient building technology. The type of lease contract, net or gross, also can play a role. Ultimately, the investment must pay off for the investor or home owner through lower operating costs, higher rent or greater property values, or must be induced by the government through taxes or regulation. So far, economic, informational as well as regulatory reasons still hold back an even stronger surge in green building investments.

***Certification guidelines and signals towards a more efficient building industry***

**Certificates make environmental performance transparent**

Certification of green buildings can play a major role in the transition to a more efficient real estate sector. New projects typically must, among other things, comply with more rigorous building codes and meet higher resource-efficiency standards in order to be certified. Certification systems provide clear market signals and guide business and household decisions. When executed well, investment decisions made on the basis of life cycle costing reduce performance risks and enhance the returns on the investment.

However, there are no globally agreed-upon standards and measurements for green buildings and certification systems. In part this is due to climatic as well as historical differences. This lack of comparability between certification systems and standards makes informed choices and quicker adoption of green buildings difficult. More comparability would improve transparency in the real estate sector.

**Features of green buildings**

- Efficient use of natural resources
- Waste minimisation
- Eco-friendly construction materials
- Incorporation of local climate conditions
- Less energy required to transport building materials
- Limited impact on surroundings (e.g. lower emissions, noise, smell)
- Consideration of life cycle costs
- Health
- Location near population centres and close to public transportation facilities
- Efficient building management and commissioning
- Social capacity and building user’s comfort
- Convenient indoor environment

Source: McCartney (2007) and Nelson (2008)

## 1. What is a green building?

Green, sustainable or low-energy buildings are just some of the existing names for building concepts that are “green” in a wider sense. Therefore, a classification of the different concepts and what they entail is necessary.

The greening of the real estate sector is reflected not only by higher energy efficiency but also by better insulation and advanced design strategies. Besides aspects that directly address environmental pollution, many other facets are often taken into account, e.g. life cycle costs, health issues or socio-cultural aspects.[2]

There are a number of different terms used for buildings that exhibit more and better sustainable features than regular buildings. They range from low energy buildings that only consider energy efficiency to sustainable buildings that consider all possible facets listed in the table below.

The terms in the table below have overlapping definitions and the differences are mostly small. From an economic point of view the

[2] Lützkendorf (2009).

concept of sustainable buildings is the most sensible one as it incorporates economic and environmental factors. Irrespective of the market, investments in environmental measures will only be made, if a long term profit can be achieved. Market forces, like high energy prices, positive marketing effects from "green" CSR goals or monetary incentives set by the government are all possible sources for the profitability of green investments.

**Green features are important due to market failure**

Those active in the real estate sector often do not differentiate carefully between such terms as "sustainable" and "green" and use them interchangeably. We will use the terms synonymously as well, but concentrate on green issues, since they are most relevant to a market failure in the real estate sector. As will be explained in section 3, the price of energy consumption does not reflect its full social costs, which results in a negative externality. This market failure is the reason for the importance of green features to governments. Governments intervene in the real estate market by means of stricter regulation and monetary incentives in order to reduce the externality.

| *Aspect* / Concept/Term | Functionality | Energy efficiency | Resource intensity | Env. compatibility | Health | Socio-cultural aspects | Life cycle costs | Value/ Earnings | Technical quality |
|---|---|---|---|---|---|---|---|---|---|
| Low energy building | | + | (+) | (+) | (+) | | | | |
| Low emission building | | (+) | (+) | + | (+) | | | | |
| Green building | | + | + | + | + | (+) | | | |
| High performance building | + | + | (+) | | (+) | | | | |
| Sustainable building | + | + | + | + | + | + | + | + | + |

Source: Lützkendorf (2009) 4

***Broad definition necessary?***

**Certification standards vary for different building types**

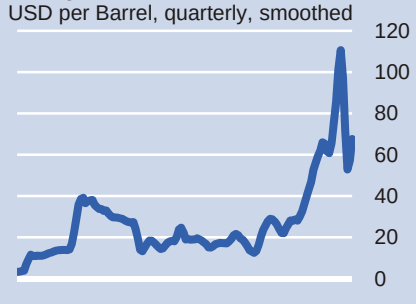
Considering the ambiguity of the terms above, it is clear that a single set of specific standards (e.g. amount of water consumption per year) for all the different types of buildings is unrealistic. Buildings are complex constructions, designed for a range of users and purposes. They also have to be adjusted to specific local conditions. Taking this into account, it seems to be more reasonable to define a catalogue of indicators and features with varying requirements for different kinds of buildings and conditions. For that reason certification systems have separate versions for the different building types (e.g. residential, commercial, or retail) and usually vary their standards according to local climate conditions.

***Green buildings contribute to both: the environment and the economy***

As evidenced in the discussion above, green buildings entail more than just eco-friendly measures. The work environment is enhanced by better air quality and greater access to natural light, which also raises workers' productivity. Waste minimisation and less dependency on increasingly scarce and expensive fossil resources lowers operation costs. Finally, the owner can benefit from increased occupancy rates (+8%), higher rents (+6%) and higher building values (+35%).[3]

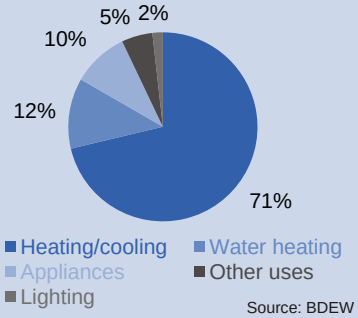
[3] See Fuerst and McAllister (2009a) and (2009b).

The oil price has increased strongly in the last decade
Average of Dubai, Brent and WTI
USD per Barrel, quarterly, smoothed



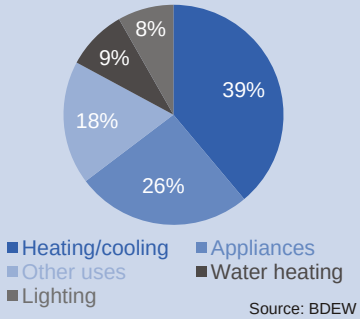

Source: HWWI 5

Heating and cooling are major energy uses
Final energy consumption, residential buildings, Germany, pJ, 2007




Source: BDEW 6

39% of energy used for heating and cooling
Final energy consumption, commercial buildings, Germany, pJ, 2007




Source: BDEW 7

## 2. Driving factors

After a sluggish start to adopting greener business practices, the real estate sector was finally embracing sustainable development and operations – just as the bottom fell out of property markets in 2008 on the heels of the worldwide financial crisis. Clearly, the recession has slowed the greening momentum, as the dramatic reversal in property markets has undercut the viability of new construction and even property renovations. Thus, private-sector construction ceased or at least greatly moderated in most developed markets, with developers generally only completing projects started years ago, and few new projects likely to break ground in the near term.

Nonetheless, various market forces, in concert with regulatory incentives and mandates, continue to pressure real estate owners and managers to enhance the sustainability of their portfolios, though the focus has shifted to more efficient property operations instead of new construction and costly building renovations. These market forces include greener tenant space requirements and rising demands for socially responsible investments. Moreover, volatile energy prices of the past few years have made for increasingly attractive financial returns on green investments, particularly with the introduction of more affordable greening technologies. The globalisation of property markets and the environmental movement have intensified these trends. Overall, the current recession has slowed, but not fundamentally altered, the shift to sustainable real estate.

### *Tenant demand*

Tenant demand for greener workplaces continues to be among the strongest drivers in the move towards more sustainable real estate. For many firms there is no greater motivator than the financial bottom line. Utility charges are typically among the top operating expenses for buildings, and studies document energy savings for green buildings average 30% over conventional buildings.[4] This is confirmed by a report from McGrawHill, which finds overall operating costs to be lower by 8-9%.[5] Firms are also attracted to the economic performance potential of green buildings, as some of the same green design features that render buildings less expensive to operate also yield tangible improvements in worker productivity, attendance, and health – all vital issues for companies.

But firms increasingly value and require sustainability in their everyday business practices as well. One reason is that sustainability matters to their customers. Companies see sustainability as an important product differentiator in the marketplace, so greener policies reflect well on the image of the firm and create goodwill among clients and customers.

Another reputational issue for companies is the rising need to report on their social achievements, including on the environment. Barely a decade since the concept was conceived, corporate sustainability reporting has been adopted by most of the world's major corporations. The ability to attract and retain workers is also a factor. Younger workers in particular and especially highly-valued creative and knowledge workers, frequently consider a firm's record on social issues in making their employment choices.

[4] See Kats et al. (2003) and Voyles (2005).
[5] McGraw Hill Construction (2006). Green Building SmartMarket Report.

**Tenants are willing to pay more for green buildings**

Of course, with numerous firms across a wide swath of industries in distress from the recession and financial crisis, it is inevitable that there has been somewhat less focus on green issues in the business community recently. But there is little evidence that tenants are backing off their longer-term sustainability commitments. A survey by GVA Grimley on the UK financial and business services sector at least gives a hint concerning the willingness to pay. They found that 89% of occupants would pay more rent for a sustainable building. In another survey by GVA Grimley respondents answered on average that they would pay 10% more rent if the building was designed and constructed more efficiently.

### *The business case for owners and developers*

The business case for green buildings by now is widely accepted by academics and researchers, if not the broader investment community. The available data suggests that sustainable buildings command higher rents and lower vacancies, lease quicker, and have lower energy and other operating expenses than conventional buildings, together yielding greater net incomes.

Three prominent studies examined the performance of office buildings using US data vendor CoStar's database, comparing buildings with high green and/or energy ratings to buildings lacking these green credentials.[6] Using somewhat different methods and assumptions, these studies nonetheless reach comparable conclusions: rent and value premiums of at least 5% and occupancy gains of 3 to 8 percentage points. At the same time, other studies demonstrate that green buildings need not cost much more to construct than less efficient buildings, particularly once government incentives are reflected.[7]

To be sure, these and other similar studies all have drawbacks, not least that they are based on a relatively small number of buildings, reflecting the still diminutive universe of investor owned green buildings. Moreover, to date no studies have focused on the European experience, primarily because property performance and transaction data is less transparent throughout much of the EU. Nonetheless, it is significant that these major studies based on US data all found at least some positive performance impact, even if the precise figures are elusive.

But the move towards greener practices among owners and developers goes deeper than purely financial calculations. Real estate participants are also motivated by risk-aversion strategies, including the risks associated with energy-price volatility and greater governmental regulation and market involvement, as well as the opportunities afforded by new and more affordable energy sources and energy-saving technologies.

### *Green and socially responsible investing*

In addition to traditional real estate industry participants, green building is attracting the attention of investors concerned with the impacts of their investments, in addition to their returns. Referred to generically as Socially Responsible Investing (SRI) and as Responsible Property Investing (RPI) when focused on the real estate sector, adherents look at the "triple bottom line" that tracks environmental and social impacts, as well as the traditional financial

**Making high-rises green**

The modernisation of the Deutsche Bank towers in Frankfurt is the biggest building modernisation project in Europe. It showcases what state-of-the-art building technology can achieve in high rises.

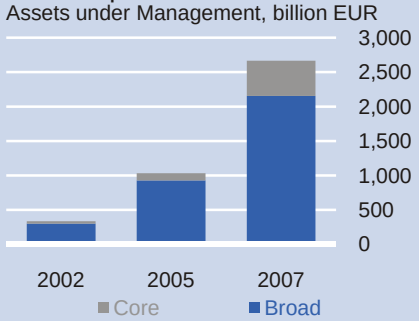
The project aims to reduce electricity consumption by 55%, water use by 74%, $CO_2$ emissions by 89% and heating energy by 67%. In addition, 98% of demolition waste will be recycled.

This is accomplished by a combination of i.e. efficient appliances, a new lighting system, the use of a cooling/heating ceiling instead of a common air condition, high efficiency IT technology and the usage of rain and grey water for toilets.

The social aspect of the sustainability concept is also incorporated into the design. A modern work place concept with improved lighting, windows that can be opened, as well as better indoor climate all add to create more comfort for the employees. Finally, stands and showers will make it easier for employees not to come to work by car.

SRI saw exponential growth in Europe

Assets under Management, billion EUR




Market coverage has changed over time, but even on like-to-like basis still considerable growth.

Source: Eurosif

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[6] Miller et al. (2008), Eichholtz et al. (2008) and Fuerst and McAllister (2008).

[7] See, for example Mathiessan, Lisa Fay and Peter Morris (2004). Costing Green: A Comprehensive Cost Database and Budgeting Methodology. Davis Langdon. Also see: Kats et al. (2003).

returns. The SRI market is thought to account for more than 10% of total assets invested in Europe and the US – totalling several trillion dollars – and is growing rapidly.[8]

### *The role of government*

Governments have long been a dominant force in the move towards more sustainable property. In most countries the public sector has forced changes on the residential as well as the commercial real estate sector, often well in advance of the sector's own schedule for adoption.

As mentioned before, the reason for governments to intervene in this matter is the insufficiency of current market mechanisms. This would result in $CO_2$ emissions too high to keep the global temperature increase at a level many scientists believe to be acceptable. The cause for the failing market mechanism is the discrepancy between the private costs a person faces and the social costs society faces for emitting green house gases. Governments can either rely on changing market dynamics through taxes or by regulating the emission of the gases directly using an emission trading system and efficiency standards.

The public sector in Europe has chosen to rely on a mix of these steps to influence property markets:

— regulation of what buildings can be constructed and how they are to be managed – typically, promulgated through building codes or via the light of transparency, by requiring building owners to post energy or other environmental performance scores;

— taxation and environmental regulation that alters market dynamics – by raising the cost of inefficiency through taxes, an emission trading system or subsidising moves to more sustainable buildings; and,

— the occupancy and construction of their own facilities – which can set market standards since in most countries the federal government represents the single largest tenant and developer.

Also, governments play an indirect role of increasing tenant demand and developer activity by raising awareness and demonstrating proof of concept. By commissioning green buildings at an early stage, governments can provide the local market with the first tangible experience with sustainable building practices.

**Social costs and the profitability of green investments**

The energy consumption of buildings is usually connected to the emission of $CO_2$ which according to the scientific consensus, is connected to global warming. Therefore the private act of consuming energy has an effect on a global scale and affects all people.

Economists call this concept negative externality. It results from a private transaction between two parties (e.g. purchase of energy) that has a negative effect on a third party not directly involved in the transaction. The negative externality is defined as the costs of the deal that are not shared solely between the two parties. Another way of saying this is that there is a discrepancy between the so-called social and private costs.

Economists see externalities as one of the main reasons for governmental intervention, as only they can equate the private and social costs, e.g. through taxes. These measures increase the private price of $CO_2$ emissions and as a result the aforementioned problem of profitability of green investments would be diminished. An alternative to this market-based solution can be the toughening of building codes.

**Regulation can slow construction because of diminished profitability**

The public sector's push towards greater sustainability is not likely to slacken in the face of the recession. If anything, governmental resolve to address global warming through stricter coercive action is strengthening and is likely to affect the construction sector. Higher construction costs due to stricter regulation can make an investment unprofitable, resulting in postponed construction until higher rents or lower costs make the investment profitable. This can lead to a slower adoption of stricter standards.

[8] See Social Investment Forum (2007). Report on Socially Responsible Investing Trends in the United States. Washington, DC, USA. Also, see Schmidt, Susann and Christian Weistroffer (forthcoming). Responsible Investment. Deutsche Bank Research. Current Issues. Frankfurt.

### *The rise of global real estate players and global capital flows*

A greater global reach of capital today accentuates growing investor demand for sustainable property. Whereas they used to operate in a very local business, sophisticated property investors today seek out opportunities in ever-more distant markets in order to capitalise on the value of their brand and expertise, making cross-border real estate investment commonplace.

These global real estate players raise sustainability levels by sharing their best practices from around the world as they expand the geographic reach of their businesses. Moreover, fully integrated firms are finding it easier and more fruitful to set global operating standards based on their best practices. The cumulative impact of these major players will likely force greener market standards.

### *The environmental movement*

**Green CSR goals influence the real estate sector**

A final greening force has been the pressure from the worldwide environmental movement. This pressure on the real estate industry has been more indirect than direct, by influencing parties that interact with property owners. For example, corporate tenants are motivated to seek greener facilities in order to attract and retain workers, differentiate their products, improve their image to consumers, and satisfy shareholder demands, all of which have ties to environmental concerns.

Similarly, environmental consciousness underpins much of the interest in responsible property investing and sustainable investment in general. What is important in this regard is the role of investment forums and various independent groups that either pressure companies to act/invest more sustainably and/or rate sustainability performance. The UNEP Finance Initiative is a multilateral change agent. It works together with the financial sector to understand the influence of sustainability considerations on financial performance and promotes the adoption of sustainable investment practices. At the European level, Eurosif and the Sustainability Forum Zurich are examples of groups whose mission is to advance sustainability in the financial markets by providing research and expertise.[9]

## 3. Regulatory standards

**Governments as drivers of green buildings**

In the previous section governments were identified as one of the drivers towards more sustainable real estate. The Kyoto Protocol was the first major political commitment to climate protection on a global scale. It was adopted in 1997 and signed by all European countries. It aimed to reduce the industrial nations' greenhouse gas emissions by 5% from 1990 levels by 2012. Accounting for a huge share of emissions, buildings are one of the focal points for governmental action in Europe.

Environmental technologies such as solar panels on buildings are often highly subsidised, and most European countries have established strict regulatory standards for buildings. In addition to national regulations, several countries have also established a myriad of different incentive programmes for developers and private home owners. This combination is meant to move EU countries quickly into compliance with the goals of the Kyoto protocol and especially the EU's own commitments.

[9] One example is the Dutch Sustainability Research (2007). Real Estate Sector Report. Eurosif. Compiled on behalf of SiRi company.

**EU directive on energy performance of buildings (EPBD)**

In 2002 the European Commission launched new guidelines on the energy efficiency of buildings.

Directive 2002/91/EC's key points:

— A common and general methodology for calculating the integrated energy performance of buildings.

— Application of minimum requirements on the energy performance of new buildings and existing buildings that are subject to major renovation.

— Energy certificate for new and existing buildings. Certificates must be less than five years old.

— Regular inspection of boilers and air-conditioning systems and in addition, an assessment of heating installations in which the boilers are more than 15 years old.

The directive came into force in 2003 and commited member states to fulfil the requirements by 2006.

According to a report by the European Parliament of early 2009 only five countries in the EU-27 had fully implemented the directive: the Czech Republic, Denmark, Germany, the Netherlands and Slovakia.

An additional 12 countries had implemented most parts of the directive, with the rest becoming legally binding soon after the publication of the report.

Bulgaria, France, Latvia, Lithuania, Malta, Poland and Slovenia still had deficits with one or more requirement.

Finally, three countries (Cyprus, Greece and Hungary) still struggle with most of the elements of the EPBD.

### *EU Energy Performance of Buildings Directive 2002*

Against the background of Europe's dependence on external energy resources and the required decrease in harmful emissions, the EU passed the "Energy Performance of Buildings Directive" (EPBD) in 2002.

The directive sets basic principles, requirements, and methodologies but still leaves considerable latitude for member states to establish regulations that are adjusted to their local conditions. According to the Commission, implementation of the directive holds a cost-effective saving potential of 22% of the buildings' energy consumption by 2010 relative to 2003. The European Commission launched a group named EPBD Building Platform to support member states in their efforts to adopt the EPBD. Additionally, this group prepares country reports that annually evaluate each member state's progress.[10]

### *Real estate sector – an EU lead market*

In 2007, the European Commission released a "Lead Market Initiative for Europe"[11], through which promising and seminal markets are identified and backed by EU action plans. Among other markets, the construction sector was identified as a lead market with enormous environmental saving potential.[12] The Commission aims to improve the performance of the appointed lead markets through acts of legislation, public procurement, labeling, certification, innovation support services, and financial support. According to a mid-term progress report issued in 2009, most of the activities have been initiated, but not yet completed.

### *EPBD 2010 – New EU regulation to come*

In November 2009 the EU countries reached political agreement on the new EU EPBD 2009. Formal adoption of the directive by the EU parliament and the council is expected in early 2010. The directive is likely to mandate that all new buildings are "near-zero energy" buildings from 2021 and fulfil new and stricter environmental standards. This would, over time, make green buildings ubiquitous. Finally, member countries would be required to set new stricter minimum standards for new as well as refurbished buildings. Although a clear move towards tougher standards, this compromise represents something of a step back from the EU parliament's proposal to mandate net-zero energy buildings (stipulating that all new buildings produce at least as much energy as they use). As the term near-zero energy building was not specified, it will be up to the EU countries to set the requirements. Regardless of the specific regulatory measures in the European countries, the direction is clear: regulation is getting tougher over time and zero-energy houses will be the de facto standard in the future. Although the focus of public discussion is mostly on new buildings, existing buildings will likely face a similar fate.

**Near-zero energy buildings becoming mandatory in 2021?**

### *National implementation of EPBD 2002*[13]

All EU countries are working towards establishing the entire range of specifications required by the EPBD. However, in Europe's largest and most important real estate markets, Germany, the United

[10] EPBD Building Platform (2008).
[11] European Commission (2007a).
[12] European Commission (2007b). For a publication with a similar conclusion see: Auer et al. (2008).
[13] EPBD Building Platform (2008) and European Parliament (2009) provide an overview of the implementation progress with newer data not available.

Kingdom, France and Italy there are variations in the EPBD status of the implementation process. Beside the EU regulations, there is a plethora of national programmes and regulations making an assessment of the state of green building difficult. This report will look at the large EU countries to provide an overview of the progress made in Europe.

### *Ever stricter regulations in Germany*

**Germany relies on regulation and preferential loans**

In 2002, Germany passed additional energy saving regulations (known as EnEV) which set new minimum and mandatory standards for all new residential and almost all new non-residential buildings.[14] According to the EPBD Building Platform's country report, most of the directive's requirements had already been implemented in the original 2002 version of EnEV; all missing points were then included in a later version dated 2007. In 2009 Germany released a third version of its guidelines (EnEV 2009), which is even stricter than its predecessors.

In addition to setting standard energy performance criteria, the guidelines embody an energy-performance certificate, which is mandatory for all new buildings and buildings subject to major refurbishment. The certificate displays a building's overall energy performance and aims at making the results of green measures more transparent and informing tenants' or purchasers' decisions.

The German government does not rely on regulation alone. There are also several local and federal programmes, providing additional incentives especially for home owners to build green. Most notably are the preferential loans offered by the state-owned KfW bank.

### *Good progress in the United Kingdom*

**UK requires provision of information to home buyers**

The UK established the directive's requirements for new and existing buildings between 2006 and 2007. Requirements regarding certification came into force in October 2008. In the case of a private sale of a dwelling in England or Wales a so-called Home Information Pack is required. The pack includes an energy-performance certificate – containing advice on how to cut carbon emissions and fuel bills – and documents such as sale statement or evidence of title. As regards government incentives, the United Kingdom relies more on grants and tax breaks, which also vary by region.

### *Deficits in France*

France adopted most of the directive's minimum requirements between 2005 and 2007. However, as far as the regular inspection of boilers and air-conditioning is concerned, not all requirements have been implemented yet. Like Germany, France also adapted a low or no-interest loan strategy for investments in green buildings. This was complemented with tax rebates on different efficiency measures.

### *Italy almost there*

Italy has started to implement the directive's requirements in three stages, with the last stage coming into force in early 2010. However, in anticipation of delayed national guidelines some local authorities have developed and established their own requirements, like the originally local mandatory CasaClima certification system in the Autonomous Province of South Tyrol Bolzano.

[14] The guidelines do not apply to non-residential buildings which are used to keep animals, breed flowers, are located beneath the surface or removed periodically (like tents).

Energy demand of school buildings vary significantly in EU

Primary energy demand, heating version basis, relative to Germany

| | Single-family home | School |
|---|---|---|
| Germany | 100% | 100% |
| Austria | 97% | 70% |
| Czech Republic | 106% | 72% |
| Poland | 110% | 92% |
| Sweden | 83% | - |
| Denmark | - | 60% |
| UK (England & Wales) | - | 59% |
| The Netherlands | - | 58% |
| Belgium (Flanders) | 99% | 95% |
| Luxembourg | 92% | 76% |
| France (Alsace H1b) | 103% | 83% |

The Netherlands' regulation was too tough to calculate the energy consumption. The UK's and Denmark's performance in single-family homes was not considered due to regulatory issues.

Source: Loga et al. (2009) 9

### *Comparing national building regulations*

Cross-country comparison of technical guidelines is very challenging because of local differences such as climate conditions. Due to these difficulties, few studies have attempted such comparisons. In an extensive research paper, the German research institute "Institut Wohnen und Umwelt" (engl.: The Institute for housing and environment (IWU)) addressed this question on behalf of the German Federal Office for Building and Regional Planning in 2009.[15] They investigated the energy performance of buildings built in accordance with the respective regulation in 10 European countries[16] with similar climate conditions. The authors defined three model buildings – two residential houses and a public school – and applied the respective national regulations.

Regarding the residential buildings, the Netherlands, Sweden, Denmark and Luxembourg were found to achieve the best energy performances. Germany ranked at an average level while Austria, Poland and the Czech Republic were positioned last. For public school buildings, the UK, the Netherlands, Sweden and Denmark have the most ambitious regulations. Germany – often thought to have very strict guidelines – actually registered the worst energy performance in school buildings compared to the other countries.

The findings have to be qualified, however. An international comparison of building regulations was not the purpose of the study and the results depend strongly on the choice of heating method. Instead, the objective was to show which energy efficiency levels have to be complied with in different countries. Also, considering the difficulty in comparing such regulation the differences in the energy demand of the residential buildings are modest. Nonetheless, the study shows that building regulations in Europe are not uniform yet and that Germany's standards are not necessarily as strict as is often believed.

The third version of Germany's EnEV (2009) will, however, provide tougher regulation and therefore improve energy efficiency in the German building sector. For new buildings the limit on the annual energy consumption for heating, ventilation and cooling will be lowered by 30% and the efficiency of insulation will have to increase by 15%. The above-mentioned EPBD 2010 will also over time lead to a convergence of building regulations in Europe.[17]

**Scandinavia has strictest building regulations**

Thus, while we await more definitive and comprehensive studies, it seems reasonable to conclude that many of the strictest regulations are found in the Scandinavian and other northern countries.

## 4. Certification systems

The lack of comparability between technical guidelines, regulations and the green performance of buildings is the main reason for the attractiveness of certification systems. They make the major driving factors of sustainable investments – lower operating expenses and the adherence to "Green CSR goals" – transparent and therefore help to steer the real estate market in a more sustainable direction.

[15] Loga et al. (2009).

[16] Austria, Belgium, Czech Republic, Denmark, France, Germany, Poland, Luxembourg, Sweden, United Kingdom.

[17] In another study (BRE 2007), the Building Research Establishment (BRE) compared Scottish building regulations to those in Denmark, Finland, Sweden and Norway. After adjusting for local climate conditions, the study suggests that Scottish regulations do not meet the building standards in the northern countries. A final report (VTT 2007) from Finland compared Finnish and Scottish regulations and concluded that Finnish standards were considerably higher than in Scotland.

### *Certification confirms green building status*

Certification systems assess a building's green performance and confirm its green building status. Moreover, certification systems set standards for green buildings and concrete targets for builders, investors and occupants.

**Certification systems award grades to differentiated performance of buildings**

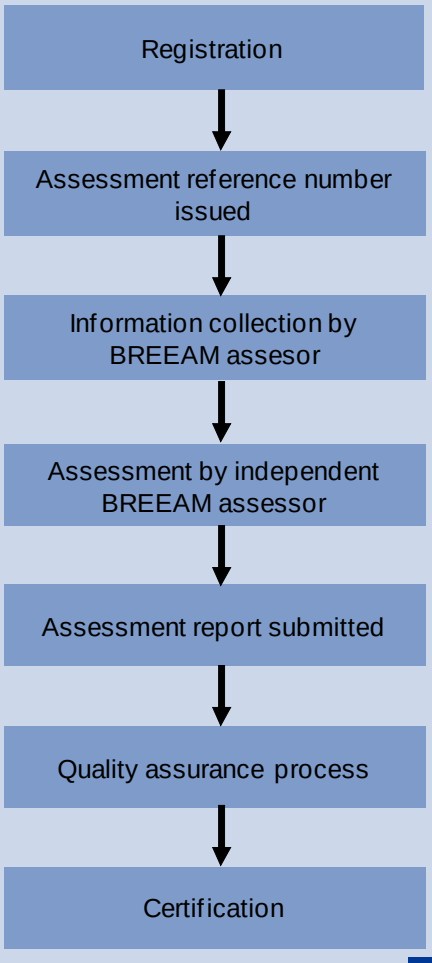
Certification programmes typically require that a majority of criteria be satisfied for a building to be certified, covering a wide range of environmental elements (section 2 above). In some systems, performance grades are awarded and most of these employ three or four grading levels, for example, from "pass" to "outstanding". Once certified, the building's green performance can be displayed and communicated.

### *Different certification systems available in Europe*

A wide variety of green certification programmes are available to building owners and managers in Europe, though they vary in their coverage. Some certify only commercial buildings; others are limited to new buildings. And some focus on building operations while others concentrate more on design (see section below). However, several of these systems are being expanded to include additional building types and situations. Most certification systems can be used throughout Europe; in practice, however, most systems have so far mainly certified buildings in their home countries.

In addition to these certification programmes, there are also various building rating systems, both private and governmental, which make inter-country comparisons of green investment trends in Europe even more difficult.

BREEAM certification process




Source: BREEAM 10

### *BREEAM*

The world's first widely-used rating system, Building Research Establishment Environmental Assessment (BREEAM), was launched in the UK in 1990. BREEAM is operated and managed by BRE (Building Research Establishment), a private research institute. Before the institute was privatised ten years ago, the system was run and promoted by British authorities. Due to its early development, BREEAM served as a model for many systems in other countries.

### *LEED*

In 1996 "Leadership in Energy and Environmental Design" (LEED), an American system, was established. The system is run by the U.S. Green Building Council (USGBC) – a non-governmental organisation. Noteworthy is the system's expansion out of the US into many countries around the world and the strong growth in its home market.

### *SBTool and its applications "VERDE" and "Protocollo ITACA"*

In their current forms, US-LEED and BREEAM remain ill-equipped to consider the idiosyncrasies of local climate conditions and regulations. To address the variation across countries, another system, known as Sustainable Building Tool (SBTool), was developed in 1996 by a Canadian group of researchers for the iiSBE. SBTool provides a general framework of criteria used in the assessment process, where the weighting can be adapted to local conditions. Hence, SBTool is a toolkit for designing a rating system. SBTools are used particularly in Italy and Spain. The local certification systems "Protocollo ITACA" and "VERDE" are both based on the iiBE's general framework.

**Germany with a late start to certification**

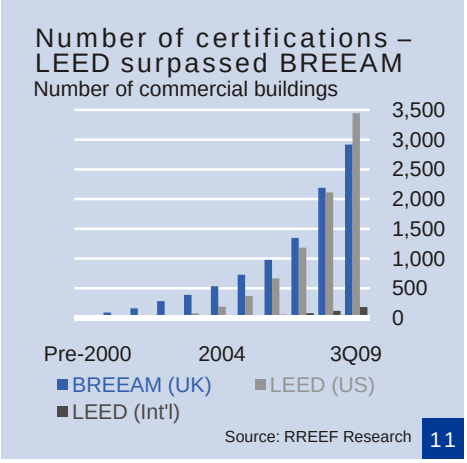
### *DGNB*

Although home to Europe's largest real estate sector, Germany lacked its own certification system until quite recently. The so-called "German Sustainable Building Certificate" was introduced as late as 2009. While environmental standards are high, compared to the US and other countries, a rating system motivating builders to implement green measures was slow to emerge. The start was also delayed as the system was meant to be comprehensive and built on an industry consensus. According to the DGNB the new system is intended not only to assess a building's environmental performance but also to highlight the technology and products available in Germany for sustainable buildings and open up more markets for them. The system was set up with the help of the Federal Ministry of Transport, Building and Urban Development and is one of the most extensive certification procedures worldwide. It is based upon more criteria than most other systems and looks at environmental, economic as well as social factors – the "triple bottom line" principle.

### *HQE*

Like Germany, France has its own certification system. Haute Qualité Environmentale (HQE) was founded in 1996 and is operated by the Paris-based Association pour la HQE. Beside these large certification systems, there are several other systems in Europe. Even within one country there often exist different, unrelated systems. Thus, the existence of so many different systems makes direct comparison of a buildings's environmental performance quite difficult.[18]

### *BREEAM and LEED the most widespread systems*




Being among the first to certifying buildings in their home market as well as in foreign countries, LEED and BREEAM account for by far the largest share of all certified buildings. Both systems have been broadly adopted by the respective real estate sectors in their home countries. Lately, LEED in particular is becoming more widespread across Europe. However, the surge in certifications is still largely limited to the UK and the US.

Comparing the numbers of certified commercial buildings in the UK and the US, it is apparent that despite BREEAM's head start, the number of LEED certified buildings in the US has now surpassed the number of BREAAM certified buildings in the UK (data as of late 2009). This development is due in part to the larger size of the US commercial real estate market and the quicker uptake of trends in the US market. On the other hand, BREEAM has rated far more residential buildings – more than 100.000 buildings all in all.

### *Different systems, different emphases*

All certification systems are based on certain pre-defined criteria. Depending on the building's performance in each category, certification and grades are awarded. Despite many fundamental similarities, the systems emphasise different facets in their definition of what constitutes the "model" green building. This is due to their mostly independent development as well as different national and climatic backgrounds.

**Certification systems differ in their complexity**

All of the major certification systems contain criteria on the efficient use of energy and water. Most systems also consider appropriate site selection, proximity to public transportation, and the indoor

[18] For an extensive but slightly outdated presentation of different certification and rating systems refer to Fowler and Rauch (2006).

environment (strategic day lighting, air temperature, etc.). Not all systems, however, look at the economic performance of green investments in buildings.

Regardless of different emphases, assessment methods should include the perspective of all stakeholders, including owners, tenants, developers and the general public.[19] A building's owner will be mainly concerned about financial issues, whereas occupants might be more focused on indoor air quality and affordable utility charges. Finally, the general public may have the broadest view of the building's environmental performance. A good system should consider and balance all interests. Otherwise, the certificate cannot provide the basis for informed choices.

### *German system is the most complex*

**Germany with the most complex certification system**

Not all systems reflect the full range of sustainability criteria. The largest and earliest systems to be widely used – LEED and BREAAM – consider fewer facets of green buildings than do the German system and SBTool. For example, neither LEED nor BREEAM consider cost issues at all; both systems instead focus on the "basics" of eco-friendly buildings such as energy, water, and indoor environment. In contrast, the German system DGNB takes the full range of sustainability into account, as described in section 2. Among others, the system considers cost issues, value stability, functionality and also the commissioning of the building. SBTool is the second most complex system. It incorporates most basic criteria as well. However, it is somewhat less detailed than the German system, for example, with regard to economic issues. Taking functionality issues into account but ignoring cost considerations, the French system HQE falls in somewhere between the two groups.

### *Rating does not equal certification*

In addition to certification, many programmes also use building rating systems. Rating systems do not award a formal green building label; rather they assist the builders and developers in the planning, construction and operation of the green building by providing clear standards for green construction. Also, they are usually less costly, making them attractive for residential buildings as well.

Among the most notable European rating systems are Sweden's "Miljöklassad", Finland's "PromisE" and the Norwegian approach, "Økoprofil". The Scandinavian countries have very high environmental standards and strongly promote environmental issues. Correspondingly, the Swedish system, for example, has already rated more than 2000 buildings.[20]

[19] Ding (2007).
[20] Nelson (2008).

## Certification systems vary in their complexity

| | LEED | BREEAM | DGNB | HQE | SBTool |
|---|---|---|---|---|---|
| | | | **Basic Information** | | |
| Origin | **USA** | **UK** | **Germany** | **France** | **Canada** |
| Name | Leadership in Energy and Environmental Design | Building Research Establishment Environmental Assessment Method | German Sustainable Building Certificate | Haute Qualité Environmentale | Sustainable Building Tool |
| Established | 1998 | 1990 | 2009 | 1996 | 2002 |
| Responsible | U.S. Green Building Council | BRE | Ministry of Housing | Association pour la HQE | iiSBE |
| | | | **Criteria** | | |
| | | | **Energy** | | |
| Low emmissions | | + | + | | + |
| Renewable energy | + | | + | + | + |
| Efficiency | + | + | + | + | |
| Electrical demand | + | + | + | + | + |
| Low carbon | | + | + | | + |
| Refrigerant management | + | + | | + | |
| | | | **Water** | | |
| Re-use/Recycling | | + | + | + | + |
| Water consumption | + | + | + | + | |
| | | | **Site/Location** | | |
| Public transportation | + | + | (+) | + | + |
| Site selection | + | + | (+) | + | + |
| Grace/Elegance | | | | + | |
| Cyclist facilities | + | + | + | | |
| | | | **Indoor environment** | | |
| Air quality | + | + | | + | + |
| Daylighting | + | + | | + | + |
| Acoustics | | + | + | + | + |
| Thermal | + | + | + | + | + |
| Smell | | | | + | |
| Hygiene | | | + | + | |

| | LEED | BREEAM | DGNB | HQE | SBTool |
|---|---|---|---|---|---|
| | | **Materials** | | | |
| Materials reuse | + | + | | + | + |
| Waste management | + | + | + | + | |
| Robustness | | + | + | | |
| | | **Process and management** | | | |
| Planning | | | + | | + |
| Construction phase | | + | + | | |
| Commissioning | | + | + | + | + |
| | | **Economical issues** | | | |
| Costs | | | + | | + |
| Life cyle consideration | | | + | | |
| Value stability | | | + | | |
| | | **Functionality/Comfort** | | | |
| Flexibility/Adaptability | | | | + | + |
| Access disabled persons | | | + | | |
| Safety and security | | + | + | | + |
| | | **Innovation** | | | |
| Innovation issues considered | + | + | | | |
| | | **Minimum requirements** | | | |
| Yes | + | + | | | |
| **Grades** | LEED Certified<br>LEED Silver<br>LEED Gold<br>LEED Platinum | Pass<br>Good<br>Very Good<br>Excellent<br>Outstanding | Gold<br>Silver<br>Bronze | Basic Level<br>High Level<br>Very High level | Minimum<br>Good Practice<br>Best Practice |

Based on information from the websites of the respective certification systems (September 2009)

Source: DB Research 12

### *The European Union's system*

**EU has its own rating system**

In the context of its Energy Performance of Buildings Directive and the lead market initiative, the European Union also runs its own rating system. The programme is meant to increase awareness and provide information on cost-effective energy efficiency investments. The "GreenBuilding Programme" initiated by the European Union in 2005 is set up as a rating system. In order to become a so-called "Green Building partner", four steps must be taken:[21]

— an energy audit

— an action plan

— the execution of the action plan

— commitment to report energy consumption on a regular basis

The action plan must include steps to improve the building's green performance and is the basis for the decision on the partner status.

### *Greener countries certify fewer buildings*

**Stricter regulation leads to fewer certifications**

Summing up, it is notable that countries with stricter environmental regulation often have a shorter history of extensive certification. Germany, for example, only established its own certification system in 2009. The northern countries of Scandinavia, which have slightly tougher standards according to the IWU study mentioned above at present only have rating systems. Conversely, certification is more common in countries like the US where green standards are considerably lower. The reason for this situation is that relatively green countries may derive little benefit from a system that awards certification to every new house built according to its strict regulations. Less green countries on the other hand likely would not benefit from a very demanding certification system that is much stricter than its building regulations.[22]

### *International networks and institutions*

Most green building rating and certification systems are embedded in one of two international networks, the World Green Building Council (WGBC) and the International Initiative for a Sustainable Built Environment (iiSBE). The WGBC includes the two largest certification systems, LEED and BREEAM, as well as all local LEED systems, the Spanish system VERDE, and the German DGNB. The SBTool was developed and is still provided by the iiSBE. While the WGBC is more commercial and larger, the iiSBE is more focused on R&D. Both organisations regularly organise and host international conferences for networking and the exchange of experiences.

### *Towards more comparability?*

**Certification systems will become more comparable**

More recently, another group, the Sustainable Building Alliance (SB Alliance), was launched. Among its members are the French HQE system, DGNB and BREEAM as well as the Green Building Council, which is responsible for the LEED system. Unlike the WGBC and the iiSBE, SB Alliance not only connects its members, but also works towards establishing common metrics and indicators for a green buildings framework, SB Core. It can be tailored to local conditions, but retains a degree of comparability among different geographies, enabling investors, tenants and owners alike to assess their buildings portfolios across country borders.

[21] European Green Building website (October 2009).
[22] Nelson (2008).

The co-existence of many different systems and the variety in regulatory standards currently make informed choices and an assessment of the state of green buildings in the EU countries difficult. However, once the EPBD is fully implemented in all European countries, building codes will be more in line and the SB Alliance's initiative will also ease current problems.

Greater comparability among the systems will result not only in better-informed investors, tenants and home owners. It will also force companies offering certification services in the same country to compete by way of price, service and the environmental standard their grading levels stand for.

***Recertification and the efficient operation of buildings***

**Recertification will become more important**

With an improved understanding of green buildings, two related issues are receiving greater attention: the importance of efficient building operations, in addition to good building design; and the need to periodically recertify buildings to ensure that they are operated as efficiently as designed. Indeed, LEED is taking significant steps in this direction, and other systems are likely to follow suit.

The focus on building operations is a recognition that many aspects of a building's environmental footprint can be reduced with no or minimal capital outlays, regardless of the original building design. Often the most important ingredients are simply awareness and attitude by building managers. However, getting the most out of the building typically requires undertaking a formal "commissioning" process in which all building systems are fine-tuned by trained engineers for maximum efficiency. Toward this end, periodic recertification requirements can ensure that building managers undertake the commonsense steps of good building operations.

## 5. Limiting factors

**Green buildings have to overcome obstacles**

As we noted above, estimating the depth of the green building market is difficult due to regional and industry inconsistencies in definitions and recordkeeping. Regardless of how the green building stock is measured, it is clear that the real estate industry was slow to embrace the sustainability movement compared to other groups of society and even other business sectors. With so much compelling evidence supporting green building development and investment, the question remains as to why green building investment has been limited to date.

Early on, an important issue was a simple lack of awareness among investors, as well as limited experience among developers. Successfully developing green buildings requires specialised knowledge regarding design, marketing, permissions, certification, and operations. A related issue is the limited supply of professionals who can certify the green credentials of the buildings. After a decade of rising industry experience with the product, however, these issues are now becoming less important.

The global recession is dampening the conversion to greener buildings. With few private-sector real estate projects likely to break ground in the next few years, the supply of new green buildings will certainly drop significantly. Beyond these short-term issues, however, several forces are still holding back green building activity, particularly by third-party investors.

### *Data sources and metrics*

**Lack of sufficient data and metrics is problematic**

The first issue is the lack of a comprehensive and transparent set of operating and transaction data that form the basis of real estate decision making. This is particularly true in Europe, which has yet to see a single major study demonstrating the financial performance premiums of green buildings over conventional buildings – all the major studies to date have focused on US, and to a lesser extent Australian, properties. There is no reason to expect that the European experience would prove different, but the absence of definitive local data undoubtedly undermines investor confidence.

**Real estate industry lacks universal standards for green buildings**

Related to this data issue is the lack of universal standards for what constitutes a green or sustainable building. Beyond the multiple certification systems described above is the reality that green buildings are not as fundamentally distinct from conventional buildings as is, say, renewable energy from carbon-based energy. What renders one building "sustainable" and another not is ultimately a subjective determination – and definitions of "green building" vary widely across regions, and even within countries. Also, unlike most other green products, what makes buildings sustainable has as much to do with their operation as their design and construction. The lack of standards inhibits green building investment, as investors fear acquiring assets with green credentials that lack widespread market acceptance.

Moreover, the real estate appraisal profession also has yet to conclusively determine how green features translate into asset value, as lenders have yet to agree on how green figures translate into underwriting criteria. Industry consensus and standards thus may still be years away.

**Real estate sector not yet ready to embrace green measures voluntarily**

Toward that end, many groups have attempted to establish industry standards by proposing their own frameworks for evaluating the sustainability of companies, funds, or projects. In perhaps the most ambitious effort to date, researchers from Maastricht University recently surveyed all listed property companies and private real estate funds within the investment universe of the three pension funds that sponsored the study (APG Asset Management, PGGM Investments, and Universities Superannuation Scheme).[23] More than 680 entities were queried on 43 aspects of sustainability performance including policies and execution. However, despite endorsements from three leading investment industry bodies[24], the overall response rate was under 30%; the response rate for private funds in Europe, which represent the bulk of relevant commercial real estate investments, was less than 20%. Together with the obvious response bias toward the greenest companies, this survey suggests that the real estate sector is not yet ready to embrace voluntary efforts to set measurement standards. A case in point: less than 40% of respondents had smart meters installed in parts of their property portfolios.

Similarly, various other efforts to set voluntary standards for property underwriting and fund performance in Europe and the US do not

[23] Kok,Nils, Piet Eichholtz, Rob Bauer, Paulo Peneda (2010). Environmental Performance: A Global Perspective on Commercial Real Estate. Maastricht University. The Netherlands.

[24] The Australian Council of Superannuation Investors (ASCI), the European Public Real Estate Association (EPRA), and the European Association for Investors in Non-Listed Real Estate Vehicles (INREV).

appear to be gaining industry traction.[25] As a consequence, investors seeking to understand the sustainability of their real estate investment options are left without definitive guidance and must either fend for themselves with improvised scorecards or rely on proprietary evaluation methods having only limited industry following. The standards vacuum thereby continues to undermine pressures on real estate participants to accelerate their greening efforts.

### *The agency problem*

**Owner costs and tenant benefits are difficult to align**

The vast majority of green construction has been initiated, and continues to be owned, by government and corporate owner-occupants; ownership rates by investor-owners with third-party tenants are far lower. A key reason is the misalignment between owner costs and tenant benefits – what economists call the "agency problem." Under traditional leasing arrangements, landlords pay for the capital costs of efficiency improvements, while many of the benefits of green buildings accrue to the user of the property, and tenants generally do not fully compensate landlords for the value of these benefits.

**Green leases as a means to faster adoption of green buildings**

In order to solve this problem, the industry has developed several innovations such as "green leases". The landlord and tenant agree on how the positive externality of lower operational costs accruing to the private or commercial tenant can be internalised by the landlord, but these agreements are still new and rare. In addition, legal reasons can hold back such agreements. German tenancy laws for example currently limit net rent increases in residential buildings due to modernisations to 11% of the costs and the Green Rent Index is not yet widely used. This index allows for further rent increases to account for efficiency levels that surpass the current building code. However, environmental performance means higher upfront costs, which the landlord might not be able to finance if the rent increase is limited.

By contrast, government agencies and major corporations own a greater share of their facilities than other types of tenants, and so these sectors have been better positioned to internalise the benefits of green buildings.

**Benefits of green buildings larger than costs over the life cycle**

Cost premiums for obtaining a LEED certificate in silver or platinum are around 2% and 6.5%, respectively. On average such buildings reduce the energy consumption by 30%, have lower emissions and maintenance costs and use less water.

The net present value of these savings over 20 years with a discount rate of 5% is over three times larger than the initial cost premium of on average 2%. Including the possible productivity gains would increase the profitability of investing in green features even further.

Energy prices are likely to increase in the future, raising the cost of heating, lighting and cooling. In addition, cost premiums will decrease as the cost of highly efficient materials goes down and the building sector gains more experience. This adds to the significance of the above calculation.

Source: Kats et al (2003)

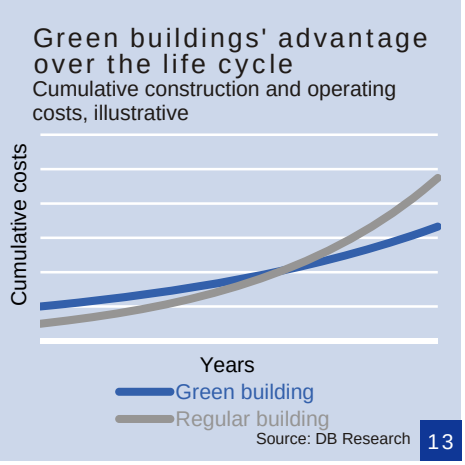
### *Current costs vs. future benefits*

Another factor limiting green building is the difference in the investment time horizon for green buildings relative to conventional buildings. A central premise of the green-building business case is that owners should consider costs over the life of the asset, not just the initial construction costs – a concept known as life cycle costing. Green buildings often will cost slightly more to construct (known as "first costs") but typically are less expensive to maintain and operate, so the total costs over the life of the property are less.

One issue is that according to the World Business Council these cost premiums are often overestimated[26], deterring developers from investments that actually yield a positive return – which is another aspect of the data problem discussed previously. A more important impediment is that the earn-back periods for many green

[25] See Capital Markets Partnership and the Market Transformation to Sustainability (2008). National Consensus Green Building Investment Underwriting Standards, Commercial Buildings.

[26] See: World Business Council on Sustainable Development. Global Survey Shows 'Green' Construction Costs Dramatically Lower than Believed. Press release. August 21, 2007. Also, Kats et al. (2003).




improvements exceed the typical holding period for investment real estate, which is generally five to ten years. Most investors would only consider investments with payback periods considerably shorter than the intended (remaining) hold period, in part because of investor pressures and financial incentives to raise shorter-term returns. Rising energy prices are reducing the significance of this issue, but the extended investment time horizon is still an obstacle for many investors, and thus an impediment to green construction among investors.

Private home owners are affected by this problem in a slightly different way. The problem of overestimated cost premiums is compounded by a financing problem. Buying or building a home is usually the biggest investment made by a household. The additional costs of constructing green or modernising an existing building to achieve better environmental performance will further increase the financial burden, making the investment seem infeasible for many households.

For all of these reasons, green buildings generally tend to be preferred by government agencies, major corporations and owner/users of real estate, all of whom tend to have longer investment horizons, and can better capture tenant benefits for their account, than can typical institutional real estate investors.

## 6. Conclusion

Striving for more efficiency is a feature of market economies, and the real estate sector in Europe is no exception. Nonetheless, with the scientific consensus on the global effects of $CO_2$ emissions and the ensuing strong political support for reduced emissions the topic of increased energy efficiency levels has received a considerable push.

The building sector was identified by the European Union as one of the markets with the highest energy saving potential. Not only is this sector responsible for over 40% of European energy consumption, green building techniques also make substantial resource savings at comparably low marginal abatement costs possible. These techniques make the higher initial costs of building green profitable over the life cycle of a building.

The fundamental shift towards a green real estate sector still faces challenges, though. The agency problem characterised by a misalignment of owner costs and tenant benefits is one of the factors limiting stronger investor interest. The other main hindrance is a lack of comparable industry standards as well as consistent data and metrics resulting in uncertainty over the profitability of investments in green buildings.

These factors are, however, more than outweighed by the effects of governmental intervention, probably the strongest driving force of green buildings in Europe. Stricter building codes and strong incentive programmes were the method of choice and have strongly influenced the market.

Sometimes though, people do not need strong incentives or strict regulation to change. Richard Thaler and Cass Sunstein, two professors using the results from behavioural economics, would probably say: "A nudge is all we need." In case of green buildings, requiring the display of the energy performance of buildings in public, as for example done for large public buildings in the UK, might alter people's behaviour more effectively than any regulation can.

In any case, future EU legislation is likely to mandate a “near-zero” energy standard for new buildings by 2021 as well as higher efficiency standards for existing buildings. This will be the next important step to a green building sector. But even before the green real estate sector is set to grow out of its current niche position it will become mainstream.

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# GreenLight and GreenBuilding EU awards: winners save up to 85% of their energy consumption

***These awards, launched by the European Commission in 2000 and 2005 respectively, promote the reduction of energy consumption by public and private organisations on a voluntary basis. One of the 12 award winners in the 2010 edition of the GreenLight programme is Dagda town council in Latvia, which reduced its energy consumption in lighting by 85% after joining the initiative in 2007. In the GreenBuilding category, two of the best refurbishment projects, an office building in Austria and a secondary school in Germany, have achieved over 80% of energy savings. These initiatives count over 700 participants all over Europe, who save approximately 545 GWh each year. This is equivalent to the energy used by two mid-size European cities over the same period.***

*"We congratulate the winners of these awards. Whether public or private sector, they are all living proof that organisations which invest and innovate in energy efficiency can bring immense benefits to themselves while making a leading-edge contribution to a more sustainable Europe. Spreading this kind of best practice, including through award schemes like this, will be a key factor in the economic and environmental success of the Europe 2020 Strategy",* stated Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science and Günther Oettinger, European Commissioner for Energy.

Managed by the European Commission's Joint Research Centre (JRC), the GreenLight and GreenBuilding programmes are voluntary schemes that invite private and public organisations to reduce their energy consumption in their premises. GreenLight encourages partners to install energy-efficient lighting, while the GreenBuilding initiative promotes improved energy efficiency in buildings through several measures such as thermal insulation, efficient heating and cooling, intelligent control systems, PV panels etc.

The two award ceremonies take place in Frankfurt on April 13 & 14 during the "Improving Energy Efficiency in Commercial Buildings" Conference (IEECB'10). A total of 24 participants receive awards in this 2010 edition for their results or their innovative projects. Decisions are based on their energy savings, technologies used and the sector they belong to (public buildings, retail, offices…).

## GreenLight

Since its creation in 2000, the GreenLight initiative has recruited more than 500 partners from across Europe. By replacing old-fashioned lighting with modern, low-energy lamps, and by controlling the use of lighting, they have achieved total savings of 241 GWh/year (see figure 1 below). This corresponds to a saving of around €24 million in running costs and over 94 million kilograms of $CO_2$ emissions per year.

***2010 GreenLight winners***

| Organisation | Country | Energy savings in lighting |
|---|---|---|
| Águas do Cávado | Portugal | 39,40% |
| Dagda Town Council | Latvia | 85% |
| Decathlon | Spain & Romania | Romania: 70%<br>Spain: 35;2% (average) |
| | | |
| E-on (Germany) | Germany | 71,92% |
| ING Real Estate | The Netherlands | 70% (average) |
| Le Centre de Dialyse du Bearn | France | 53% |
| Municipality of Dobrich | Bulgaria | 50% |
| NH Hotels – 1 hotel | Spain | 60,24% |
| O.S.V.O Comp, a.s. | Slovakia | 18% (with an increased number of luminaires and burning hours) |
| Prague Marriott Hotel | Czech Republic | 68% |
| Public Service of the City Villingen-Schwenningen | Germany | 58% |
| Saule Birinius Pils SIA | Latvia | 76% |
| Best endorser (promoter): Infrax CVBA | Belgium | |

## GreenBuilding

The GreenBuilding initiative, created in 2005 following the success of the lighting initiative, has recruited over 185 partners. The 286 participating buildings save an estimated 304 GWh/year in primary energy (e.g. electricity, natural gas and heating oil), which corresponds to an average percentage saving of 41%.

These results have been achieved by a combination of measures (see figure 2 below), mainly by installing more efficient heating and air conditioning systems, followed by a better insulation of the building envelope (the separation between the interior and the exterior environments) and more efficient lighting. Harnessing solar and geothermal energy has also contributed.

Important findings from this programme can contribute to the promotion of efficiency measures:

For new buildings, additional costs related to energy efficiency investments are low (less than 10% of the investment)

Most of the projects brought more savings than initially estimated.

***2010 GreenBuilding winners***

| *Best corporate partner* | | Savings |
|---|---|---|
| Brostaden | Sweden | 34 buildings refurbished<br>38% primary energy savings |
| *Best Refurbishment Projects* | | |
| Secondary school Hengersberg | Germany | 81% of primary energy demand |
| Piraeus Bank Syggrou | Greece | 30% of final energy demand |
| NH Principe de la Paz | Spain | 49% of electricity consumption<br>48% of gas consumption |
| Office Manschein – special recognition for innovation | Austria | 82% of primary energy consumption |
| *Best New Projects* | | |
| Phoenix Plaza | Croatia | 71% of heating energy demand |
| ASILO Cologno Monzese | Italy | 81% of primary energy demand |
| Port of Ghent office - special recognition for replication potential | Belgium | 67% of primary energy demand |
| Office ENERGYbase – special recognition for innovation | Austria | 72% of heating energy demand |
| *Special acknowledgment from the jury* | | |
| AB Vasilopoulos | Greece | 32% of electricity consumption |
| SeaBridge Logistics | Belgium | 73% of primary energy demand |
| *Best endorser (promoter of GreenBuilding)* | | |
| Levenger | Spain | |
| Bengt Dahlgren | Sweden | |

The JRC is currently evaluating the overall results of both programmes and detailed reports summarising the main energy efficiency measures, savings, motivations and experience of the partners will be published during the EU “Green Week” in early June.

**Figure 1: energy savings of all GreenLight partners per category, by the end of 2008**

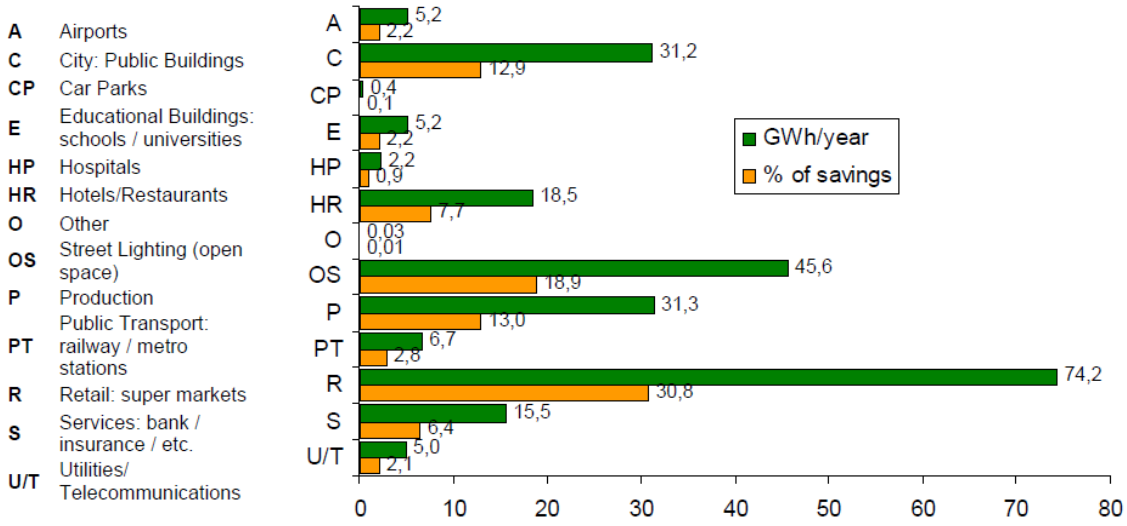
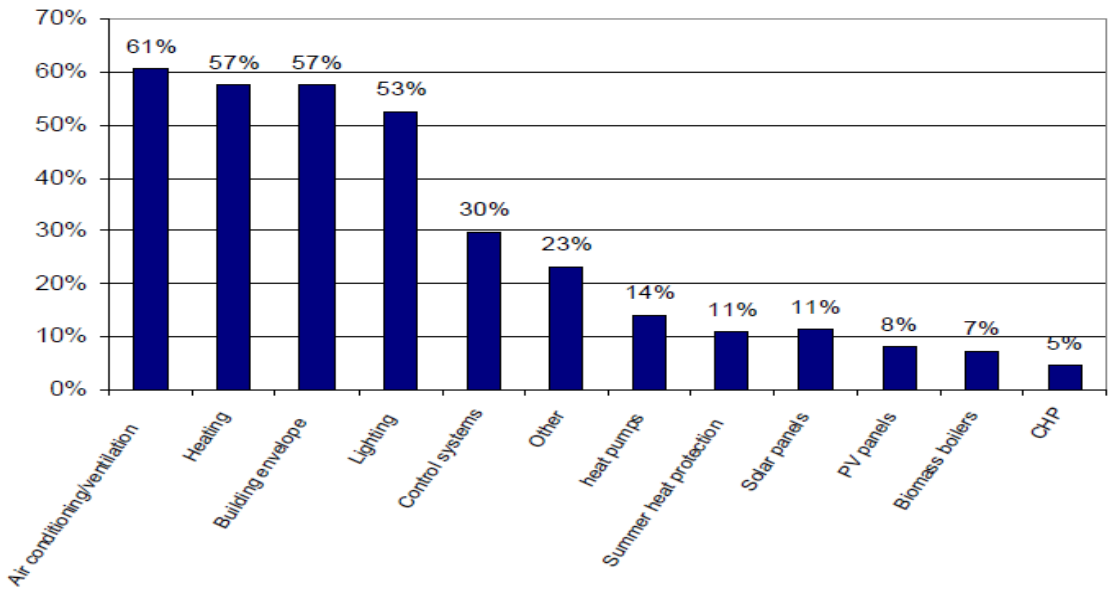



**Figure 2. Typical proportional use of energy-efficiency measures used in the GreenBuilding programme.**




## Further information

For more information about the GreenLight and GreenBuilding programmes, please visit: http://re.jrc.ec.europa.eu/energyefficiency.