

# *European Energy Saving Guide 2013*

*of the European Association for External Thermal Insulation Composite Systems (EAE)*

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<i>Thermal insulation of buildings – No time to lose and make progress</i>	4
<i>Günther H. Oettinger</i> , EU Commissioner for Energy	
 <i>Editorial</i>	7
<i>Ralf Pasker</i> , EAE Managing Director Technical & Marketing Affairs	
<i>Dr. Wolfgang Setzler</i> , EAE Managing Director	
 <i>Why thermal renovation will be a huge success story</i>	8
<i>Oliver Rapf</i> , Executive Director of the Buildings Performance Institute Europe (BPIE)	
 <i>The Green Deal for energy efficiency – The British experience</i>	12
<i>Charles Phillips</i> , Deputy Director in the UK Department of Energy and Climate Change (DECC)	
 <i>Status quo in 2012 - Huge potential demands determined action</i>	16
 <i>Plan for future action - Mission possible</i>	28
 <i>About our association</i>	
<i>EAE – Partners for sustainable building and refurbishment in Europe</i>	40

**Günther H. Oettinger**

EU Commissioner for Energy



## *Thermal insulation of buildings – No time to lose and make progress*

*It is time to make significant progress in terms of energy efficiency. The efficient use of energy is a main challenge of energy policy – not only because of climate protection objectives, but especially as we have to face limited resources and potentially further increasing energy costs.*

*Here the energetic improvement of buildings' envelopes plays a major role: almost 70% of EU's energy consumption of average private households are caused by heating and cooling. Even with existing technologies the energy consumption could be reduced by at least a half. In other words: we do not make use of energy saving potentials that could be re-*

*alized economically and waste both limited resources and money. Improving the energy efficiency on the other hand leads to a win-win-win situation. The competitiveness of regions and companies will be improved, consumers will be relieved from energy costs, and the environment will be preserved.*

*By adopting the Energy Efficiency Directive we managed to establish a stable and reliable legal framework for necessary investments in energy efficient technologies and systems. Now we can develop competitive markets for energy services that will realize existing potentials actively.*









**Ralf Pasker**

EAE Managing Director  
Technical & Marketing Affairs

**Dr. Wolfgang Setzler**

EAE Managing Director

## Editorial

Europe will be able to switch to renewable sources of energy only if we make every possible effort to reduce energy consumption of the building stock. The savings in this field are many times higher than the output that can currently be achieved using nuclear power. Furthermore, saving energy is probably the most effective way of protecting our resources.

This Energy Saving Guide primarily wants to inform you when planning objectives, political targets and available options. We have drawn together current findings from recent studies in a clear and comprehensible guide giving you a sound overview of this very complex topic in a short time.

Only if we can make people aware of all positive arguments we will reach our common goal of consuming less energy and supplying most of the remaining requirement largely from renewable sources.

Saving energy, action on climate change and resource protection are trans boundary tasks in a Europe characterized by changes. Energy-saving renovation of the European building stock is a force driving the economy in all countries across Europe. All Europeans can benefit from this forward-looking task, because the capital investment pays off within the shortest time by reduced heating costs. For all of us it makes more sense to invest in a profitable future than to fund existing unemployment from tax revenues.

As a European association deeply involved in building insulation and as publishers of this Energy Saving Guide, we would be delighted if you were to help us spread the findings presented here to other people.

## Why thermal renovation will be a huge success story.

**Oliver Rapf** is Executive Director of the Buildings Performance Institute Europe (BPIE) in Brussels. In our interview he talks about the huge study „Europe's buildings under the microscope“ and perspectives for thermal renovation in Europe.

**With the study „Europe's buildings under the microscope“ the BPIE analyzed for the first time the situation of Europe's building stock in total. Which data occurred to be the most difficult ones to be collected?**

The data the most difficult to collect were on commercial buildings, the ownership profile in the non-residential stock, the energy breakdown by building type and end-use, and the renovation rates in general. There is also very little information on energy efficient renovations, for example the scale and depth of renovations and overall involved costs at country level.

**What do you think about the chances to close this data gap within the next future?**

It will be important that the governments in the EU countries recognize that reliable and detailed data are a prerequisite to develop and implement policies and programmes which significantly improve the energy performance of buildings. We will do our best to support data collection and transparency through the BPIE data hub which will go online in autumn 2012. With this portal it will be possible to select single data sets and to compare e.g. the energy consumption of single family houses in Germany and Austria. All data will be presented transparently together with the information about the source. If figures are based upon estimations, this will be mentioned explicitly. The purpose of the data hub is also to show what we don't know, with the aim that the responsible people in

all EU member states improve data collection. We hope that other institutes and authorities will work with us to provide better information over time.

**What is the highest objective of your data hub?**

We want to make data in the building sector much more transparent and want to work towards harmonization of available data. After all, the EU has set goals for CO<sub>2</sub> reduction and energy saving and all Member States will have to contribute to achieving the targets. If we cannot properly evaluate their contributions and potentials, we have a problem - even in practice. Different standards and measuring methods for buildings' performance act as very strong trade barriers although we have a common European labor market. Let me give you an example from the construction business: if a German business wants to renovate a building in Belgium, it needs deep knowledge about the national buildings codes and standards, which differ significantly from those in Germany.

**Looking at the building stock: which areas of urgent action could be identified by your study?**

In addition to the need for systematic data collection and monitoring, we recommend to develop national renovation roadmaps and to create new financing tools incentivizing deep renovations across Europe. Today, financing is one of the most important barriers to energy ef-



efficient building renovation, especially to cover the high upfront costs. The current economic and financial crisis makes the access to public money more difficult, therefore we need innovative financing mechanisms which channel more private investment into energy efficient renovation projects. On the policy implementation side, there should be more attention paid to the establishment of sound monitoring systems, to ensure compliance with building codes and standards, and to develop effective enforcement schemes. Training and education of the workforce plays also an important role if it comes to making quality renovations happen.

**Keyword financing: how could, according to your opinion, financial barriers be lowered in order to achieve an increasing refurbishment ratio?**

Today, institutional investors have very little opportunity to invest into energy efficiency projects. For sure, investments in energy saving measures of the building stock could be absolutely attractive for investors with a long term perspective like pension funds, as they provide longterm, low risk and reliable returns. To make it happen a variety of small private renovation projects could be combined to create one large investment project. What will be important is, that such investment tools are tailored to national circumstances. At the moment we are in contact with investors about a project to define how such investment tools could be designed. A role of the government could be

to provide guarantees for the projects to a certain extent. This would not require a big continuous investment like other subsidies do.

**According to your opinion, do you think that thermal renovation of buildings could be a driver of economic growth European-wide?**

Absolutely! The technical know-how is available, work force is available as well - certainly we should invest in further qualification - and there are more than enough buildings that have to be renovated. With respective support the recovery would not only help the local construction businesses and the construction products industry, but also cover the fields of construction planning, innovation, research and development.

**It seems to be a recipe for success even for EU Member States highly affected by the crisis ...**

We only have to take a look at Spain: throughout the past decades they often built very fast and cheaply. Many of these relatively new buildings have big potential to increase their energy performance. With the help of a big governmental program qualified people could find a new job, and money that today has to be spent for unemployment benefits could be invested in energy efficiency measures instead. Keeping in mind that this will not be a short-term labor effect and that these jobs cannot be transferred abroad, success story.

**Where do you see the greatest potential for actions – at EU level or at the level of Member States?**

Both will have to make their contributions. Climate targets, economic growth and energy security are European topics and require therefore cross-European strategies. When it comes to the realization of these objectives, Member States are responsible for developing, implementing and enforcing national policy measures. In the building sector, this can be ensured by roadmaps towards nearly zero-energy buildings and large-scale (deep) renovations. To design realistic approaches, the bottom-up view is necessary. The responsibility therefore must be delegated to Member States. This is where it all has to happen. But in the end, only a combination of political decisions in Brussels and in the European capital cities will deliver results such as achieving the European climate and energy saving targets.

**According to your opinion: what are the most important results of your study?**

Our study illustrates the huge potential for building renovation and its environmental, economic and societal benefits. It demonstrates the feasibility of a systematic renovation of the existing building stock and the considerable Return on Investment. Current practice will not be enough to meet the European climate targets. A roadmap approach at national level – as now required by the new Energy Efficiency Directive – is necessary to foster a step change in renovation activities which will stimulate economic growth in Europe.

**Thank you very much for the interview!**



**Oliver Rapf** has been appointed Executive Director of The Buildings Performance Institute Europe (BPIE) in June 2011.

Before joining BPIE, Oliver Rapf worked for the global conservation organization WWF in various roles. Most recently he was Head of the Climate Business Engagement unit of WWF International, managing strategy and partnership development with the private sector. His experience in buildings' efficiency goes back to the late 1990s when he was a project leader for several deep renovation projects on behalf of WWF in cooperation with housing companies across Germany. Other roles include the position of deputy Head of WWF's European Climate Change and Energy Policy Unit. Oliver participated in UNFCCC negotiations, and was the leader of the German NGO coalition at international climate change negotiations.



## The Green Deal for energy efficiency – The British experience

**Charles Phillips** is a Deputy Director in the UK Department of Energy and Climate Change (DECC) and works on the Green Deal, the UK Government's new scheme for promoting the delivery of energy efficiency measures in households.

*Climate change is one of the greatest threats to UK and global security and prosperity. There is an overwhelming scientific consensus that climate change is happening, and that it is very likely to be primarily the result of human activity.*

*Energy efficiency is one of the most cost-effective ways of tackling this challenge. The cheapest energy is the energy we do not use, and in a world of increasing energy prices, market volatility and reliance on imports, being efficient with our energy has never been more important. All customers and businesses are looking to see how they can reduce their monthly bills, and energy efficiency is the obvious first choice.*

*In the UK, our building stock is among the most inefficient in the world and contributes a sizeable proportion of our emissions. For the country as a whole, properties leaking heat and money are also properties leaking carbon.*

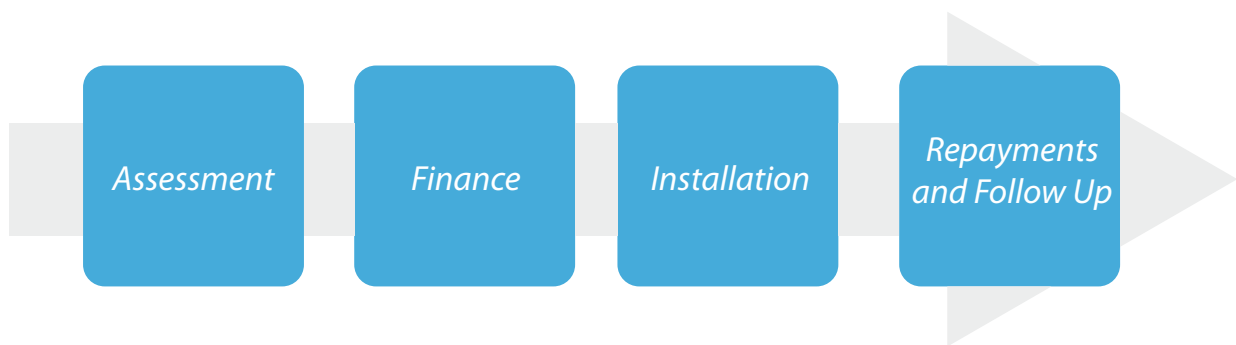
*The central rationale for the new Green Deal program is therefore to reduce carbon emissions cost effectively. We know insulation is often the most cost-effective way to reduce carbon emissions from buildings. It is also often one of a package of improvements, including heating measures, needed to lift a family out of "fuel poverty". And many energy efficiency measures save money straight away – so what is stopping us adopting them?*

*Our research suggests that people are unable to act because they cannot afford the upfront costs, or they are unsure whether*

*they can trust the quality of work. In the case of measures like solid wall insulation, which have not in the past been delivered in large quantities in the UK, there is also a lack of awareness of the benefits.*

*Previous Government schemes have tended to be "top-down" – putting an obligation on the major energy companies to achieve certain targets, effectively requiring them to "push" certain measures like loft or cavity wall insulation onto consumers at reduced prices. The consumer has little choice other than to accept, or not, the measure they are offered.*

*The Green Deal is designed to change that. It puts consumers and consumer choice at the heart of things, by increasing a household's ability to finance whatever energy efficiency package they choose, with confidence that it will meet the standards they expect. At its center is an innovative new financial mechanism which eliminates upfront costs and provides reassurance that the costs should be covered by the savings. A "Golden Rule" stipulates that the amount the consumer can pay back should never be more than the anticipated savings – so, if the installation of a particular measure is expected to save, say, £50 a month on their energy bills, then they can "borrow" up to that level of repayment. Linked to the finance are strong consumer protections including a Government-backed system of accreditation for impartial initial assessment, reliable measures, and quality installation by trained installers.*



*And, crucially, the finance is linked to the physical property (via the energy meter) not to the individual consumer. If the consumer who originally takes out the finance moves house, then the new occupant – who will experience the energy-saving benefits of the measure which has been paid for – will become liable for the repayments. No debt attaches to the original occupant once they are no longer receiving the benefit. The fact that the finance attaches to the energy meter, not the individual, also makes the repayments more secure for the company providing the finance – repayments are made along with the monthly energy bill, for which default rates are generally low.*

*The vision for the Green Deal is thus an ambitious and far-reaching one. Whereas a very large amount of the energy efficiency activity in Britain at the moment is delivered by the six major energy companies, who dominate the UK energy supply market and are legally obligated by Government, in future we expect to see a more dynamic, genuinely market-led landscape, with a variety of companies and organizations competing to make the best offers to consumers. This could include nationwide retail brands, local businesses, local and regional Government, energy suppliers and energy service companies...*



*And since all these companies will be looking to identify and attract the right consumers, there is a huge opportunity for those firms, including the building and property maintenance sector, who are already used to engaging with households. For many consumers, the right moment to consider insulating their walls is when they find themselves needing new plumbing, or wanting a new kitchen – and this creates a new business opportunity for a company that is selling the plumbing or the kitchen, whether they choose to diversify into delivering the insulation themselves, or to partner with a Green Deal company who does so.*

*Of course, not every measure will pay for itself for every household. Some homes, due to their construction type, are more complex and more expensive to improve and need measures like external (or: solid) wall insulation which may be less cost effective to the household (though still cost effective to the country as a way of saving carbon). If an external wall installation costs, say, £10,000, perhaps only £5,000 will realistically pay for itself under the Golden Rule. Extra funding will be needed to make it affordable.*

*That is why in Great Britain we are continuing with an obligation on the major energy companies (in line with requirements under the new European Energy Efficiency Directive). But the obligation will be very different in future to what it has been in the past. Where past programs have driven significant delivery of the cheaper insulation measures like loft and cavity wall insulation, in future it will focus on more expensive, “hard to treat” measures like solid wall insulation. In doing so, it will also support the growth of the Green Deal market. Energy companies will be looking to partner with Green Deal companies who can provide a proportion of the funding, with the ultimate objective of boosting the overall market, driving down unit costs, and thus over time reducing the proportion of the cost that has to be met through socialized, bill-payer subsidy, and maximizing the amount that is paid by the individual consumer who benefits.*



**Charles Phillips** has particular responsibility for quality, standards and capacity issues relating to the industry supply side – for example, the solid wall insulation industry which has historically been only a small component of the UK insulation market, but which is projected to grow strongly under the Green Deal. He is also responsible for the obligations that Government imposes on the major energy companies to deliver insulation and other energy saving measures through programmes such as the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP), and the new Energy Company Obligation (ECO).



## *Status quo in 2012 - Huge potential demands determined action*

*The EU's energy and climate targets are certainly ambitious. Yet there are many who doubt whether the requirements for 2020 are realistic. Potentials for 20% less energy consumption certainly exist – simply making buildings more efficient would enable attainment of a large proportion of the targets, as current studies and surveys clearly show.*

*However, the figures also reveal that in the EU Member States much too little has been done so*

*far to motivate home owners to modernize their properties. In many places there are insufficient supporting options, too little information and no clear instructions for the owners. This is incomprehensible, especially given that most investments in energy-saving building refurbishment bring about huge monetary savings in the long term.*

*The EU and its Member States must provide the right impulses – for more action and commitment to ensure a future worth living.*





## **Energy and CO<sub>2</sub> status in the building sector**

Three times 20% – that was the ambitious target passed by the European Council in 2007. By 2020, greenhouse gas emissions should decrease by this amount, and both energy efficiency and the proportion of renewable energies should rise by the same factor. Furthermore, the target of reducing CO<sub>2</sub> emissions by at least 80% until 2050 now applies to the EU and other industrialized countries.

The study “ENERGY SAVINGS 2020”<sup>1</sup> reveals what the energy efficiency target in particular means in terms of numbers. The authors calculate that in the year 2020 energy savings of around 394 megatons oil equivalent (Mtoe) will be necessary for achieving the targets. However, in view of the current situation at best half this figure is realistically attainable, which matches the conclusion of the WWF’s “EU Climate Policy Tracker 2011”<sup>2</sup>. According to “ENERGY SAVINGS 2020” the 2006 Energy Efficiency Action Plan (EEAP) puts a figure of 95 Mtoe on the potential savings from all existing efficiency policies, and renewable energy policies and the economic recession are expected to bring about 20 and 70 Mtoe of savings respectively. The remaining gap of 208 Mtoe far outweighs the actual savings being made. It is roughly equal to the annual primary energy consumption in the United Kingdom<sup>3</sup>.

Yet even at the end of 2011 the European Commission was still optimistic in its “Energy Roadmap 2050”<sup>4</sup>: “Political commitment to very high energy savings; it includes e.g. more stringent minimum requirements for appliances and new buildings; high renovation rates of existing buildings; establishment of energy savings obligations on energy utilities. This leads to a decrease in energy demand of

41% by 2050 as compared to the peaks in 2005-2006.” The most important drivers of this development are also mentioned: “Higher energy efficiency in both new and existing buildings is the key driver. Nearly zero energy buildings should become the norm.” One of the questions is, “...how to find the cost-optimal policy choice between insulating buildings to use less heating and cooling ...”

## **Climate targets? Buildings have to be included!**

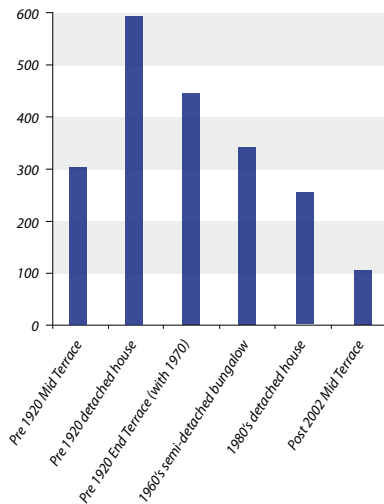
The precise locations of these efficiency potentials are shown in “Europe’s buildings under the microscope”<sup>5</sup> from the BPIE, which analyzes the building stock in Europe more detailed than any other preceding study. For example, in 2009 households accounted for 68 per cent of total final energy use in buildings. Most energy goes on heating, although of course the local climate leads to major variations: in Southern Spain the proportion of energy consumed in heating residential buildings is 55 per cent, which is relatively low, while the figures for Poland and France are 66 and 67 per cent respectively. Yet an equally decisive factor is the efficiency of the installed heating systems and in particular the properties of the building envelope.

The study compares several countries from various parts of Europe in terms of final energy consumption by typical single family homes, categorised by year of construction. Some considerable differences emerge: a detached single family home in the UK built before 1920 has an average annual energy consumption of 585 kilowatt hours per square metre of residential space, whereas a new home in Slovenia consumes only 34. Even if one takes into account influences such as climate and average house size, these values still span a huge range.

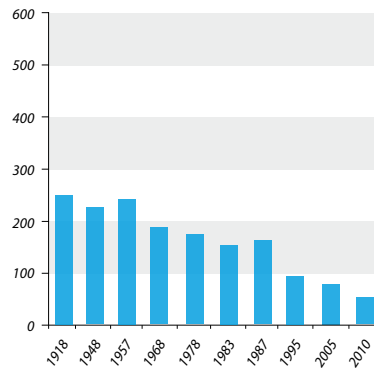


*Average heating consumption levels in terms of final energy use (kWh/m<sup>2</sup>a)  
of single family homes by construction year*

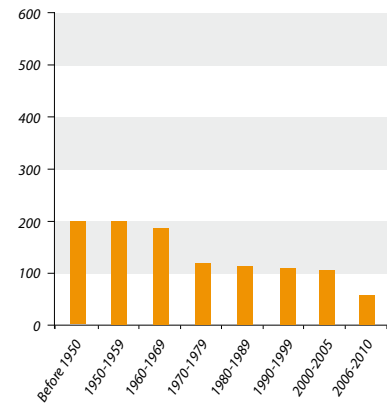
**United Kingdom**



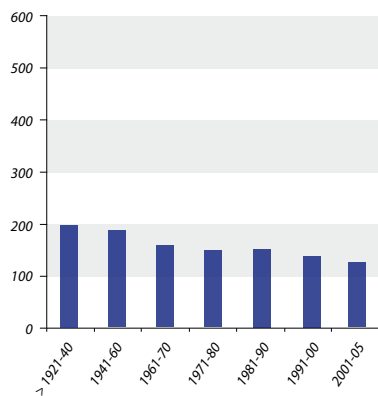
**Germany**



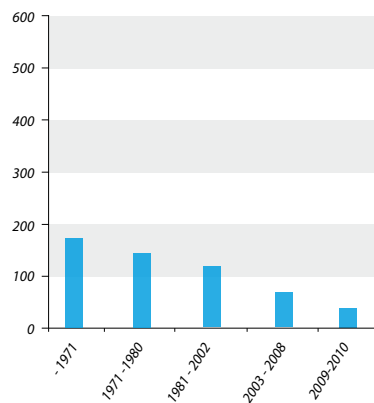
**Portugal**



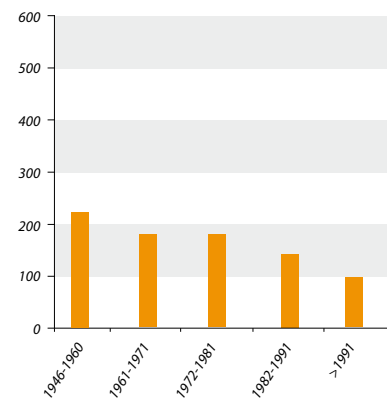
**Sweden**



**Slovenia**



**Italy**

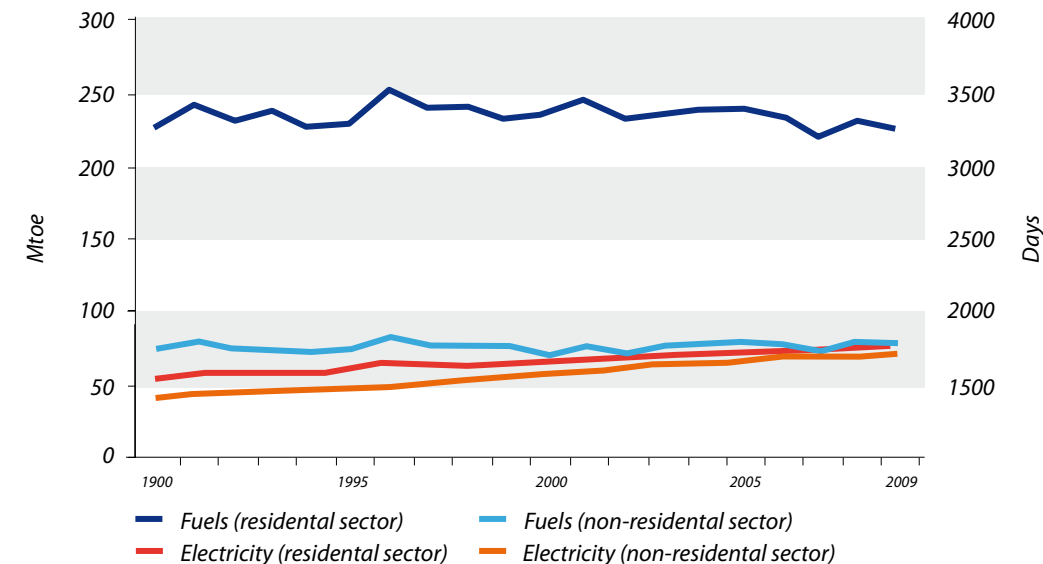


Source: BPIE

A similarly large spread appears in a Europe-wide comparison of CO<sub>2</sub> output. Buildings are responsible for 36 per cent of annual emissions, but there is a great range above and below the average value of 54 kilogrammes of CO<sub>2</sub> per square meter of floor space. Norway and Sweden have the best values, of between 5 and 15 kilogrammes, while France comes among the top five with a good 25 kilogrammes of CO<sub>2</sub> per square meter of floor space. The numerous countries in the me-

dium range are grouped around the average mentioned above, while the highest figures, exceeding 100 kg, are recorded for Greece, Cyprus, Poland, Lithuania, the Czech Republic and Ireland. When assessing these figures it is important to remember that they are particularly affected by the energy mix prevailing in each country; using renewable energies has an equally positive impact on the result as large-scale use of nuclear power, which also emits zero carbon dioxide.

## Historical final energy use in the building sector (EU27, Norway and Switzerland)



### Unclear strategy, huge responsibility

Even this limited overview of the figures gives an idea of the possibilities latent in the European building stock – in relation both to energy efficiency and to reducing CO<sub>2</sub>. The path to follow is described only in vague terms by the European Commission in its communication entitled “Energy 2020”: “The energy-efficiency renovation rate should be accelerated by investment incentives, wider use of energy service companies, innovative financial instruments with high leverage factors and financial engineering at European, national and local levels.” It goes on to say, “Programmes and technical assistance facilities are needed ... to develop and structure finance for projects that target both public authorities and private actors.”

Here great importance is attached above all to the final group mentioned, the “private actors.” According to figures in the BPIE study, the great majority of European homes are privately owned, and most of these are also owner-occupied. The highest private ownership quotas are found in the countries of Southern Europe, headed up by Spain with a figure of nearly 100 per

cent. The largest proportion of publicly owned residential buildings occurs in Austria at over 20%.

These facts rapidly make it clear that those “private actors” have to bear the main burden when it comes to European efficiency targets.

### In detail: potential in existing building stock

First, the good news: the massive shortfall in reaching the European Commission’s ambitious CO<sub>2</sub> and efficiency targets can be almost completely covered using measures that pay off economically. Calculations to this effect appear in the extensive “Study on the Energy Savings Potentials in EU Member States, Candidate Countries and EEA Countries”, which was commissioned in 2009 by the European Commission and co-ordinated by the Fraunhofer Institute for Systems and Innovation Research. It states: “Energy efficiency measures in the building sector provide enormous potentials to reduce CO<sub>2</sub> emissions in Europe. The energy use of the building segment

accounts for 40 % of the total energy use in the EU and represents Europe’s largest source of emissions. This high amount of emissions could be reduced up to 80 % by simple measures, e.g. better insulation of the different components of the existing building stock, of already refurbished dwellings, as well as for new buildings ...”

### Climate action pays off

The paper provides a very detailed summary of the potential savings for various sectors; for the building segment the potentials are shown under different sets of conditions, which are pooled into three scenarios. The “Low Policy Intensity” (LPI) and the “High Policy Intensity” (HPI) scenarios are based on economic measures for raising energy efficiency and have different overall conditions as their starting points – with greater or lesser ambitions among all those involved. The figures of the “Technical Potential” (TP) scenario reflect what is technically possible without taking economic performance into consideration.

In the housing sector alone the study identifies a savings potential of nearly 20 Mtoe for 2020 in the LPI scenario, and starting from more ambitious initial assumptions the figure climbs to over 50 megatons, reaching a technically achievable maximum of almost 80 megatons oil equivalent. There is an interesting dynamic worked into these scenarios: for the year 2030 the authors calculate a savings potential in each case that is already more than twice as high.

If one adds in the potential savings in non-residential buildings, for 2020 there are already possibilities of saving between 40 and 118 megatons oil equivalent in buildings in the EU-27, and a whole 76 megatons could be saved by applying efficiency measures.

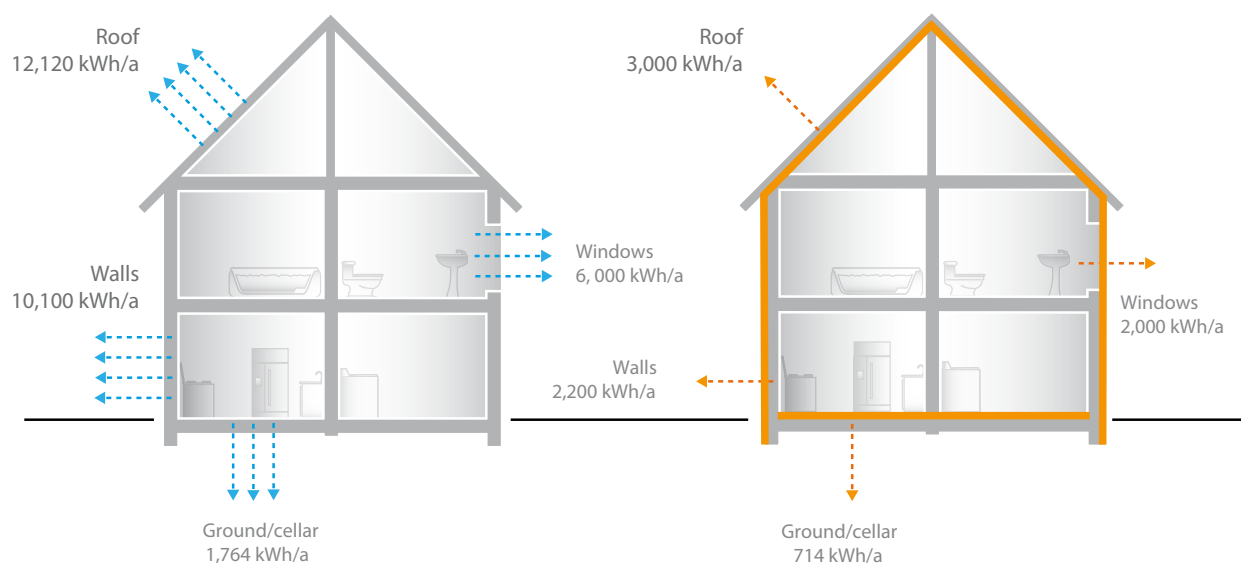
### Enormous potential in old building stock

The regions and countries harbouring these efficiency potentials are shown in great detail in the study "Europe's buildings under the microscope"<sup>8</sup>.

The 27 EU states, plus Switzerland and Norway, have a total building floor space of about 25 billion square meters—equal to 80% of the total area of Belgium. In addition, the study assumes annual growth of around 1% in floor space for the EU states. Three quarters of this area is accounted for by residential buildings, 64 per cent of these are single family houses. However, this level varies from one country to another, in some cases considerably. The proportion of owner-occupancy in Ireland comes to nearly 90 per cent, whereas the figure in Latvia is only a little over 25%.

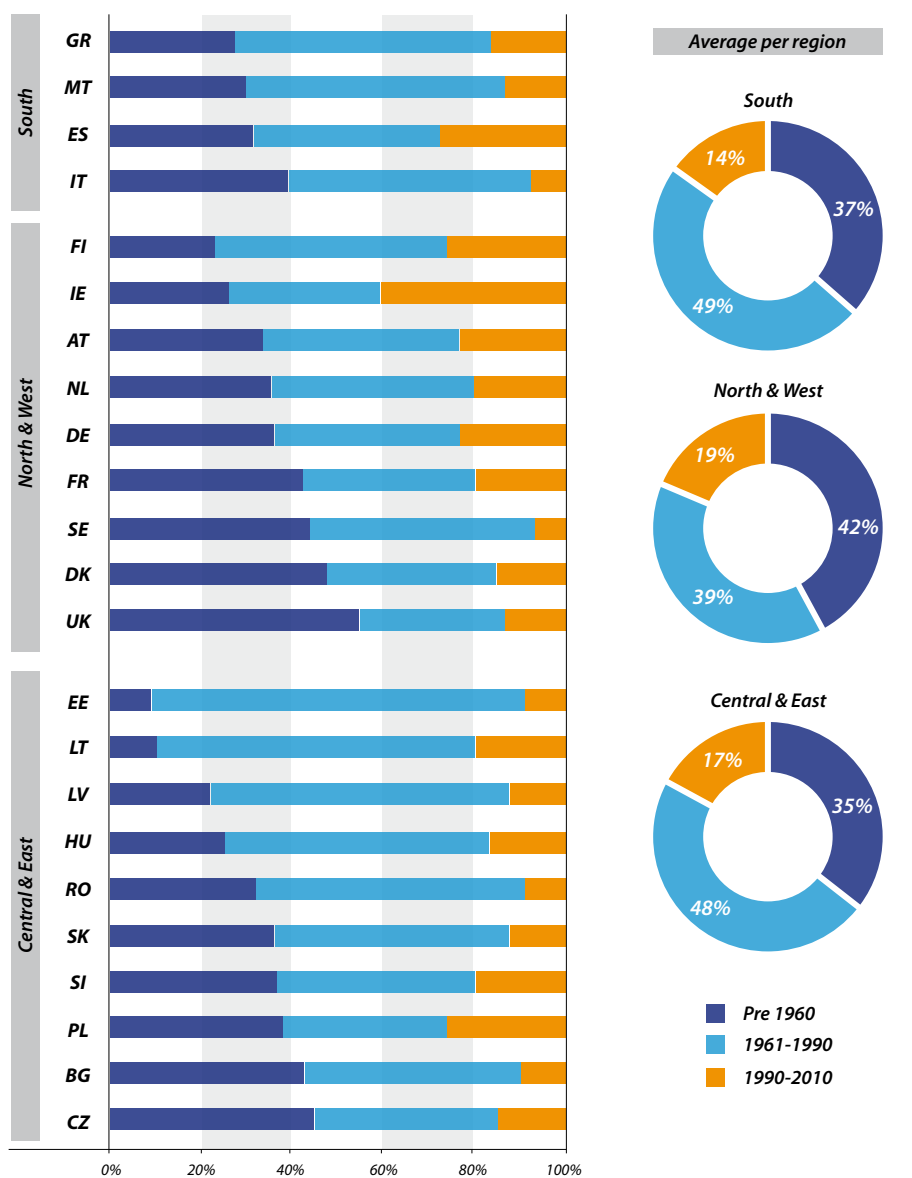
One key factor affecting the energy efficiency of residential buildings is their age. The BPIE study classifies them into three age bands. Old buildings are all those that were built up to 1960. Modern buildings were constructed in the years 1961 to 1990, and houses built from 1991 onwards are described as recent. On average, in Europe far more than one third of residential buildings are in the oldest category, whereas the share of new buildings is below 20% in all regions. The comparison reveals that the United Kingdom has the oldest building stock. Around 55 per cent of dwellings in the UK were constructed before 1961, followed at some distance by Denmark, Sweden, France and the Czech Republic. The largest proportion of new buildings is found in Ireland, at 40%, followed by Spain, Poland and Finland.

## Annual heat losses of a single-family house before (left) and after (right) energy-saving renovation



Source: "Modernisierungsratgeber Energie", dena, 2009

## Age profile of residential floor space



### Notes

BG: Based on estimations.

EE: Data from 1951 onwards.

GR: Data only till 2000.

IT: Values exclude heritage buildings before 1950.

LT: Data from 1941 onwards.

MT: Based on a sample survey with data till 2002.

PL: Based on estimations.

ES: Based on primary residences (i.e. excluding secondary houses).

LT: Data only from 1921 till 2005.

Source: BPIE survey

### Three scenarios for an efficient future

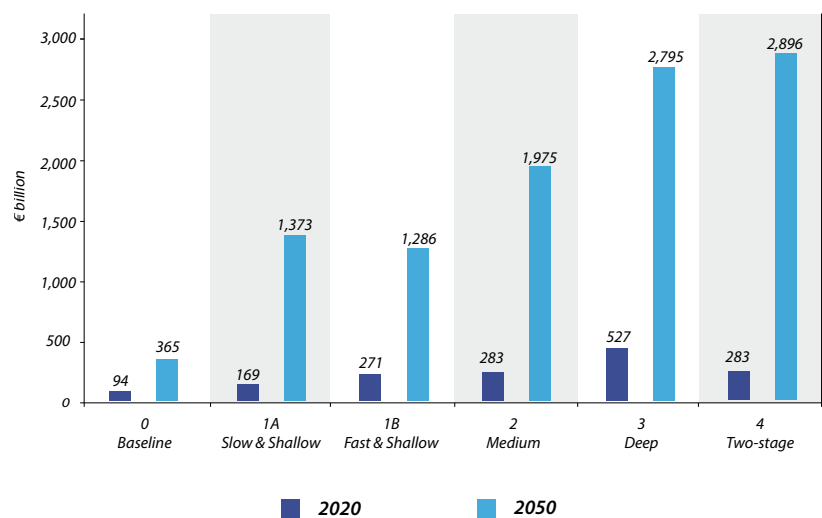
The authors of the study used several scenarios to calculate how this will affect Europe-wide potential savings in buildings. The variable factors in all the calculation models are the speed at which renovation ramps up and the average “renovation depth”, which can go as far as “nearly Zero Energy Buildings” (nZEB).

In the two “shallow” scenarios with the most modest retrofitting ambitions, minor energy-saving renovations dominate up to 2035, after which measures requiring medium input are the most common, and by 2050 total retrofits make up at best a good 20% of all energy-related modernization measures. The rate of retrofits is what tips the balance: if it reaches the target of an annual 2.6% of the building stock by 2015, 7% of the energy savings will already be realized by 2020. If it does not reach its target until 2035, at most 4% of the savings can be achieved by 2020.

In the “medium” scenario, in the year 2020 moderate and deep renovations form the dominant majority until 2030, accounting for 95%. This will include a maximum of 5% of nearly Zero Energy Buildings. However, the energy saved in this variation only becomes noticeable in the long term: in 2020 it amounts to 7% despite the lower renovation depth, thus matching the first scenario described above; but by 2050 the savings realized with this renovation strategy reach 32% to 48%. Total Europe-wide investment costs come to 551 billion euro, which is only 100 billion higher, due to the higher savings but a net gain of 300 billion euro as opposed to only 160 billion.

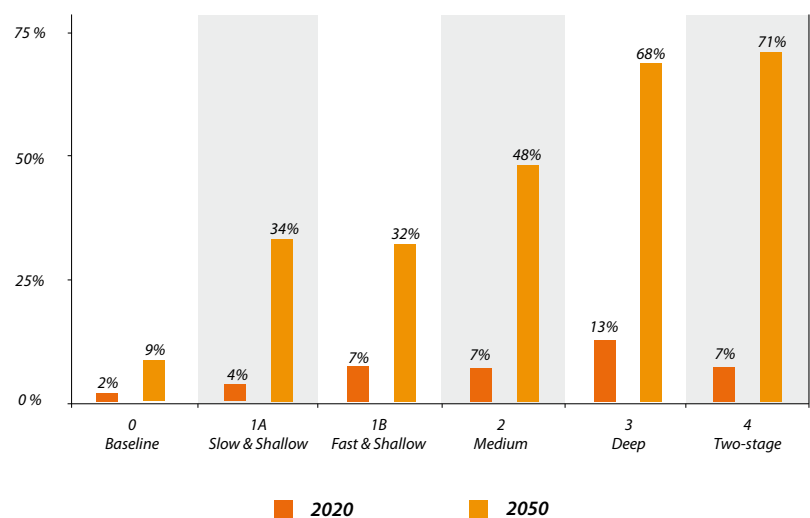
### BPIE model scenarios

#### Annual energy savings



Source: BPIE model

#### Energy savings as % of today



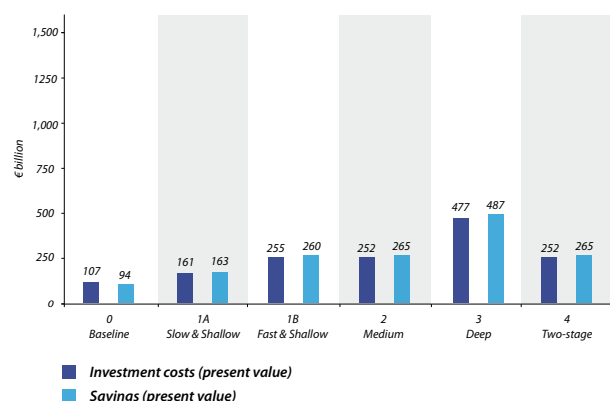
Source: BPIE model



## BPIE model scenarios

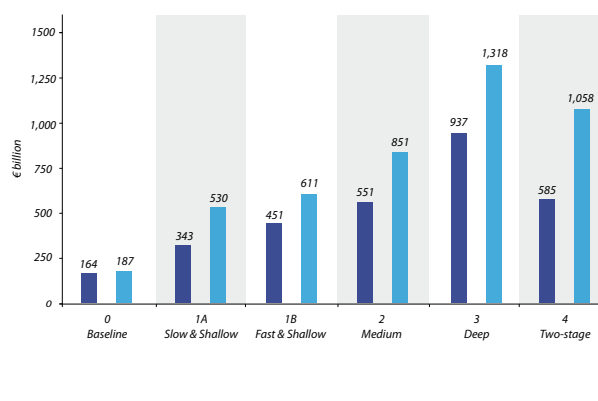
### Investment costs and savings

2020



Source: BPIE model

2050



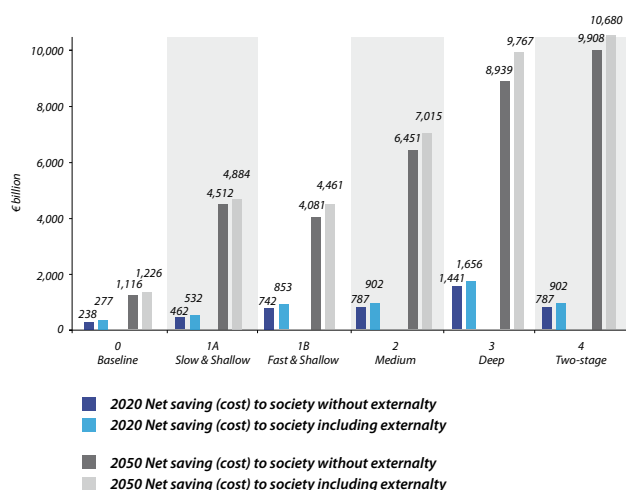
## Two steps to success

The greatest input from investors is required in the “deep” scenario, which envisages an 85% proportion of total renovations by 2020, with 5% of nearly Zero Energy Buildings, making up 25% of all renovations by 2050. Investments of 937 billion euro by 2050 are juxtaposed with savings in energy costs of 1,318 billion euro – a net gain of 381 billion euro.

According to the calculations of the BPIE experts, however, the most efficient scenario is the “two-stage” model. In the period up to 2030 it develops like the “medium” version. After this date, initial small to medium renovation measures are upgraded to total modernization or nearly Zero Energy Buildings. With only 584 billion euro in investment costs, energy consumption is reduced by 71% until 2050, which is translated into **monetary**

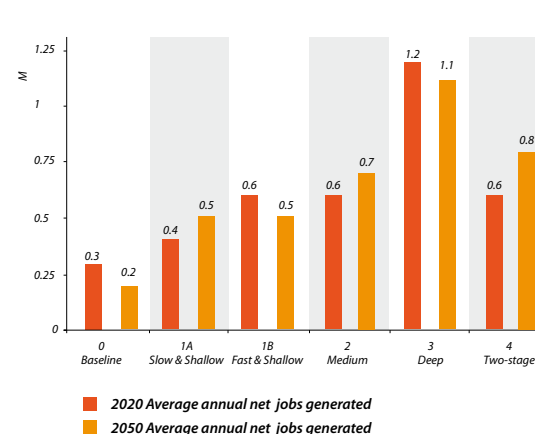
**savings of 1,058 billion euro**, that is, a net gain of 474 billion euro. In this scenario the authors put the **annual internal rate of return at 13.4 per cent. CO<sub>2</sub> savings of 90.7%** are added to this, along with **800,000 new jobs annually** across Europe due to the renovation work.

## Savings to society



Source: BPIE model

## Average annual net jobs generated



### **Where do the EU States stand today?**

Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 fired the starting shot for a Europe-wide initiative for greater energy efficiency in buildings to be brought about by measures including building certification. The recast Energy Performance of Buildings Directive (EPBD) has been in force since 8 July 2010. It specifies (among other things) that from 2020 all new buildings must be nearly “zero-energy” buildings, and public buildings must be nearly “zero-energy” buildings from 2018. To the extent technically and economically feasible, existing buildings should also be adapted to the new requirements.

The level of EPBD implementation is therefore a good measure of progress in the European Union. For example, the WWF’s “EU Climate Policy Tracker 2011”<sup>99</sup> documents the countries with developments related to the EU’s climate and energy targets from 2010 to 2011, including the building sector, in its investigations.

In **Austria** the target depth of renovation is seen as positive, as is a 100 million euro support programme for thermal insulation, 70% of which is designated for private households. Current plans envisage disbursing this amount each year.

The assessment for **Belgium** turns out less positive: certification of non-residential buildings was delayed, and the regions of Wallonia and Brussels received a warning from the European Commission in June 2011 because they were lagging behind schedule in implementing the EPBD. By contrast the Flemish Minister of Energy announced in September 2011 that 3,000 rental houses were to be thermally insulated every year, and hoped that by 2020 this would result in a good energy efficien-

cy rating for all houses in that part of the country.

The increased budget for energy efficiency projects in the **Czech Republic** is noted by the authors of the study, but they regard promotional options for renovation and modernisation as limited. The standards for new buildings, on the other hand, are appropriate to the times: since 2012 new houses have had to meet the low energy standard, from 2020 the passive house standard will be mandatory, and even stricter standards will apply to most public support programmes. In cases of non-compliance, recipients may be forced to repay the support.

In **Finland** the harsh climate ensures satisfactory energy performance of buildings even though there are hardly any efficiency initiatives. Grants equalling up to 25% of the investment are paid for improvements to heating systems, and the limit values on the energy consumption of new buildings were brought down by 20% in 2012.

For new owner-occupied homes in **France**, a maximum annual energy consumption has been set at 50 kilowatt hours per square metre of living space from the end of 2012. As early as in March 2011 the ministry responsible announced 16 proposals intended to decrease energy consumption in the building sector by 38% by 2020. One of these proposals was thermal renovation for an annual 400,000 homes from 2013 onwards.

The “Climate Tracker” finds that **Germany** currently has at best moderate ambitions for implementing efficiency measures in the building segment. The background is that funding in this sector was curtailed in 2011 – partly due to premature budget spending in 2009. From 2012 to 2014 however, a total of another 1.5 billion euro will be available per year, most of which is to

be disbursed via the state bank Kreditanstalt für Wiederaufbau (KfW). The declared goal is to double the rate of refurbishment in Germany.

**Ireland** is one of the countries receiving good marks for its consistent tightening of efficiency regulations applying to new buildings. The legal amendment of 2008 ensured that the maximum permissible energy consumption by new buildings decreased by 40% in comparison with 2005 levels. By 2013 this figure is actually intended to reach 60% to 70%. The Better Energy Homes scheme and the Warmer Homes scheme are both mentioned, which aim to improve the thermal insulation of owner-occupied accommodation and the heating technology used. Moreover, since 2010 Irish homeowners have been able to claim tax relief of up to 10,000 euro on energy efficiency measures on their income tax return.

The authors of the study find that the ambitious targets of the **Netherlands** for the energy efficiency of buildings by 2020 are not backed up with sufficient framework conditions. There is positive mention of a test period from October 2010 to June 2011: as an incentive for private investment in expansion and modernization, the rate of VAT on work carried out in this sector was reduced from 19 to 6 per cent for a trial period.

The report notes the absence of binding targets in **Spain** for introducing zero energy buildings. For raising energy efficiency the “Sustainable Economy Law” provided for a tax break of 10% on all renovation measures leading to greater energy efficiency.

Cuts in efficiency-relevant support in the **United Kingdom** are seen as a retrograde step. Furthermore, the objective of constructing only zero carbon houses by 2016 was significantly impaired because in 2011 the energy consumed by domestic appliances was removed from the calculation.

## **Unified standards: not apparent**

In its summary the “EU Climate Policy Tracker” also comes to the conclusion that current EU policy will go only roughly one half of the way to achieving the climate-related targets by 2020. Twelve countries did in fact institute new steps in the field of energy efficiency in buildings within the period of investigation, but these are generally small-scale measures and do not exploit the full potential of energy efficiency improvements in buildings. The authors see a much higher rate of renovation as necessary for a turnaround: “Public authorities will be required to refurbish at least 3% of their buildings (by floor area) each year.” Yet in many cases incentives for homeowners were not in place.

The paper entitled “Implementing the Energy Performance of Building Directive (EPBD),”<sup>10</sup> published in April 2011, identified where in particular the structural problems lie. Its foreword says the following: “Buildings are at the core of the European Union’s prosperity. They are important to achieve the EU’s energy savings targets and to combat climate change whilst contributing to energy security. An enormous unrealized energy-saving potential lies dormant in buildings. In untapping that potential, not only more energy efficient buildings, but also better living conditions, financial benefits and sustainable jobs can be provided for Europe’s ci-

tizens.” This finding is presented alongside a number of challenges, which experts from the EU Member States have documented in minute detail in the study.

For example, the experts complain that it is almost impossible to compare various national approaches to implementing the EPBD. “There is a need for harmonized terms and definitions, taking into account national calculation methods, neither limiting the technological options nor hindering innovation”, the report says – and adds, “Intercomparisons are extremely complicated ...”

The study states that also many countries are heavily interpreting the requirements of the Directive and adapting them to suit their own needs and possibilities – often owing to the absence of a binding methodology for drawing up suitable reference values. “Member States would welcome a simple yet robust framework for the cost-optimum methodology, which should also be as consistent as possible with the established procedures.”

## **Communication is necessary**

The authors also find that work is needed to catch up in the field of communication. The substantive issues will have to be better communicated to the owners of the properties if the energy efficiency of buildings is to be increased. “The professional parties that are in di-

rect contact with the building owners (such as designers of buildings, building assessors, financial parties, legal parties, suppliers of products and materials, media, consumer organisations etc.) are an important group that has a decisive influence on improving the energy performance of buildings, and therefore on the impact of the EPBD.” In the opinion of the experts, it would be necessary to have better dissemination of information about possible national support, to get these groups more involved. This could be done, for instance, via a link with the relevant certification procedure: “By linking financial instruments to the Energy Performance Certificate, the impact of the EPBD can be heightened. When consumers, building owners and investors have an insight into the different kinds of financial opportunities on offer, there is a higher possibility that they will implement energy saving measures.” The authors determined that one important argument in this regard was the increasing market value of properties with good energy performance.

Some of these challenges can already be overcome today as the following chapter will show, using individual examples from the Member States. However, for other challenges new ideas will be needed, along with common pan-European action for greater energy efficiency in the building sector.



## *Plan for future action - Mission possible*

*Numerous examples show clearly that there is no shortage of ideas or solutions that ensure greater energy efficiency in buildings and can offer a realistic chance of attaining the EU's climate goals. Innovative financing models are available and several countries and regions prove that an integrated and sustainable efficiency policy is possible.*

*Yet apparently there is still no vision of a large European Community project or the political will to set out on this path.*

*Rarely have the chances been as good as they are now that these plans will find broad support among the general public. And now more than ever, the states of Europe would benefit from the enormous economic effects that an international energy efficiency programme would provide.*

*So why is so little happening?*





## **Energy efficiency requires consistent policies**

Successful long-term climate action requires not only active commitment from those involved, but above all a reliable legislative framework. This demand is addressed primarily to the European Union, because according to information from the "Climate Policy Tracker"<sup>11</sup> almost half of the climate-policy preparations made in the Member States can be traced back to decisions from Brussels: "The majority of new policy developments in EU member states are either a direct implementation of EU legislation or are linked to EU legislation. This reinforces the message that intensification of policies at the EU-level can have a large impact on countries' performance." However, the conclusion on national climate policies during the observation period is rather more sobering: "Nine EU member states have, on balance, made progress, and five have fallen further behind. **Overall, current effort remains insufficient to meet a low-carbon vision.**"

In buildings in particular, the report does indeed see "a focus on measures to stimulate renovation policy and improved certification of buildings", but it calls for more "Guidance to member states on how to encourage retrofit for energy efficiency and renewable energy as part of the Energy Performance of Buildings Directive". Furthermore, it points out the lack of long-term strategies and targets for the period beyond 2020 and greater ambitions for saving energy during this period.

**And there is one more problem on which most publications are unanimous: energy poverty.** In the United

Kingdom it was precisely this topic that triggered the initial steps towards large-scale promotional programmes after the turn of the millennium. With an ever increasing number of people on lower incomes, energy costs were consuming a disproportionate share of household income, with the result that sufficient supplies of electricity and gas represented a poverty risk on their own. Such tendencies can now be observed throughout Europe owing to further rises in energy prices – and should also spur national governments to take urgent action.

## **Small steps are good, but not enough**

Despite all the criticism, the publication's list of recommendations ends by noting that every EU member state has an activity that could serve as an example to other states. The authors mention, for instance, Germany's "bolder nuclear energy phase out plans", the massive resistance of Italian voters to a return to nuclear power, the environmental taxes for transport introduced in Austria, and the Irish plans to double the CO<sub>2</sub> tax in the year 2014.

All the same, many small successes cannot replace concerted action. The study "Improving National Energy Efficiency Strategies in the EU Framework"<sup>12</sup> brings together a number of proposals for achieving trans-national success in the medium term. For example, it urgently recommends the EU-wide introduction of Minimum Energy Performance Standards (MEPS): "By setting stringent energy performance standards based on life-cycle cost, a minimum level of energy efficiency is ensured and at least the most inefficient buildings and technologies are excluded from the market."

The authors state that this could lead to market adjustments like those already seen in Germany, Holland and Denmark: according to the study, single glazing and non-condensing gas boilers have already completely disappeared from the market in those countries.

### **Best practice – ideas for Europe**

The study provides some indication of what an integrated and consistent policy approach might be like, using the United Kingdom and Upper Austria as examples. For instance, in recent years the UK has launched an ambitious package of measures for housing construction, parts of which have already been implemented. It acts through legal requirements such as MEPS and energy performance certificates, information and motivation from institutions such as the Energy Saving Trust, and economic incentives.

Today's new buildings must be at least 40% more energy-efficient than those built ten years ago, and the zero carbon standard will apply from 2016 onwards. For the refurbishment of old buildings – which will still account for three quarters of the total building stock in 2050 – there are additional modernisation programmes, some of which are run in co-operation with the regional energy utilities. For example, the latter are also obliged to reduce final energy consumption by means of efficiency measures such as thermal insulation in existing buildings. Programmes of this type also enable households on lower incomes to benefit more easily from energy efficiency measures.

The Home Energy Conservation Act (HECA) also obliges all local authorities responsible for buildings to report regu-

larly on the energy efficiency status of all residential buildings in their area.

The next stage will start in the autumn of 2012. As part of the "Green Deal", households in the United Kingdom should have the opportunity to invest in the energy efficiency of their houses without having to provide funding for it in advance. The costs will be recovered through savings on heating bills.

### **Successful model since 1993**

The measures in Upper Austria, the fourth largest federal state in Austria, are similarly comprehensive. Here the Upper Austrian regional energy agency O.Ö. Energiesparverband has been using a combination of legal regulations and attractive financial incentives, vocational training and information since 1993. As the individual Austrian states are responsible for defining energy efficiency standards, the agency has a lot of flexibility. It has exploited this, for instance, in determining an energy saving goal of one per cent per year, introducing MEPS, coupling financial investment incentives to energy performance certificates, and having rating results with requirements that become more stringent each year. Furthermore, people who are interested in state support have to have on-site energy consultation.

The impacts of these and other measures are impressive. From 1993 to 2007, a total of 74,000 buildings were either built or retrofitted in conformity with the strict efficiency requirements, which has resulted in an annual energy saving now reaching 350 million kilowatt hours. The costs per kilowatt hour saved come to 1.8 euro cents.

### **Broad consensus for courageous action**

It is obvious that implementation of a similarly comprehensive concept at European level would represent a formidable challenge for all those involved. But on the other hand, interest in sustainable building technologies is greater than ever before, as reported by the recent "Energy Efficiency Indicator Study"<sup>13</sup> from the Johnson Controls Institute for Building Efficiency: "The 2011 European survey reveals an increasing emphasis on energy among decision-makers in both private and public-sector buildings. The EEI data shows decision-makers taking concrete actions and seeking government incentives and rebate programs to support efficiency and clean energy. Ninety per cent of European respondents considered energy efficiency at least 'somewhat important.' Nearly 20% said energy efficiency is 'extremely important,' while 43% considered it 'very important.'"

Now we have to strike while the iron is hot, to find new common paths in European energy policy that will have a sustainable impact. However, to this end – to enhance "communication" – a broad social consensus will be required. Private house owners will have to recognize their role in this challenge that will last for generations to come, because for them, too, the issue will not solely be reducing energy costs. One of the questions will be how responsibly we handle limited resources and the environment – also in consideration of later generations. Then there is security of supply: lower energy consumption increases the effect of renewable sources of energy and simultaneously reduces Europe's dependence on energy imported from politically unstable regions.

## Germany's example: impacts of KfW programmes for energy-efficient construction on the federal budget

	2008	2009	2010
<i>The resulting investments and effects on employment lead to the following increased revenue and decreased expenditure for the state*:</i>			
	<b>In million euro</b>		
Wage tax, social insurance contributions	1,167	2,273	2,282
VAT	1,173	2,313	2,343
Taxes on products, minus subsidies	170	334	339
Taxes on corporate income and investment income	261	441	388
(reduced unemployment-related expenditure)**	(857)	(1,800)	(1,823)
<b>Programme costs (federal budget funding)</b>	<b>-1,167</b>	<b>-2,273</b>	<b>-2,282</b>
<b>Lower limit of the net effect on the state budget (OS)**</b>	<b>1,478</b>	<b>3,323</b>	<b>3,987</b>
<b>Upper limit of the net effect on the state budget (JS)**</b>	<b>2,335</b>	<b>5,126</b>	<b>5,810</b>

\* Financial effects of the promotion for the federation, federal states, municipalities and social insurance

\*\* Overtime scenario (OS): the construction measures initiated are implemented during overtime only.

Job scenario (JS): the construction measures initiated are implemented exclusively through new jobs. Only in the job scenario are unemployment costs reduced.

Source: „Energiesparkompass 2012“ Fachverband WDVS



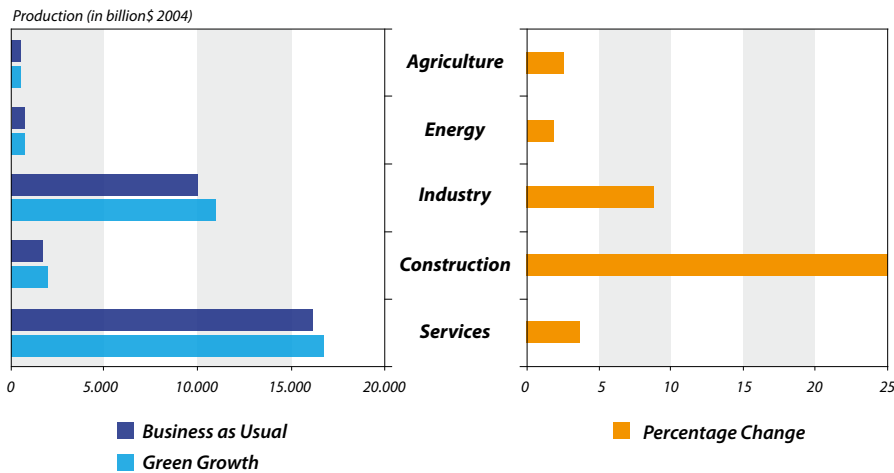
### Promotion of economic growth

State promotion of private investment in energy-efficient buildings is very often viewed solely in relation to the expenditure – taking this view, every euro spent makes a hole in the state coffers. But in fact this argument does not go into the matter in enough depth. Several investigations have calculated the positive effects that energy efficiency programmes can have on the national economy – huge impacts on the labour market, economic performance and the public budgets for social services. The paper “ENERGY SA-

VINGS 2020. How to triple the impact of energy saving policies in Europe”<sup>14</sup> states that as a rule, energy-saving programmes create added value and promote jobs in an order of magnitude far greater than the volume of the promotion. The paper cites, for example, a study from the UK<sup>15</sup>, which takes as its starting point 10 to 30 person years of direct employment – for every one million pounds invested in measures for raising energy efficiency. A survey in Hungary<sup>16</sup> came to the conclusion that by 2020 between 43,000 and 130,000 new jobs could be created in the country if a large-scale programme for



## Effects of green growth on individual sectors



Source: „A new Growth Path for Europe“, European Climate forum, 2011

efficiency retrofitting of buildings were to be implemented. According to the calculations the impacts on the labour market depend on the level of retrofitting, which could range from a 40% energy saving in 150,000 residencies up to 75% to 90% in 250,000 residencies per year.

Looking back to 2010, Dr. Norbert Irsch, chief economist at the German development bank “Kreditanstalt für Wiederaufbau” (KfW), drew a very positive balance: “The energy-efficient building and retrofitting measures in the state programmes promoted by investments in 2010 either secured or created 287,000 jobs. The great

majority of investments promoted are implemented by medium-sized enterprises, most of them in the local construction business and the local craft trades. ... These impacts on the economy and employment are made possible by the enormous promotional leverage. In 2010 state funding of 1.4 billion euro was used to initiate investments in the German economy worth sixteen times as much.”<sup>17</sup> Irsch puts a figure on the gain for the state from the KfW programmes for 2010 of close on 4 to 5.8 billion euro, comprised of additional tax revenues and savings in employment benefit.

## Energy-efficiency as a social way out of the crisis

EU-wide the “Green Paper on Energy Efficiency”<sup>18</sup> assumes that energy-saving measures could create one million new jobs by 2020. The labour-intensive jobs would be carried out locally and would therefore benefit the respective regions. It states that direct supra-regional employment is also possible in the manufacture of equipment and materials, and in monitoring energy use, efficiency, marketing and consulting.

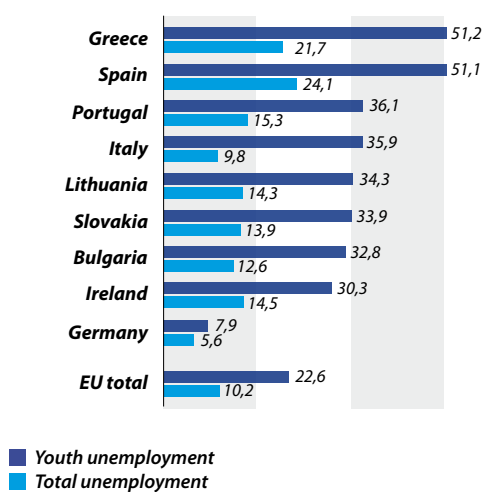
These figures make it clear that a consistent efficiency policy can have far-reaching positive impacts – on both climate and economy in equal measure. Nonetheless, the publication “A New Growth Path for Europe. Generating Pro-

sperity and Jobs in the Low-Carbon Economy”<sup>19</sup> noted that such success necessitates a huge effort in several areas. “The new growth path implies a major effort to retrofit buildings and enhance the built environment. This is advantageous in view of employment because people with very different vocational skills can operate in these sectors after a few months of on-the-job training (in construction, as in the industry, nowadays the majority of jobs are not centered around manual work – and there too, on-the-job training can be very effective).” Once again the authors repeat that “Energy efficiency is mainly, but not only, a matter of buildings.” Logically, the study sees the development opportunities for the construction industry as positive – with the possibility of up to 25 per cent growth.

In the EU countries in crisis in particular, this potential could become the urgently needed motor for creating jobs. No national economy can cope with long-term youth unemployment rates from 30 to over 50%<sup>20</sup> – either financially or socially. For example, many Southern European countries need major remedial measures because it takes huge amounts of energy and money to air-condition their buildings which have little or no thermal insulation. The effect is that far more energy is used than would be needed for buildings with modern insulation. Corresponding EU support programmes for energy-saving renovation could have huge consequences for the economy and the labour market, especially in these regions.

## Boosting the economy – but how?

Unemployment rate in selected EU countries  
(March 2012), data in percent



Source: European Commission





### **Added value included**

*That growth due to energy efficiency also affects buildings' value and performance, is spelled out by the paper "Sustainable real estate. From niche to mainstream"<sup>21</sup>. "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. Using somewhat different methods and assumptions, these studies nonetheless reach comparable conclusions: rent and value premiums of at least 5% and occupancy gains of three to eight percentage points. That also the additional construction costs of sustainable buildings are reasonable, in particular in view of the state support, is evidenced by a number of other studies."*

*Yet the authors of the study also drew attention to one of the largest problems that plays a major role in the case of rented buildings: "However, the fundamental shift towards sustainable real estate still has obstacles to face. Investor interest is hampered by factors including the agency problem, which is manifested in the unequal distribution of owners' costs and tenants' benefit. Another major obstacle is the lack of unified standards and consistent data and indicators, which renders it difficult to estimate how profitable it is to invest in green buildings."*

*These comments reveal once again that solutions are required at European level, on the one hand when standards for comparable data are being designed and on the other in the search for innovative solutions to the agency problem. This is*

*because the latter also exerts a major influence on the acceptance of energy-saving renovations in residential buildings, as the "tenant-landlord dilemma" (also called the "split-incentive"), even in countries with a relatively low proportion of owner-occupied accommodation.*

*But even in the case of owner-occupied housing it may be assumed that in future the energy standard will be the key determinant of the value of a property. For houses without modern thermal insulation this could mean that the expected costs of refurbishment will reduce the purchase price accordingly.*

### **Making climate action affordable**

*The figures in the previous chapter clearly show that it must be in the interest of each EU Member State to improve energy efficiency. However, since the great majority of housing is privately owned, the challenge will be to provide incentives for the owners to implement the relevant measures. The study "Improving National Energy Efficiency Strategies"<sup>22</sup> summarises by saying that on the one hand economic incentives and financial support are required to initiate the necessary efficiency measures, which could be realized via tax benefits, low-interest loans or grants. In addition, however, there is a lack of innovative financial schemes.*

*Many of the support programmes never benefit homeowners, as they still require considerable financial outlay that is only recovered in the long term through savings on energy bills. The publication produced by the Institute of International and European Affairs in Dublin entitled*

## Higher targets for more growth

Reduction of CO<sub>2</sub> emissions by 20 or 30 per cent and effects on the national economies of the EU-15

		GDP in 2020 (billion \$ <sub>2004</sub> )	GDP growth rate	Unemploy- ment rate	Investment in 2020 (share of gdp)	Investment in 2020 (billion \$ <sub>2004</sub> )	Emission (Mt)
<b>Austria</b>	-20%	310	2.0%	4.7%	20.8%	64.7	86.3
	-30%	320	2.3%	3.6%	25.9%	82.7	78.5
	Δ	3.2%	0.3pp	-1.1pp	5.1pp	27.9%	-9.1%
<b>Belgium</b>	-20%	449	2.2%	7.8%	22.5%	101.1	111.0
	-30%	476	2.8%	5.3%	26.9%	127.7	105.0
	Δ	6.0%	0.6pp	-2.5pp	4.4pp	26.3%	-5.4%
<b>Germany</b>	-20%	2914	1.8%	8.5%	14.9%	433.2	880.1
	-30%	3103	2.4%	5.6%	18.6%	576.5	742.8
	Δ	6.5%	0.6pp	-2.9pp	3.7pp	33.1%	-15.6%
<b>Denmark</b>	-20%	239	1.6%	5.0%	18.2%	43.5	61.9
	-30%	245	1.9%	3.8%	21.7%	53.2	57.4
	Δ	2.5%	0.3pp	-1.2pp	3.5pp	22.1%	-7.4%
<b>Spain</b>	-20%	1314	3.0%	10.6%	24.1%	317.2	440.6
	-30%	1385	3.6%	7.0%	27.3%	378.4	387.6
	Δ	5.4%	0.6pp	-3.6pp	3.2pp	19.3%	-12.0%
<b>Finland</b>	-20%	215	2.0%	7.7%	19.2%	41.1	60.7
	-30%	219	2.2%	5.1%	24.0%	52.7	55.3
	Δ	1.9%	0.2pp	-2.6pp	4.8pp	28.2%	-9.0%
<b>France</b>	-20%	2206	2.0%	8.1%	18.9%	416.5	424.3
	-30%	2351	2.7%	5.4%	22.9%	537.4	383.5
	Δ	6.6%	0.7pp	-2.7pp	4.0pp	29.0%	-9.6%
<b>United Kingdom</b>	-20%	2377	2.3%	4.4%	15.3%	362.4	393.0
	-30%	2550	3.1%	3.5%	19.4%	495.1	347.0
	Δ	7.3%	0.8pp	-0.9pp	4.1pp	36.6%	-11.7%
<b>Greece</b>	-20%	270	2.8%	8.7%	25.1%	67.8	122.1
	-30%	283	3.3%	6.0%	27.0%	76.4	104.4
	Δ	4.8%	0.5pp	-2.7pp	1.9pp	12.8%	-14.5%
<b>Ireland</b>	-20%	218	3.2%	9.0%	8.8%	19.1	62.4
	-30%	224	3.5%	5.7%	12.1%	27.2	54.6
	Δ	2.8%	0.3pp	-3.3pp	3.3pp	42.6%	-12.6%
<b>Italy</b>	-20%	1820	1.8%	7.6%	20.4%	370.9	571.1
	-30%	1908	2.3%	5.0%	26.4%	504.2	512.5
	Δ	4.8%	0.5pp	-2.6pp	6.0pp	35.9%	-10.3%
<b>Luxembourg</b>	-20%	56	3.3%	3.4%	21.5%	12.0	16.5
	-30%	59	3.8%	3.1%	24.7%	14.5	15.6
	Δ	5.4%	0.5pp	-0.3pp	3.2pp	20.5%	-5.6%
<b>Netherlands</b>	-20%	603	1.7%	3.9%	17.8%	107.0	193.0
	-30%	627	2.1%	3.3%	19.5%	122.0	189.0
	Δ	4.0%	0.4pp	-0.6pp	1.7pp	13.8%	-2.1%
<b>Portugal</b>	-20%	178	2.0%	6.3%	24.5%	44.0	81.0
	-30%	184	2.3%	4.5%	30.1%	55.0	69.0
	Δ	3.4%	0.3pp	-1.8pp	5.6pp	27.2%	-14.5%
<b>Sweden</b>	-20%	425	2.3%	5.8%	13.8%	59.0	78.0
	-30%	439	2.6%	4.1%	17.0%	75.0	62.0
	Δ	3.3%	0.3pp	-1.7pp	3.2pp	27.4%	-20.1%

Δ: Difference 20% vs. 30% either as percentage of 20% value or as difference in percentage points (pp).

Source: „A new Growth Path for Europe“, European Climate forum, 2011

*"Thinking Deeper: Financing Options for Home Retrofit"<sup>23</sup> therefore represents a remarkable overview of classical and less well known means of financing – with a particular focus on the extensive refurbishment of owner-occupied housing.*

A great deal of space is given – not without good reason – to the "Pay as you save" (PAYS) model in which the money necessary for retrofitting is provided by a public lending body such as a state guarantee fund. The value of the loan is attached as a legal charge to the property. The interest payments and instalments for repaying this loan are funded solely from the reduced energy bill for the property. This method of funding has two major advantages: the homeowners can retrofit their property practically without having to invest any of their own capital, and when they sell, the loan remains attached to the house. Since the new owners will also save energy because the house has been retrofitted, they can take over the loan without any problem and once it has been paid off they benefit directly from the low energy costs. This model also makes long-term investment in energy-efficient buildings attractive also in regions with a dynamic property market, as illustrated by the success of the Property Assessed Clean Energy (PACE) system in the USA. The programme was given around \$150 million of government funding in 2010 and the study estimated that with the aid of private investors a total of up to \$500 million could be reached if the fund was backed with federal loan guarantees. In the USA the loan is usually repaid over a period of 20 years, and the mechanism

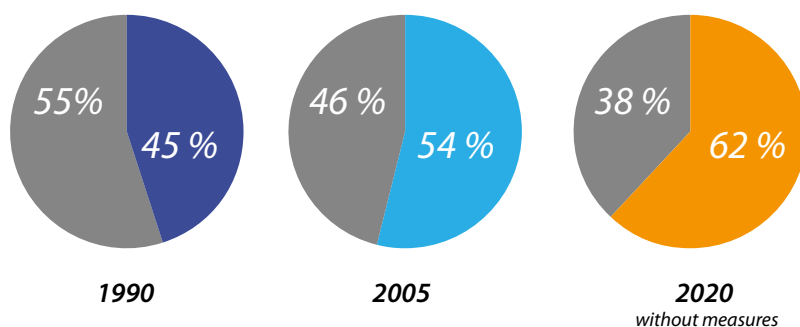
of repayment is the property tax bill. On surveys among US homeowners "42% said they would be 'extremely' or 'very' interested in using PACE for energy efficiency and renewable-energy projects."

### **Avoiding the split-incentive dilemma**

The study describes "PAYS to Energy Meter" as a comparable financing model in which the debt is attached to the energy meter. Here, too, the debt used to pay for the property to be retrofitted is financed by the monetary savings, but the bill payer, i.e. the beneficiary of the savings, is responsible for repayment. This model is likely to be of interest in particular in regions where a large proportion of apartments or houses are rented. The repayment instalments are collected as an extra charge on the energy bill, and several safety mechanisms ensure that demands for payment do not exceed the actual savings. Given the necessary state support, this model could possibly even present a solution to the split-incentive issue: house owners do not have to fund retrofits that will bring most benefit to their tenants.

The Irish study also lists several approaches to financing such support programmes. For example, a "Green Bank" or government risk guarantees would be suitable means for interesting financiers in funds backing environmental or ethical projects. The study cites the example of the KfW Bankgruppe in Germany, which provides services such as low-interest loans for increasing the energy efficiency of buildings, and its AAA rating and state-backed guarantees make it an attractive option for many investors.

***Without action Europe's total primary energy needs will depend for 62% on imports by 2020***



Source: Primes 2009, ECOFYS, Fraunhofer ISI [34]



## ***Attractive offers for private investors***

The authors of the study regard Green Funds as useful for attracting private capital – especially in countries with high levels of savings, such as Ireland. There the Special Savings Incentive Account (SSIA) pulled in 16 billion euro in the five years from 2001, which was topped up with a tax credit. Another example given is that of the Netherlands, with its Green Bonds and certificates with a fixed term, value and interest rate, on which capital gains tax is waived on investments of up to 52,000

euro. Such incentives or tax credits have since become established as important criteria for the successful financing of energy-efficiency measures. And so many countries including France, Italy and Belgium, along with California, are proposing tax credits for private investments in energy-efficiency measures.

Traditional financing methods such as mortgages are mentioned in the study for the sake of completeness, but are not regarded as options for bringing large benefits in the sense of reducing obstacles to investment.

**Opportunities do exist: use them!**

The wide range of options shows that there are ways for Europe to achieve its energy-efficiency and climate goals. Admittedly, for this to happen some of the small, innovative ideas will have to be given a broader base – yet the indications are that acceptance levels will be high. The “ENERGY EFFICIENCY INDICATOR STUDY”<sup>24</sup> clearly shows that a need for action at the highest level is perceived, and not only in view of rising energy prices. “Not surprisingly, cost savings remains the most important driver for pursuing efficiency activities. Beyond cost concerns, however, respondents cited markedly different drivers in 2011 than in 2010. Respondents in 2011 saw cost reduction, government rebates and energy security as the top three drivers for

action.” The paper goes on to say: “This trend toward energy efficiency and GHG emissions reductions is evident in that 91% of European respondents had implemented at least one energy efficiency measure during the past year. Looking forward, respondents expressed highest expectations for technologies that will lead to ‘deep’ energy savings, such as advanced building materials and new lighting technologies.”<sup>25</sup>

The large number of measures implemented in companies should be sufficient to induce political decision-makers to make substantial improvements in the overall conditions and financing options for such measures. The fact that this is not a loss-making business is illustrated by the publication “Financing Mechanisms for Europe’s Buildings Renovation”<sup>26</sup>, which

suggests learning from experience in Germany and the UK. For example, from 2006 to 2009 public subsidies provided via the German KfW Bank helped to stimulate a total invested volume of 54 billion euro. And the British Green Deal, with its target investment quotas of 0.5 to 0.7% of the gross domestic product, has already triggered energy-efficiency measures in up to 14 million British households. The ratio of public money to the total volume of investments stimulated here is estimated to be between 1:4 and 1:9.

Such figures illustrate very well that more commitment to energy efficiency can pay off for all the EU Member States. Perhaps it is impulses like these that could boost economic activity in times of crisis – to the benefit of the countries, the European Union – and not least the environment.



## About our association EAE – Partners for sustainable building and refurbishment in Europe

Since it was founded in 2008, the European Association for External Thermal Insulation Composite Systems (EAE) has been working towards a “culture of sustainability” in the construction sector. The members of the EAE include eleven national ETICS associations and four of the largest European insulation material associations. Together they represent around 85% of the European ETICS market and share across national borders their unique competence in the field of façade insulation. Their common aim is to improve the energy efficiency of the European building stock. This comes about through continuing technical developments in materials, construction materials and technologies, and through ongoing dialogue with politicians.

However, measured against the technical and economic requirements, up to now all European states have lagged a long way behind their savings potentials, and in the building sector some countries consume far more than 50% too much energy. The largest portion of this is wasted on either heating or cooling poorly insulated buildings, and this is one reason why Europe is becoming increasingly dependent on imported energy. This is problematic

for several reasons. On the one hand, the EU states buy large quantities of oil and gas from other countries, including politically unstable regions, which one day may affect the security of supply and therefore the standard of living in the EU. On the other hand, the increasing volatility on the energy markets results in ever greater economic restraints and rising prices, which increasingly inhibit growth in Europe. This in turn threatens international competitiveness and prosperity.

In addition, this gigantic waste of energy gives rise to issues of action on climate change. The European Union has already made important political preparations in the form of its targets for climate action and energy efficiency. Yet unless there is a massive rethink and binding requirements for each Member State, particularly in the construction sector, the targets will not be met. For this reason the EAE and its members are in continual dialogue with the decision-makers in their governments and in Brussels. This is because business and politics will have to work together on the ambitious energy and environmental targets if the dream of sustainable construction and life in Europe is to become reality.





The EAE is therefore issuing a Europe-wide invitation to discuss a seven-point programme that examines the key problem areas in the EU – and to elaborate solutions together.

### **1. Tell people about energy efficiency!**

*EU citizens lack knowledge and information about energy efficiency. This has got to change so that people can contribute.*

### **2. Improve the promotional options!**

*Too little, too complicated, and too uncertain – in many EU countries those who could potentially refurbish buildings have only slender chances of obtaining financial assistance from the state.*

### **3. Use efficiency measures to boost the economy!**

*Energy-saving refurbishments stimulate the economy and create jobs: there is virtually no better way to invest state funding.*

### **4. Combine renewable energies with efficiency programmes!**

*No competition! Renewable energies are the perfect complement to energy-efficient buildings. If total consumption is reduced, we will be able to successfully switch to renewable energies even faster.*

### **5. Think beyond political borders and parliamentary sessions!**

*Energy efficiency needs long-term, responsible approaches and stable framework conditions. This topic is too important to be overshadowed by political posturing and electioneering.*

### **6. Create comparable standards in Europe!**

*Technical standards and political targets vary from country to country; this creates massive barriers to comparability, competition and concerted action.*

### **7. Get the energy suppliers on board!**

*Vendors of energy have little interest in economical customers. But despite this the utility companies have to be won over as partners for a sustainable future.*

## Full members



- **Qualitätsgruppe Wärmedämmsysteme**, Austria



- **IVP, Werkgroep ETICS**, Belgium



- **Cech pro zateplování budov**, Czech Republic



- **Groupement du Mur Manteau**, France



- **Fachverband Wärmedämm-Verbundsysteme e.V.**, Germany



- **Consorzio per la cultura del sistema a capotto**, Italy



- **Branchevereniging Producenten gepleisterd Bouwen**, Netherlands



- **Stowarzyszenie na Rzecz Systemów Ociepleń**, Poland



- **Združenie pre zatepľovanie budov**, Slovakia



- **Verband Wärmedämmverbundsysteme**, Switzerland



- **Insulated Render and Cladding Association**, United Kingdom

## Extraordinary members



- **European Manufacturers of Expanded Polystyrene**



- **European Phenolic Foam Association**



- **European Insulation Manufacturers Association**



- **The European voice of the polyurethane insulation industry**

*The European Association for ETICS would like to thank all member associations and their member companies for supplying beautiful pictures of insulated buildings, expressing that all architectural designs are possible at all types of buildings. We would also like to thank Eric Braunreuther, Oliver Rapf and Charles Phillips for their valuable contribution to this European Energy Saving Guide.*

<sup>1</sup> "ENERGY SAVINGS 2020. How to triple the impact of energy saving policies in Europe", Ecofys and Fraunhofer ISI, September 2010

<sup>2</sup> "Main report. EU Climate Policy Tracker 2011", published in November 2011 by the World Wide Fund for Nature (WWF), Brussels, Belgium

<sup>3</sup> Source: Eurostat (<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=de&pcode=ten00086&plugin=1>)

<sup>4</sup> "Energy Roadmap 2050", European Commission, 15 December 2011

<sup>5</sup> "Europe's buildings under the microscope. A country-by-country review of the energy performance of buildings", published in October 2011 by Buildings Performance Institute Europe (BPIE)

<sup>6</sup> "Energy 2020. A strategy for competitive, sustainable and secure energy", European Commission, 2010

<sup>7</sup> "Study on the Energy Savings Potentials in EU Member States, Candidate Countries and EEA Countries. Final Report", For the European Commission Directorate-General Energy and Transport, March 2009

<sup>8</sup> "Europe's buildings under the microscope. A country-by-country review of the energy performance of buildings", published in October 2011 by Buildings Performance Institute Europe (BPIE)

<sup>9</sup> "Main report. EU Climate Policy Tracker 2011", published in November 2011 by the World Wide Fund for Nature (WWF), Brussels, Belgium

<sup>10</sup> "Implementing the Energy Performance of Buildings Directive (EPBD). Featuring Country Reports 2010", Concerted Action Energy Performance of Buildings, Brussels, April 2011

<sup>11</sup> "Main report. EU Climate Policy Tracker 2011", published in November 2011 by the World Wide Fund for Nature (WWF), Brussels, Belgium

<sup>12</sup> "IMPROVING NATIONAL ENERGY EFFICIENCY STRATEGIES IN THE EU FRAMEWORK. FINDINGS FROM ENERGY EFFICIENCY WATCH ANALYSIS", Wuppertal Institute and Ecofys, March 2011

<sup>13</sup> "2011 ENERGY EFFICIENCY INDICATOR STUDY: EUROPEAN REGIONAL RESULTS SUMMARY", Johnson Controls Institute for Building Efficiency, 2011

<sup>14</sup> "ENERGY SAVINGS 2020. How to triple the impact of energy saving policies in Europe", Ecofys und Fraunhofer ISI, September 2010

<sup>15</sup> ACE research (2000). Energy efficiency and jobs: UK issues and case studies. A report by the association for the conservation of energy to the Energy Savings Trust

<sup>16</sup> Ürge-Vorsatz, Diana et al. (2010). Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary. The Center for Climate Change and Sustainable Energy Policy (3CSEP), Central European University, Budapest, Hungary. <http://3csep.ceu.hu/projects/employment-impacts-of-a-large-scale-deep-building-energy-retrofit-programme-in-hungary>

<sup>17</sup> "Energiesparkompass 2012", Fachverband Wämedämm-Verbundsysteme, Baden-Baden, 2012

<sup>18</sup> COM(2005) 265 final. Doing More With Less. Green Paper on Energy Efficiency

<sup>19</sup> "A New Growth Path for Europe. Generating Prosperity and Jobs in the Low-Carbon Economy. Final Report", European Climate Forum e.V., Potsdam, June 2011

<sup>20</sup> „Boosting the economy – but how. Unemployment rates in selected EU countries as at March 2012“, in %, European Commission

<sup>21</sup> "Nachhaltige Gebäude. Von der Nische zum Standard", Energie und Klimawandel - Aktuelle Themen 483, Deutsche Bank Research Frankfurt am Main, 11 May 2010 [first sentence quoted from the condensed English version: "Sustainable real estate. From niche to mainstream" published on the Internet: <http://www.bnpparibasip.com/whitepapers/Investment%20case%20for%20Sustainable%20real%20estate.pdf>, accessed 27 August 2012]

<sup>22</sup> "IMPROVING NATIONAL ENERGY EFFICIENCY STRATEGIES IN THE EU FRAMEWORK. FINDINGS FROM ENERGY EFFICIENCY WATCH ANALYSIS", Wuppertal Institute and Ecofys, March 2011

<sup>23</sup> "Thinking Deeper: Financing Options for Home Retrofit" The Institute of International and European Affairs, Dublin, September 2011

<sup>24</sup> "2011 ENERGY EFFICIENCY INDICATOR STUDY: EUROPEAN REGIONAL RESULTS SUMMARY", Johnson Controls Institute for Building Efficiency, 2011

<sup>25</sup> "30% - Why Europe should strengthen its 2020 climate action", Climate Action Network Europe

<sup>26</sup> "Financing Mechanisms for Europe's Buildings Renovation. Assessment and Structuring Recommendations for Funding European 2020 Retrofit Targets", European Insulation Manufacturers Association, January 2012



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