



European Energy Saving Guide **2016**

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

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„Energy efficiency as the “first fuel” for the European Union“

Claude Turmes

Member of the European Parliament
Committee on Industry, Research and Energy



Dear readers,

first of all I believe that we need to promote a paradigm shift when considering energy efficiency in order to acknowledge that energy efficiency is indeed the „first fuel“ for the European Union.

I take note with satisfaction that a whole pillar of the energy union as proposed by the European Commission is dedicated to moderation of demand with the objective to „rethink energy efficiency and treat it as an energy source in its own right“. This implies for instance that energy efficiency investment should be considered as infrastructure investment to the same extent as supply-side projects are (long-lived capital stock providing input to a wide range of goods and services and freeing up capacity elsewhere in the economy). In the context of low economic growth, low building construction activity and low inflation, investment in energy effici-

ency can significantly support economic recovery, improve the competitiveness of the European economy and its resilience to external shocks, as well as create substantial market opportunities for SMEs and midcap companies.

As a first priority, member states should fully implement the Energy Efficiency Directive, notably its article 7 which creates energy obligation schemes and article 8 which incentivises energy management systems and which resulted already in significant benefits and business opportunities in countries such as Denmark. A real market for energy service companies and energy performance contracts is more than ever needed. Public authorities should also lead by example with the implementation of large renovation programmes in schools, universities, social houses and office spaces.



However, I am concerned to see more words than deeds in this sector and investment in energy efficiency is currently estimated to be around half of what is needed by 2020. For this reason, I propose in the „Luxembourg Declaration“* published on 23 September 2015 that Europe engages in a comprehensive „de-risking“ strategy in order to trigger this investment, particularly in the field of renovating and increasing energy performance of buildings. I am convinced that guarantee funds can play a significant role in this de-risking strategy and I am confident that the recently established Juncker plan, managed by the European Investment Bank will make a substantial contribution due to its focus on this area. Similar funds are already successfully established at national level, mostly by national promotional banks such as KfW in Germany. In smaller countries, in central and south-eastern Europe for example, we should consider establishing regional funds functioning as the Green Climate fund does at a global level.

Regional initiatives could allow us reaching a critical mass in the project portfolio and thus lead to increased overall investments. The challenge is indeed to find ways to standardise and re-group small diffuse projects into larger, bundled ones, which are more bankable on the financial market. Availability of sufficient public funds for project development assistance (PDA) and technical assistance (TA) to ensure a large pipeline of projects is critical to support this development. Furthermore, building technical capacities of local authorities ahead of the introduction of near zero energy buildings (nZEB) standards for new built in 2021 will allow member states to be ready for this major transformation.

Increased investment in these sectors will also require a well-qualified and substantial workforce. To foster these new skills the European Union should develop and implement training programmes with the aim to deliver high-quality jobs across Europe.

To conclude I'd like to argue that although there is no silver bullet, we have a whole toolbox consisting of a combination of regulation, technical assistance and third-party independent advice, financial support schemes combining tax incentives, low interest-rate loans and grants available in order to achieve our energy efficiency goals.

It is now up to the political leaders to show their commitment to an ambitious and binding energy efficiency target by 2030, backed by a robust governance system, to ensure that energy efficiency is indeed valued as the „first fuel“ of the European Union.

The European Energy Saving Guide 2016 provides an excellent overview about how far we have got to achieving the 2020 targets, explains why Member States are still far behind the schedule and clearly points out the huge potential improvements of the thermal performance of buildings' envelopes offer for Europe's economic growth, employment and our environment.

* Claude Turmes, The Luxembourg Declaration, 23 September 2015. Available on <http://bit.ly/LuxDeclaration>



Editorial



Ralf Pasker

EAE Managing Director

Dear readers,

Europe is currently experiencing eventful and moving times which necessitate quick and decisive action. Despite these current needs, we must not lose sight of the EU's long-term objectives if we are to be able to tackle the challenges of the future and fulfil our responsibility to future generations. Many of these challenges are linked to the issues of energy supply and climate protection and thus also to the question of how our children will live in the world of tomorrow.

Just as we did with the first edition in 2012, we have once again analysed current studies and academic surveys from Europe in compiling the new Energy Saving Guide. These show clearly that it is more important than ever to view ensuring energy efficiency in the existing building stock as a central task for European politicians.

Around 40% of all energy is still consumed in Europe's buildings. This well-known fact is even more controversial when one considers that a considerable portion of this energy is imported – in many cases from regions that have become more

politically unstable since the last edition. The new studies also show for the first time the extent of energy poverty in Europe, an issue which now represents a considerable social problem.

On the other hand, many studies and experts provide encouragement that we should view the current situation as an opportunity for Europe. They show that a focussed renovation drive would offer enormous potential for the European economy. In particular, regions in southern Europe, which in some cases are still suffering the consequences of the euro crisis, would benefit significantly from an energy modernisation programme. The „InnovationCity“ project in Bottrop in western Germany, for example, shows that something like this is possible: an annual renovation rate of almost 4% has been achieved here within just a few years.

On this optimistic note, I would like to wish you an interesting read and hope you find the Energy Saving Guide 2016 to be informative.

„This responsibility cannot be left to the individual“

Working as a research fellow at the European Commission, **Dr Yamina Saheb** investigated the significance of the construction sector for the European economy. Her study, entitled „Energy Renovation: The Trump Card for the New Start for Europe“, shows the enormous potential here, in particular in the area of energy renovation in existing buildings. In order to tap into this potential, however, a paradigm shift is required: Increasing energy efficiency in buildings must in future be understood as a societal challenge and not as the task of the individual property owners.

In essence, her study can be understood as a call for governments to take on more responsibility in the area of energy renovation. But should this not be the task of the building owners, who ultimately also benefit from any energy savings?

It may be true that in theory it should, but in practice it has been shown over the decades that the prospect of making future savings on heating costs has encouraged too few building owners to implement comprehensive energy renovation projects. Thus the enormous energy consumption of buildings in Europe can not be substantially reduced in this way. Having said that, the EU member states themselves should nevertheless have a significantly greater interest in the required renovation programme.

Can you explain why this is?

The economic benefits for building owners are relatively clear: lower heating costs, improved levels of home comfort and perhaps an increase in their property's value. For governments, the potenti-

al benefits are more varied: economic, political and social. This can be seen most clearly when looking at the significance of the construction industry. It represents around 7% of the overall European economy and accounts for almost 9% of all employed individuals.

However, the number of new buildings in the EU has been falling steadily, in particular since the financial crisis. How does this fit into the picture?

The shortage of new buildings meeting modern standards makes it even clearer just how significant energy renovation could be in the future. Today, this area is already dominant, accounting for almost two-thirds of the entire construction industry. The stability of the construction sector with more than 11 million employees is thus heavily dependent on the political will to ensure greater energy efficiency in existing buildings.

You also talked of the social benefits of a Europe-wide renovation programme. How might these look?

Based on the structure of the construction industry in Europe, some of these benefits are directly linked to the economic benefits. Well in excess of 90% of construction firms employ fewer than nine members of staff. This means that a booming construction industry has a very direct impact on the lives of many people. The second important point to highlight is the topic of fuel poverty. In recent years, the number of households in which energy costs are becoming a poverty risk has increased considerably. In such cases, energy-efficient buildings would thus also be in the interests of the respective governments.

And then there are also the political benefits...

I also see two key points here. Firstly, we have the EU's climate objectives. If Europe is really taking this project seriously, it will need to make significant improvements to the energy efficiency of buildings, as the ambitious goals will otherwise be unachievable. The second point relates to the issue of supply security. Experts have been observing an increasing level of risk here for several years: Many EU member states are completely or very highly reliant on gas or oil imports from politically unstable regions. Lower consumption in the energy-intensive building sector could provide significant relief.

Your arguments sound convincing, but why isn't there more activity at a European level?

I certainly see signs that views within the EU Commission are changing, but what we are talking about here is a paradigm shift. We need to make clear that we cannot place responsibility for energy-efficient buildings on the shoulders of the individual property owners – this issue is simply too important to do that. However, a number of things still need to be clarified for the implementation of a focussed and effective renovation concept.

Can you give examples?

There is still a lack of common and binding standards in the area of energy renovation. These could perhaps be drawn up by 2020. And – very importantly – we need to ensure that we also involve the economy in this effort. Companies have to understand that far-reaching renovation projects represent a sensible business model and that the required foundations here can only be laid together. My dream would be a kind of „renovation kit“ for different building categories with pre-defined parameters, for example as regards facade insulation or heating systems. This would mean that each renovation property would not become a time-consuming individual project, the energy renovation of buildings would gather momentum more quickly and over the long term all of Europe would benefit.



Dr. Yamina Saheb joined the Research Centre of the European Commission in October 2013 as a senior research fellow. She is in charge of conducting analysis of energy efficiency policies at the building and the city level. Prior to that, she was the Head of the Sustainable Buildings Centre of the International Energy Agency. This role includes conducting research and analysis on the use of policy instruments to reduce energy consumption in the buildings sector. She regularly presents papers and analysis results at international conferences and has contributed to a book published on sustainable cities. Prior to joining the IEA, she worked as an energy efficiency analyst for IFRI (Institut Français des Relations Internationales). Before that, she worked as the Technical Director for CLASP (Collaborative Appliances Standard and Labeling program) and as the head of the Technical Department for Eurovent (HVAC manufacturers organisation in the EU). Yamina holds a Ph.D in Energy Engineering, master's degrees on Economics and environmental policies and an Engineering degree in Buildings and environmental policies and an Engineering degree in Buildings.

A city full of ideas

There are many cities like Bottrop in western Germany. It was this fact that made it the ideal candidate for the „InnovationCity Ruhr“ project. The project is aiming to implement a practice-based transformation process, which could also be referred to as a „bottom-up energy revolution“. In just about three years, it has succeeded in realising energy modernisation measures in 10% of buildings – collaborating with municipalities, energy providers, research institutions, businesses and local people. The appeal of this energy efficiency concept is now attracting visitors from all over the world to the former coal-mining area.



At first glance, there is not much to see to set Bottrop apart from other cities in the Ruhr area. In many urban districts, the surroundings are characterised by miners' settlements – low rows of houses from the 1950s and 1960s which are typical of the region's building stock. Nothing too extraordinary so far. Only upon closer inspection does it become apparent what has been drawing the attention of city planners and politicians from around the world to Bottrop for a number of years. In particular, you may notice that a few more houses are fitted with modern thermal insulation than is the case elsewhere, that an increasing number of photovoltaic systems are evident and that information boards can be found here and there providing details of energy efficiency projects. Many of the features that make Bottrop an „InnovationCity“ are of course hidden in cellars or engine rooms – as well as within people's minds. „Raising the awareness of the people of Bottrop about the issue of energy efficiency was certainly a decisive step in ensuring the project's success“, says Burkhard Drescher, Managing Director of Innovation City Management GmbH. As the former Mayor of neighbouring Oberhausen, he knows just how important it is to involve the people if politicians want to achieve anything.



Vivawest House of Future is a project of InnovationCity

Interdisciplinary projects

The objective of the politicians and many other parties involved here is to test in practice the options for achieving greater energy efficiency in the existing building stock. Bottrop applied to participate in the model project in 2010 and ultimately was accepted as the first „InnovationCity“. Since this time, a lot has changed in the south of the city, where a project area comprising approximately 14,500 buildings and 70,000 inhabitants has been defined. Around 200 different projects have been initiated to date, with their scope being just as varied as the parties involved. Regional research institutions, energy suppliers and housing associa-

tions are pulling together with energy consultants, city planners and craft businesses. Together, they have introduced a rental system for e-bikes and electric cars, converted four different „future houses“ into model buildings, installed 100 combined heat and power systems and an equal number of heat pumps and switched parts of the city over to energy-saving LED lighting. And all this is just the beginning for much wider-scale ideas. For example, the combined heat and power systems are in future to be linked with one another, together creating a network that can provide the neighbourhood with electricity on a decentralised basis.

Incorporating the people pays off

In parallel to high-tech plans such as these, the InnovationCity employees are investing a great deal of time in providing information to the people. „It is essential that we spur building owners into taking action“, explains Drescher. „A modern heat pump, for example, is only really appropriate if the building is also equipped with up-to-date thermal insulation.“ It is for this reason that Bottrop's building owners are being offered free energy consulting services with the objective of assessing the potential and options for energy modernisation measures. With more than 1,850 such initial advisory sessions, the team of consultants has already reached 18% of the individual owners within the project area. In addition, information events are frequently being held, with some attracting more than 3,000 people. Bottrop is also striking out in a new direction in terms of subsidies: State funding for urban development no longer only goes to the local authorities, but is also distributed directly to the building owners via the City. Depending on the efficiency potential, up to 25% of their investments is thus subsidised.

The impact of this comprehensive approach can already be seen today: After the first measures were implemented in 2012, the energy modernisation rate at the end of 2014 was already 7.8% or almost 4% per year and the figures for 2015 suggest that this momentum is being maintained. In comparison, the annual renovation rate across Germany as a whole fluctuates around the 1% mark at best.

An express desire to see the project repeated

In addition to the local success in Bottrop, the InnovationCity Ruhr project has another objective. From the very beginning, it has been about developing strategies that can be applied to other cities and regions. „Guidelines for Climate-Friendly Urban Redevelopment“ have thus been made available as a blueprint for new projects. The „Elting district“ in Essen is one residential area that is set to be enhanced and developed over the coming years on the basis of the experience gathered in Bottrop. Several other projects in the Ruhr area are already at the preparatory stage. And it is not only here: Based on the knowledge generated in Bottrop, CO₂ emissions are to be cut by 20% and energy efficiency increased to the same extent by 2020 in the „Hochkamp district“ of Eutin in Schleswig-Holstein.

The international interest in the InnovationCity project can also be seen. Among the approximately 200 visitor groups, there have been delegations from Canada, Japan and China. It is therefore quite possible that the former coal-mining area will soon once more become an energy region – with fantastic prospects for the future.



More ideas, less energy consumption

The number of new buildings is falling across Europe. Many architects may view this as a problem, but it in fact represents an opportunity. After all, their expertise and experience are also needed more than ever for the renovation of old buildings in particular. As each property comes with its own requirements, architects – as independent parties who are first and foremost committed to their professional ethics and their chosen vocation – represent an important interface between building owners and construction companies, helping to ensure the quality of energy modernisation measures. What's more, in Austria architects are personally liable for any planning errors for a period of 30 years. For professionals in this field, this area also offers a great deal of scope for new ideas and impressive architectural design.

For many young architects, new construction projects are seen as the „supreme discipline.“ You begin with the proverbial „blank canvas“ and with each stroke of your pen something new emerges: a wall, a panoramic window or a lounge with a fireplace. This is followed by the construction phase, with the architect's creative fantasy coming to life in the form of wood, concrete and glass. This process is an undeniably wonderful experience for every master builder. The problem is that it is becoming increasingly rare to be able to turn this dream into reality. The number of new buildings across Europe has been on the decline since the financial crisis at the very latest. Despite this, there is still enough work for aspiring architects if they choose to take it. However, for experienced professionals in this area – Otto Wagner opined that you first be-

come a „real architect“ after 40 years, with the time before this being spent trying to make your mark to the detriment of building owners – the „supreme discipline“ lies in the modernisation of old buildings, conversions or extending old properties of architectural value.

The challenge lies in the existing building stock

The European Union is home to more than 200 million buildings. The majority of these are many decades old and the lion's share are also likely to still be standing in 2050 if you believe the relevant forecasts. The variety of building styles will certainly still be a source of joy. It is also for this reason that they are the commonly accepted image used on the notes of Europe's single currency.

One thing, however, will no longer be accepted by anybody: That old buildings consume several times more energy for heating and operational purposes than modern properties. Environmental, economic and political considerations have ensured a considerably greater level of energy efficiency in new buildings over recent decades. Not one of these reasons – including climatic change, volatile energy prices and the associated risk of „energy poverty“ as well as our dependency on oil and gas from Russia or the politically unstable Middle East (our greatest security problem) – has become any less applicable in the recent past. In fact, the opposite is true. It is thus only logical and consistent that much-welcomed developments such as the passive and energy-plus house technology used in new properties will in



future extend to older buildings. In this context, technologies and skills that allow for energy consumption in existing buildings that is in line with modern standards will be very important. Renewable energies will of course play an important role here. As such, however, the energy modernisation of buildings will be unavoidable: renewable energies can only be used in an appropriate and sustainable manner if energy consumption is drastically reduced. After all, the „green energy“, which is costly to generate, is too valuable to waste. And saved energy remains the cheapest and most environmentally friendly form.

Creativity still in demand

Against this backdrop, it becomes clear that architects will also still be able to fully express their technical and creative skills in future. Conversions and the modernisation of old buildings usually require a greater level of experience and skill than planning a new property from „scratch“. The creative expertise of the planner can be challenged in a very special way when working with existing structures – for example when creating new spaces from historic or listed buildings which offer a highly individual quality of living that a new property could never offer. For the best architects, such as Carlo Scarpa in Venice, this was the most important task.

There are many successful examples of such architectural feats and these should provide encouragement to also take a „simple“ energy modernisation project seriously as a welcome challenge, in particular as regards economic, technical and aesthetic quality. The specialist monitoring of these aspects, however, requires great experience and every building owner would be well advised not to save on this essential service. It will pay off many times over further down the line. Despite the existence of many proven system components for windows, heating systems and building insulation, during the construction itself it is a number of details that determine the success of a building project. A quote from the Austrian architect Adolf Loos can certainly be used as a benchmark here: „A renovation that doesn't bring about improvement is a failure.“

Ideas instead of the cost-benefit trap

The regulations applicable to new buildings have achieved a great deal in recent years. An increasing number of building owners are also incorporating high energy efficiency standards as part of major construction projects. Projects such as the „SolarCity Linz-Pichling“ and the „Young Corner“ passive house complex in the north of Vienna also demonstrate that the additional costs linked to the ambitious construction methods are marginal with good planning, something which can't be said as regards the benefits enjoyed by the occupants. They benefit from both lower energy costs and a higher level of home comfort.

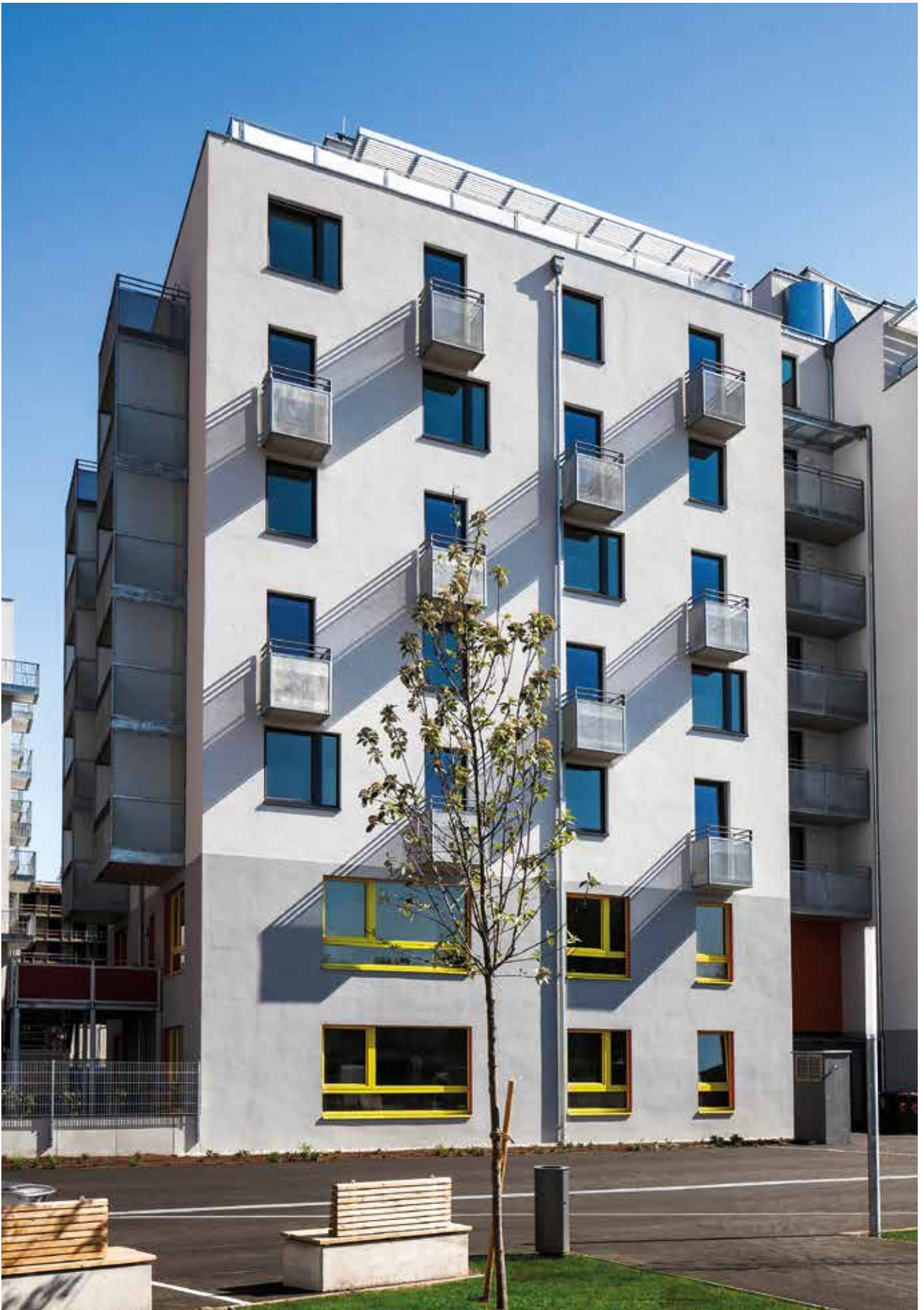
Nevertheless, the renovation examples also make clear a dilemma which is acting as a considerable obstacle to the acceptance of energy modernisation projects in countries with a high proportion of rented properties. Here, building owners are often unable to make economically sound investments in meeting high efficiency standards. Should a building owner plough a large sum of money into a modern building envelope with thermal insulation and new windows, only the occupant will save on the heating costs. However, in areas with high vacancy rates, building owners would benefit from the renovation if this enables them to rent out their properties.

To achieve the common goal of an energy-efficient building stock in Europe, it will not only require the commitment of more architects, but also an effort from politicians to find new solutions. Flat-rate renting models could be one way: The landlord defines a rental sum including heating that is not tied to consumption and in this way benefits from the cost savings achieved through high energy-efficiency standards. Or communal housing providers could become pioneers as part of a renovation drive: They themselves could benefit from the modernisation of the social housing stock, provided the heating costs of many occupants are publicly financed via transfer payments in any case.

**There is thus no shortage of options.
Now is the time to act!**



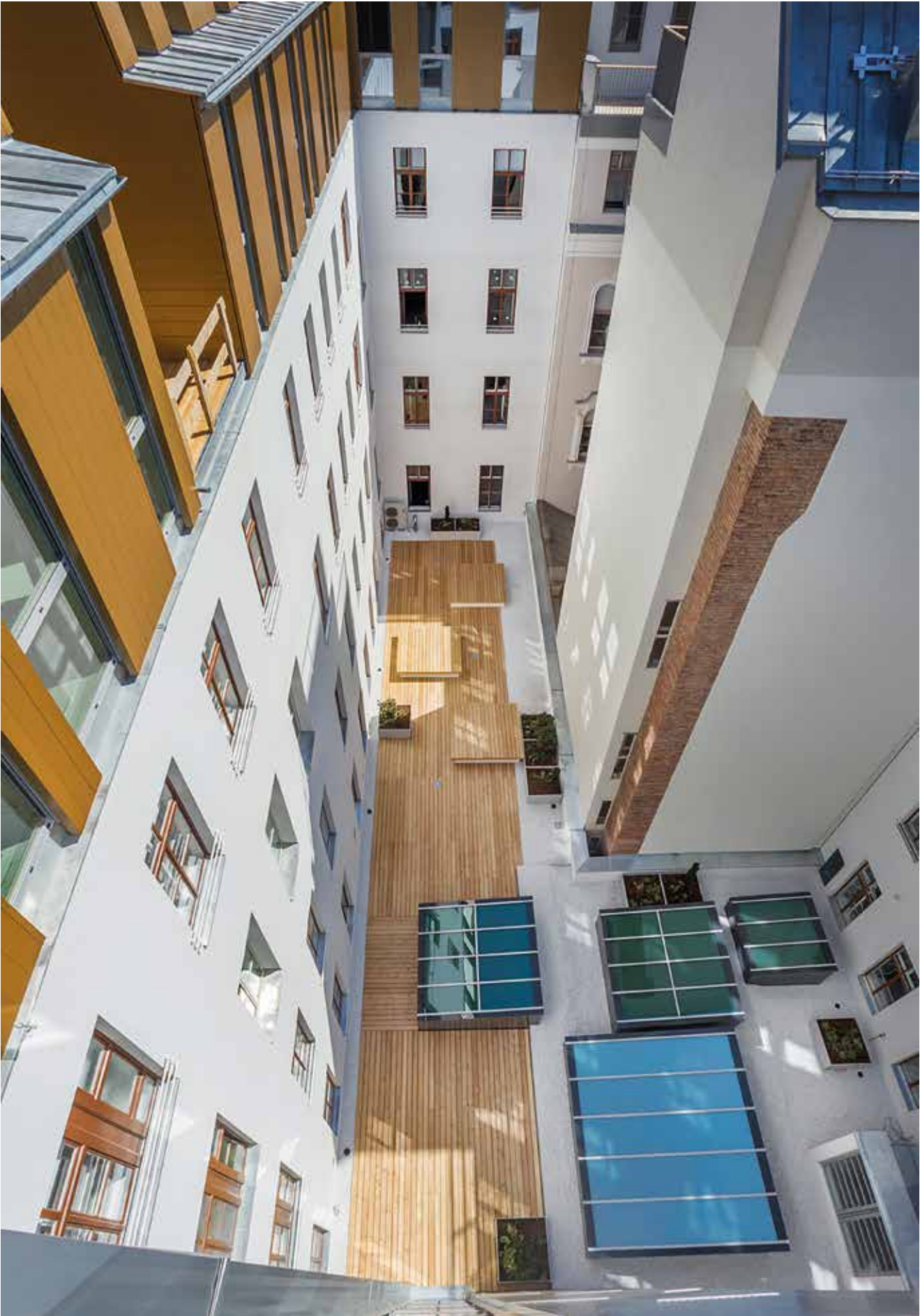
The architect **Prof. Martin Treberspurg** has been working on the area of energy efficiency in the construction sector, with a particular focus on solar structures, for more than three decades. In his dissertation, he already looked at the passive use of solar energy through ecological construction methods and has gone on to pen several books on this topic. Between 1997 and 1999, Treberspurg headed up the Structural Engineering department at the Vienna University of Applied Sciences and since 2004 has been a professor in the area of resource-oriented construction at the Vienna University of Natural Resources and Life Sciences. Following positions at several renowned architecture firms, he founded Treberspurg & Partner Architekten in 1996 and still manages the company's business today. Many of his international projects have been recognised with awards. In 1999, for example, he received the Sir Robert Matthew global architecture prize „for the improvement of the quality of human settlement.“



Status quo:

The long road to energy-efficient buildings in Europe

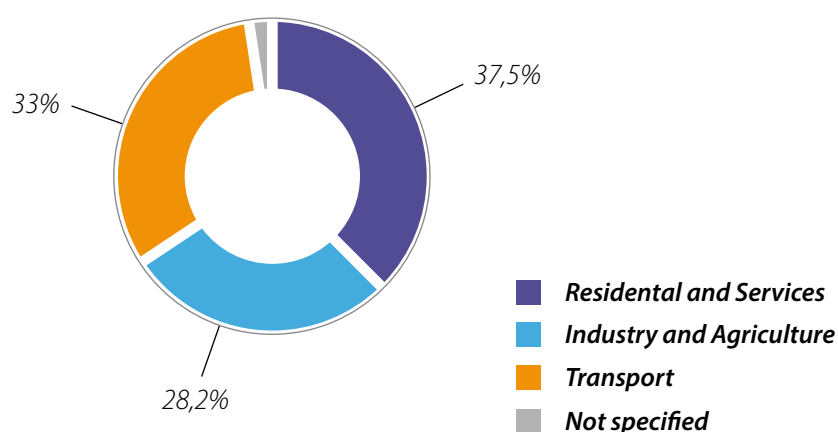
Let's start with the good news: The need for energy-efficient buildings is increasingly becoming an issue in the realms of European politics and business. On the other hand, however, current statistics clearly show that political will alone will not be enough to bring about sustainable change. While there is no doubt that modern standards are essential for new developments, such guidelines represent little more than „a drop in the ocean“ when one considers the enormous share of old buildings in Europe. As the figures show, these buildings will have to be subjected to an EU-wide renovation drive if the European Union's ambitious efficiency and environmental targets are to be achieved.



Just why energy efficiency in existing buildings is so important for Europe can be outlined using just a few key figures. According¹ to the data of the Buildings Performance Institute Europe (BPIE), the European Union is home to more than 200 million buildings. Across Europe, these account for around 38% of energy consumption² and 36% of all greenhouse gas emissions³. These figures exceed the share accounted for by both the industrial sector as a whole and the transport industry in the EU's member states. The EU Commission's „Technology Map of the European Strategic Energy Technology Plan“ also states that the „energy saving potential of this sector is substantial and can bring significant benefits at individual, sectoral, national and international levels⁴.“

This situation is based on the EU's 2012 Energy Efficiency Directive. Article 4 states that „member states shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private.“ In Article 5, the member states subsequently undertake to renovate 3% of all buildings belonging to or used by their central government each year. The fact that this specific objective is limited to a few public buildings is a clear indication that the practical implementation of ambitious objectives in this area faces enormous challenges.

Final Energy Consumption 2011



Source: Eurostat, data extracted on 31 May 2013

***Diversity that represents
a challenge but also offers
great potential***

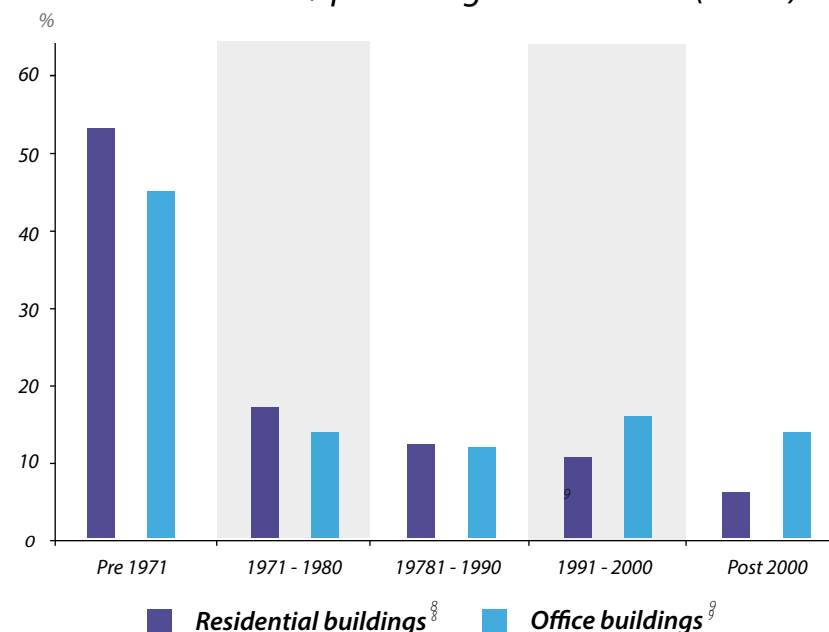
An analysis of the existing buildings in the EU's member states reveals enormous differences – both at a regional and national level and as regards the ownership structure. According to the BPIE study entitled „Europe's buildings under the microscope⁵“, more than two-thirds of the energy consumption of all buildings in Europe is accounted for by residential properties. Depending on the climatic conditions, the share of consumption that can be assigned to heating energy varies between less than 25% in Portugal and around 67% in Poland or France. Viewed as an average across the EU, the share accoun-

ted for by heating energy is well in excess of 50%, suggesting that around 20% of all final energy consumption in Europe is used for space heating.

The recent study entitled „Survey on the energy needs and architectural features of the EU building stock⁷“ put the total residential floor area in the EU at around 17.6 billion square metres, with an estimated 85% of this area being heated. This requires 2,299 terawatt hours of energy annually, which equates to an average of 152 kilowatt hours per year and square metre.

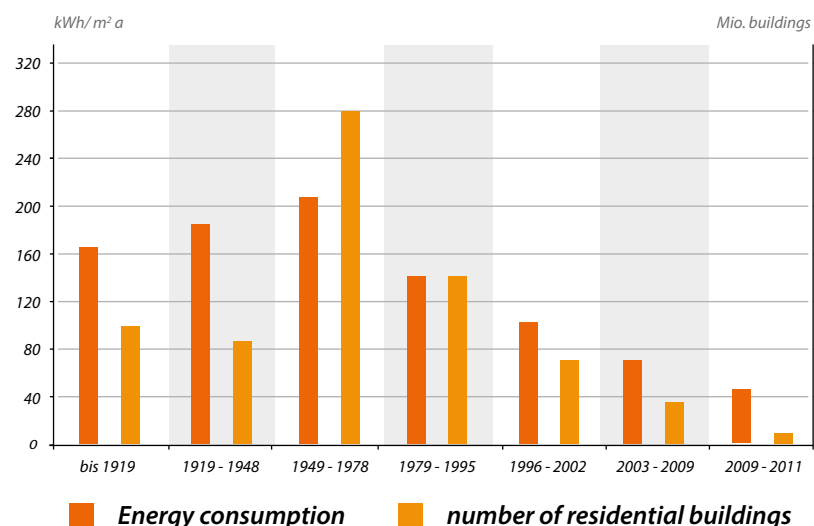
The potential represented by these figures becomes clear upon looking at the buildings' age structure. Around three-quarters of all residential properties in the EU were constructed during periods in which there were no or only very minor requirements regarding the energy consumption of buildings. Technologies such as facade insulation only began to slowly catch on from the 1980s and even then were still a long way from complying with current standards. A large portion of old buildings therefore still record consumption values which exceed the current standards many times over.

Year of construction / percentage of floor area (EU 27):



Source: BPIE model

Age profile of buildings and energy consumption in Germany



Source: Wohnen und Bauen in Zahlen (BMVI) ¹⁰

The example of Germany (see chart) shows that the 7 million buildings constructed during the post-war period up to the end of the 1970s consume the most energy, with average consumption of more than 200 kilowatt hours per year per square metre. In comparison, state-promoted „energy-saving houses“ in Germany consume between 40 and 70 kilowatt hours per year per square metre.

As real estate is viewed as a long-term asset, experts expect that 75% to 90% of old buildings will also still be in use in 2050¹¹. More than 70% of the building space is concentrated in the EU's so-called „big six“: France, Germany, Italy, Poland, Spain and the United Kingdom. These countries thus have a special responsibility as regards increasing the energy efficiency of the existing building stock on a sustainable basis.

The level of the possible energy savings is of course dependent on a large number of influencing factors and generally requires an individual examination. However, the model calculations from

a study published in 2014 ¹² provide a good impression of the influence that the respective renovation measures can have on the energy consumption of buildings from various age groups.

Energy saving potential with different levels of renovation.

Differences in different countries and different building categories occur due to different climate, traditions, building codes, barriers and technological opportunities.

	Standard	Good	Ambitious
Roof	10-15 cm of thermal insulation	20 cm of thermal insulation	30 cm of thermal insulation
Wall	5-10 cm of thermal insulation	15 cm of thermal insulation	20 cm of thermal insulation
Base	10 cm of thermal insulation	10 cm of thermal insulation	15 cm of thermal insulation
Windows	Double glass $U_g=1.7-2.7 \text{ W/m}^2\text{K}$	Double glass $U_g=1-1.7 \text{ W/m}^2\text{K}$	Triple glass $U_g=0.65-1.7 \text{ W/m}^2\text{K}$
Reduction space heating energy need (construction period < 1950)	21% - 47%	26% - 58%	44% - 85%
Reduction space heating energy need (construction period 1950-1990)	23% - 42%	25% - 52%	27% - 85%
Reduction space heating energy need (construction period > 1990)	12% - 20%	10% - 39%	25% - 80%

Source: Fraunhofer Institute for Systems and Innovation Research ISI, TU Vienna ¹²

Positive approaches, minor impact

Overall, extremely positive effects can already be observed today: „The energy used per m² for space heating, which is the indicator used to assess energy efficiency trends for household heating, has decreased steadily in most countries since 2000; the rate of improvement reached around 2.3%/year at the EU level¹⁵. Some EU-15 countries, such as Sweden, the Netherlands and Germany, experienced a very strong reduction (around 3%/year), mainly explained by energy efficiency improvements¹³.“ Other figures from the EU Commission¹⁴, however, seem to contradict this: According to these figures, energy consumption in the housing sector increased by 0.8 percentage points between 2000 and 2010. A reduction of 0.4% only is forecast for the following decade.

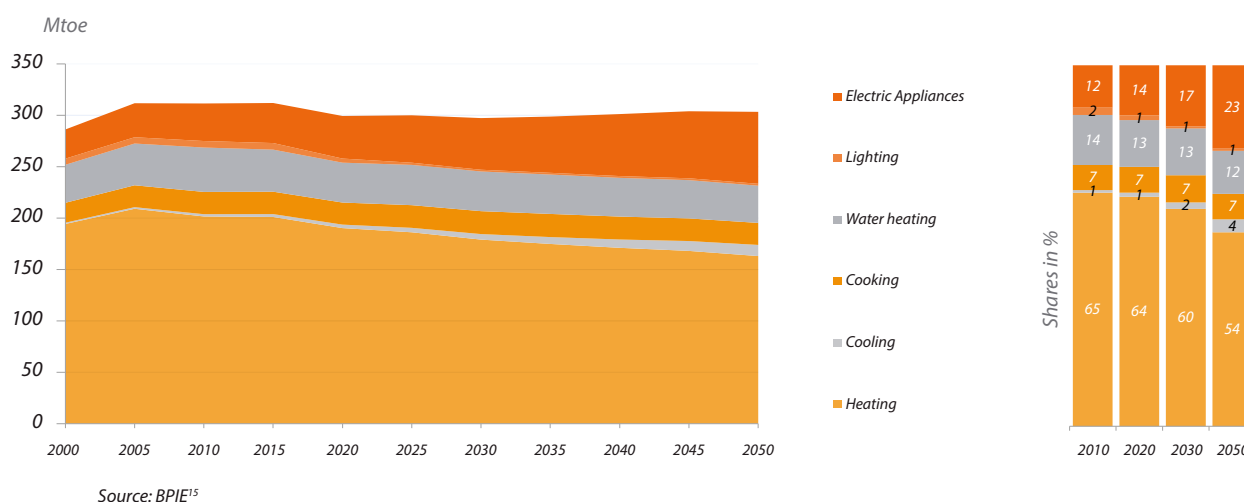
The reasons for this effect are obvious: While modern buildings are considerably more efficient, they nevertheless lead to an increase in overall energy consumption if they do not replace old properties – despite the decrease in consumption values per square metre.

The vital impetus required here can thus only be achieved through increasing renovation rates across Europe – and ensuring an appropriate level of renovation. The BPIE notes here¹⁶: „Most renovation activities at the moment achieve only modest energy savings, perhaps 20-30%, but this needs to increase to deep renovation of at least 60% if the full economic and environmental potential is to be realised. ... in order to reach the ultimate objective of transforming the existing building sector into a sustainable one by 2050, renovation rates need to ramp up from the prevailing rate of around 1% of the total floor area renovated annually, to around 3% p.a. from 2020 onwards.“

A survey of key decision-makers from the construction and real estate sectors conducted by the „Economist“¹⁷ attests that Europe has a comparatively good starting position, but has had modest success: „EU companies are relatively active in retrofitting buildings compared with their counterparts in other regions, but efforts need to double to meet EU energy efficiency goals by 2020. Our 2012 survey revealed that 43% of EU respondents in the building sector focus on retrofits – more than in the US (37%) and in China (23%), for example. The majority (57%), however, still focus on new builds, with energy-efficient retrofits still accounting for only a meagre 1% of existing stock.“ The conclusion for the study's authors is clear: „To reach EU 2020 efficiency targets, retrofits will need to double from about 1% of existing stock today to 2-3%. This will require a combination of regulatory push and market pull.“

Final energy demand in residential sector

By energy use



A long and rocky path

The challenges in connection with new legislation and market incentives are admittedly great. On the one hand, there are the very different ownership structures within the EU¹⁸. In countries such as Bulgaria, Lithuania and Romania, more than 90% of residential units are privately owned, and this figure is greater than 70% in 17 EU member states. This group, however, only includes two of the previously mentioned big six – heavyweights such as Germany have considerably lower private ownership rates. And where a large number of people rent their properties it is difficult to create suitable renovation incentives: The landlords have to bear the costs, while the tenants enjoy the benefits.

Binding standards regarding the quality of energy renovation projects would have to be a further key component of this strategy. A summary of the latest report of

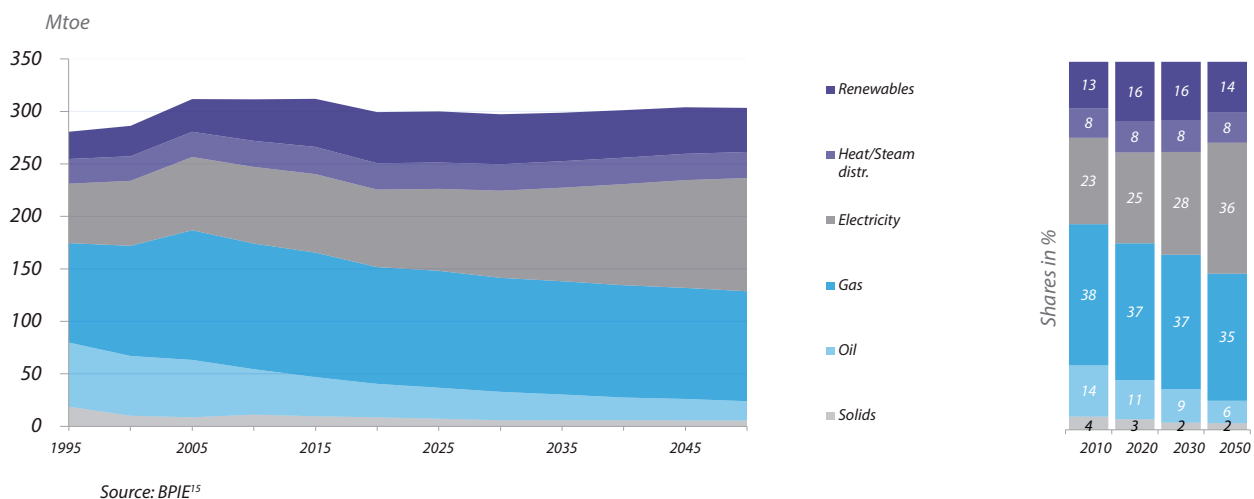
the „Intergovernmental Panel on Climate Change“¹⁹ notes the following in this regard: „The very long life-cycles of buildings create risks of energy use ‚lock-in‘ with the effects of low ambition today playing out for decades. Using state-of-the-art standards immediately, for both new and retrofit buildings, would alleviate this hazard.“ The report states that particular attention must be paid to the building envelope, with „high-performance insulation and windows, avoiding thermal bridges and maintaining air tightness while using mechanical ventilation“ being key aspects in the success of a renovation. In multi-family homes, in particular, high-quality energy renovation projects can achieve a great deal, „reducing space heating requirements by 80–90% and, in developing countries, cutting cooling energy use by 30% and heating energy by 60%.“ The paper’s findings thus correspond with the findings of the EU Commission²⁰: „The building envelope has the greatest impact on the energy consumption of a building. The

separation between indoor and outdoor climate defines importantly the final energy consumption of the building. Therefore, the focus is mainly on the insulation level of the building envelope and secondly on the energy resources that are required to fulfil the needs for space conditioning, for example, heating, ventilation and cooling.“

These figures and data reveal two things. Firstly: The potential represented by existing buildings remains enormous. Secondly: A tremendous effort is required across the EU in order to tap into this potential – including with a view to future generations. However, a change of thinking will be required here. Instead of short-term cost-benefit calculations, the issue needs to be understood as a societal task. If this can be done, the energy renovation of buildings in Europe can solve many more problems than just the dependency on fossil fuels. The following argument outlines the decades-long road ahead here, drawing on several landmark works.

Final energy demand in residential sector

By energy form



Argument:

Why Europe requires an energy efficiency offensive

It was not so long ago that the debate about greater energy efficiency in the building sector was still primarily guided by environmental arguments. In the meantime, it has become increasingly clear that, in addition to reducing CO₂ emissions and preserving resources, there are many other good reasons for a renovation drive. Current figures suggest that following the financial crisis the EU economy would benefit considerably from a corresponding programme of investment. Even social injustices such as the growing risk of „energy poverty“ can be reduced in this way, as can the political problem linked to the dependency of energy imports from unstable regions.





It was Jean-Claude Juncker himself who declared energy efficiency a top priority. While still a candidate for the role of President of the European Commission, he stated the following in mid-2014: „I would also like to significantly enhance energy efficiency beyond the 2020 objective, notably when it comes to buildings, and I am in favour of an ambitious, binding target to this end.“ Significantly, this important sentence can also be found in the publication „A New Start for Europe: My Agenda for Jobs, Growth, Fair-

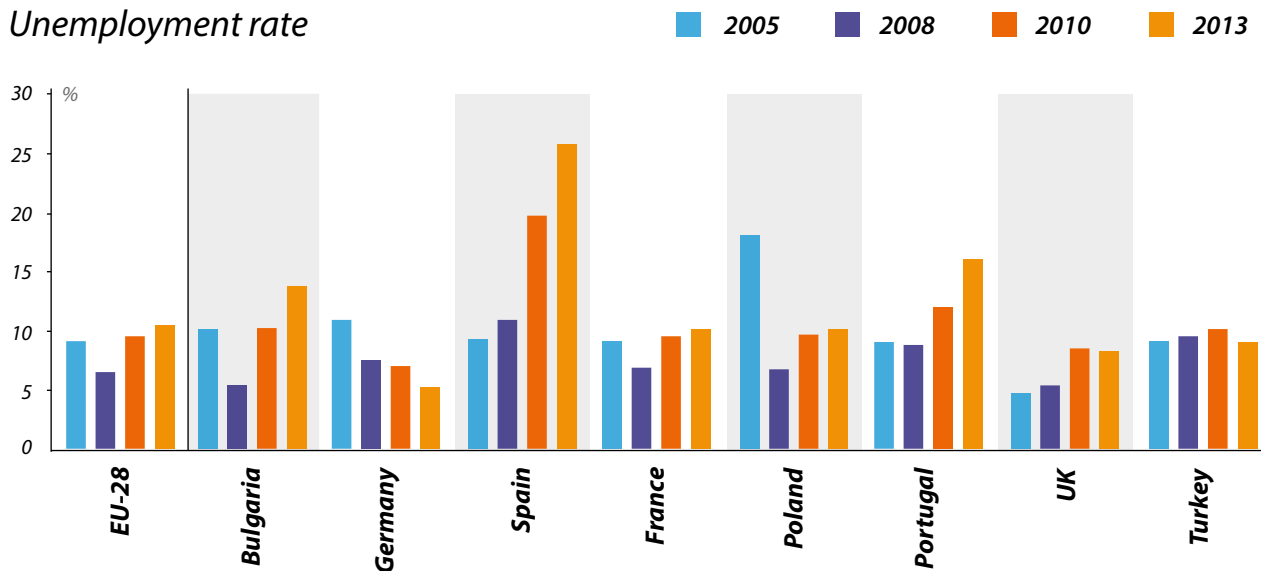
ness and Democratic Change.“ The link between energy efficiency, economic growth and social justice indeed offers enormous opportunities for the entire continent, as demonstrated by a large number of academic surveys.

The economy needs growth

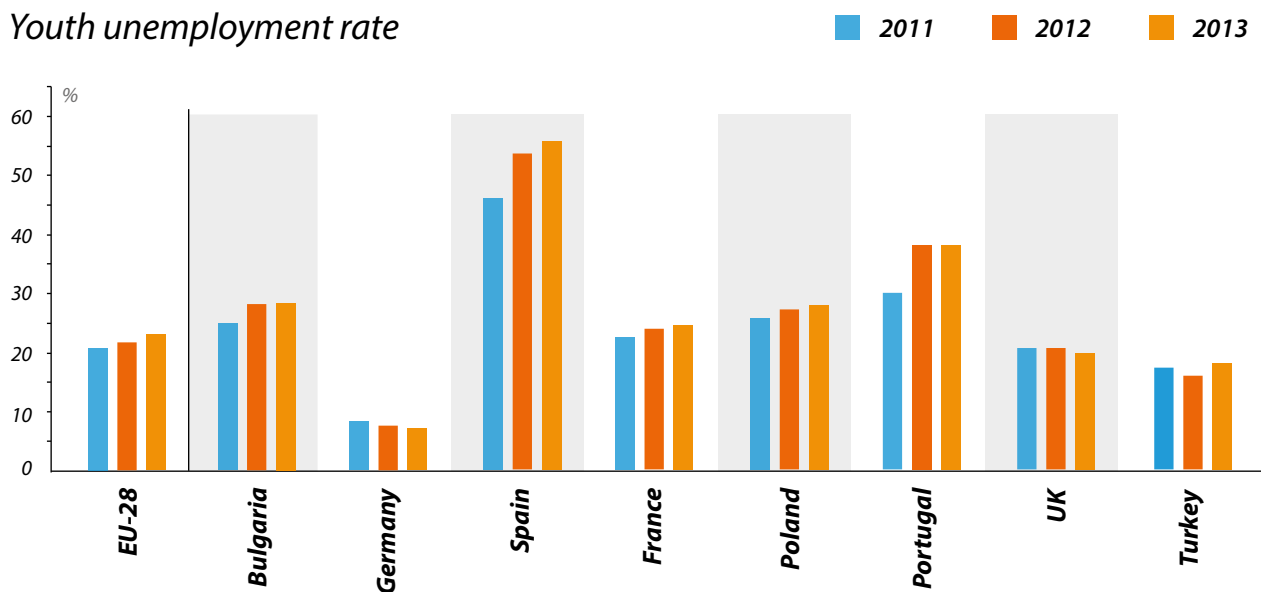
Just a brief glance at the EU's unemployment figures in recent years shows that the economy urgently requires a substantial boost. Following the onset of

the financial crisis, unemployment rates increased continuously, with the figure for the EU as a whole standing at 10.8% in 2013. Individual countries such as Greece and Spain even reported figures in excess of 25% in 2013. The situation on the labour market for young people was even more dramatic: On average, almost a quarter of all young people aged between 15 and 24 and able to work were unemployed, with this number being well in excess of 50% in Spain and Greece.

Unemployment rate



Youth unemployment rate



Source: Eurostat



A recent study²¹ conducted by the Institute for Energy and Transport at the European Commission Joint Research Centre (JRC) makes clear that the construction sector can make a significant contribution to improving this predicament: The paper states that the „energy renovation of existing buildings is a ‚win-win‘ option for the EU economy as a whole.“ And this theory is backed up by a number of figures. For example, the study reveals that as at 2011 more than 11 million people were employed in the construction industry, a sector which is responsible for around 7% of the GDP of the entire EU and which has experienced major problems in recent years: „In Member States where the construction of new residential buildings makes a big contribution to its economic value, the sector has lost up to 60 % of its jobs since the start of the crisis.“ Due to the massive collapse

in new building rates, it is said that energy renovation projects have thus also increased in economic significance for the labour market. „Specialised construction activities that include renovation work and energy retrofits account for two thirds of overall employment in the building sector.“

This assessment is also shared by an Ecofys study²², which especially looked into the benefits of comprehensive building renovations. It states that „deep renovation is a suitable way forward, not only for reduction of EU's dependency on imports, but also ... a strong impetus for economic recovery...“

An extensive analysis²³ conducted by the Energy Efficiency Financial Institutions Group (EEFIG) in February 2015 identifies the building sector as „the largest untapped long-term, cost-effective energy sa-

ving potential“ and provides figures on the possible costs of a renovation drive. „Estimates suggest that € 60-100 billion is needed to be invested annually in EU buildings to achieve Europe's 2020 energy efficiency targets yet current investments are below half of these requirements and five times lower than required to deliver 2050 decarbonisation targets for buildings.“

The EU Commission calculated the magnitude of the economic upturn it is „Energy Efficiency Plan 2011“²⁴: „The energy efficiency measures will be implemented as part of the EU's wider resource efficiency goal encompassing efficient use of all natural resources and ensuring high standards of environmental protection. The combined effects of full implementation of the existing and new measures ... have the potential to generate financial savings of up to



€ 1000 per household every year; improve Europe's industrial competitiveness; create up to 2 million jobs..."

And there is another factor that speaks in favour of the construction industry: The sector primarily comprises small companies which exclusively operate at a local or regional level. Corresponding investment programmes would thus represent carefully targeted economic measures with a direct impact on the lives of many people.

The UK-based „Economist“ surveyed²⁵ leading decision-makers from the construction, financial and real estate sectors in investigating why the private sector, in particular, is hesitant in taking action despite the clear existence of major opportunities here. According to the survey, 48% of those questioned indicated that they have already

made investments in energy efficiency measures within their portfolios. While this result may be higher than that recorded for their peers in Asia or the US, the barriers to investment in Europe are nevertheless viewed to be high: „The big problem is that we can't spread out [retrofit] activities throughout our entire portfolio because we are facing different types of national standards," remarked Dr Thomas Beyerle, Managing Director of IVG Immobilien, one of the largest real estate companies in Europe, as part of the study. For example, the study states the following: „While the EED requires national strategies for building renovations and promotes a focus on deep retrofits, it does not specify a time horizon or define what ‚deep‘ retrofit means."

Frank Hovorka brought home the point of just how important clear performance

guidelines are. The Director of Real Estate Sustainability Policy at the French state-owned Caisse des Dépôts said: „The risk of being lax on the definition of performance is that we're going to spend money in an inefficient way. And the reason for that is simple: if you give money but do not ask for performance in return, people will naturally take the money and do the minimum." The major risk represented by half-hearted renovation projects is also one of the findings of the „Intergovernmental Panel on Climate Change". In this regard, the „Fifth Assessment Report"²⁶ states the following: „The very long life-cycles of buildings create risks of energy use ‚lock-in‘ with the effects of low ambition today playing out for decades. Using state-of-the-art standards immediately, for both new and retrofit buildings, would alleviate this hazard."

Growing level of risk

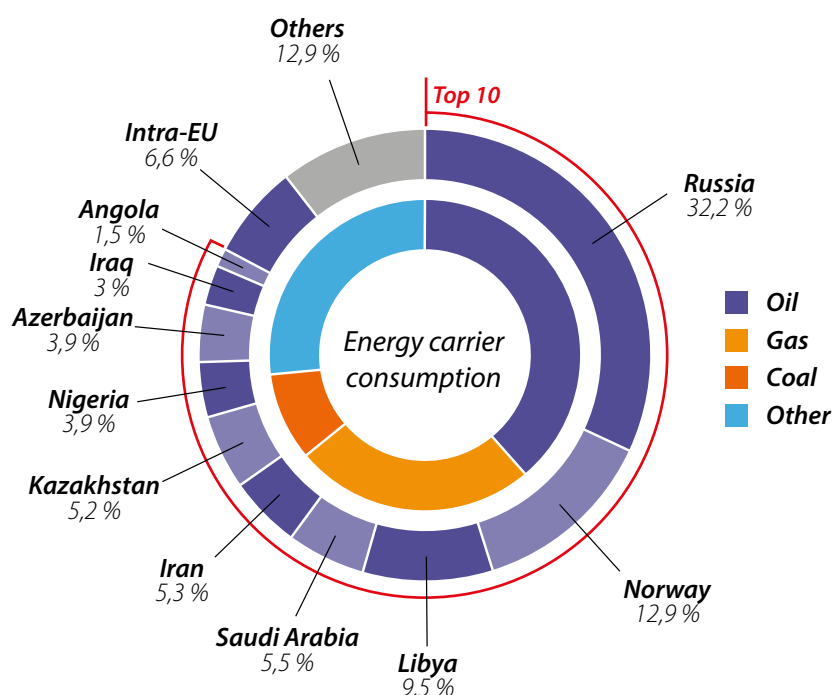
As part of the political debate on greater energy efficiency, an additional point has come into focus over recent years: supply security with gas and oil. For a long time, it appeared acceptable that Europe had to import a significant portion of its energy. Upon the outbreak of the ongoing conflicts in the Middle East at the latest and given the region's tense relations with Russia, the way in which the issue of supply security is viewed has changed. The question is as follows: How dependent is Europe on its energy suppliers?

The figures speak for themselves. According to an Ecofys study²⁷, at 79% the reliance of the transport sector on these suppliers is particularly high. The building industry follows with a dependency rate of 38%, while the figure for other sectors is also around one-third.

The study also outlines which countries the oil and gas used for heating Europe's buildings comes from: „Again assuming the same averages as for the whole of the EU, the buildings sector final energy demand also depends heavily on energy imports. 31% of all net imported oil and gas is consumed in the building sector (61% of all imported gas and 14% of all imported oil). Russia and Norway account for about 1/4 of the imports each.“

These figures are particularly controversial when looking at individual countries. Based on figures from 2012, the JRC study²⁸ establishes, for example, that the energy for the heating of buildings in the Baltic states, the Czech republic, Bulgaria and Slovakia comes exclusively from Russia, while this figure is at least 80% in Hungary, Romania and Poland. No less problema-

Origin of oil imports (EU 27)

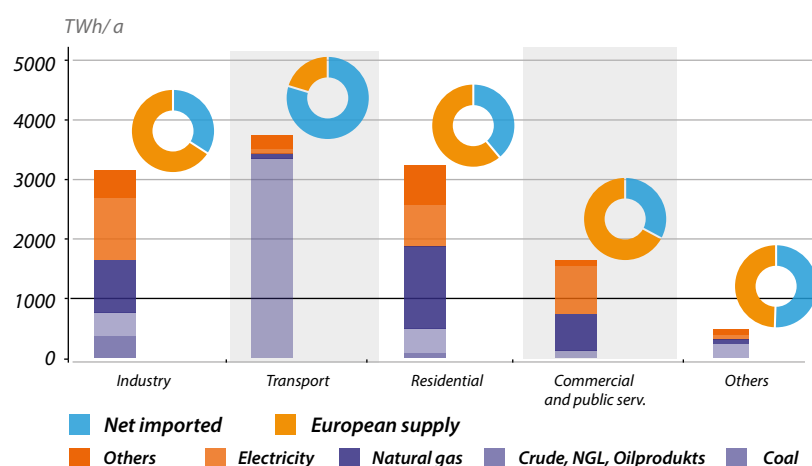


Source: Eurostat

tic is the fact that 100% of Portugal's gas requirements for its buildings are met by supplies from the Middle East and northern Africa, with the corresponding dependency rate in Spain standing at 85%. For all of these states, it thus has to be said

that their energy supplies are highly reliant on the political situation in the respective export regions. Only Sweden, Finland, the UK and the Netherlands are classified by the paper as largely immune against possible disruptions in energy supplies.

Final energy consumption per sector and energy carrier with energy import dependency

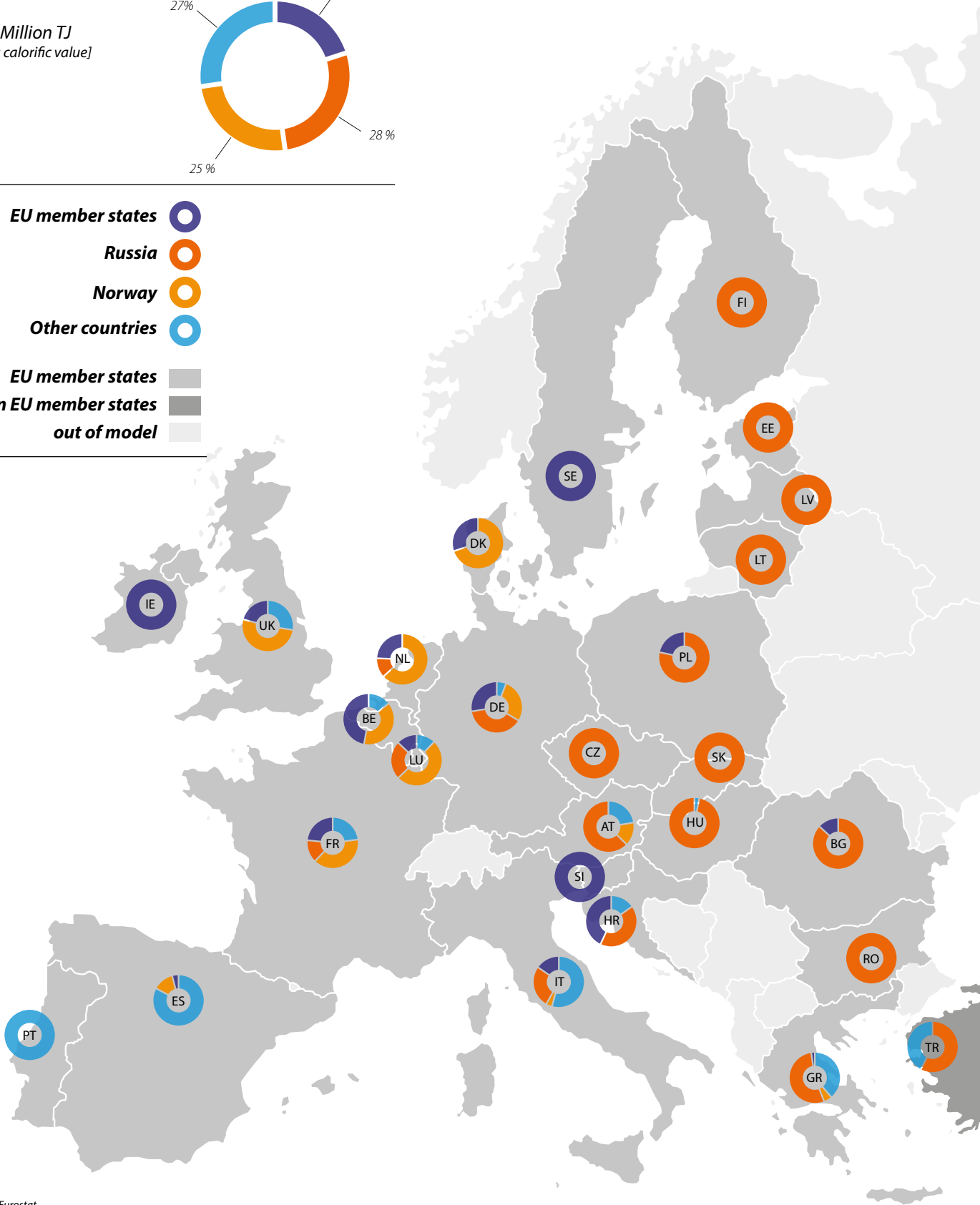
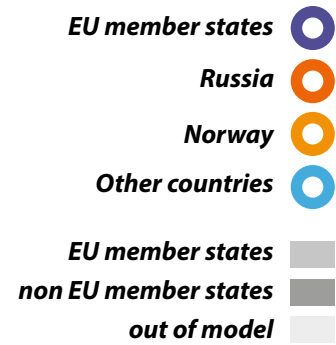
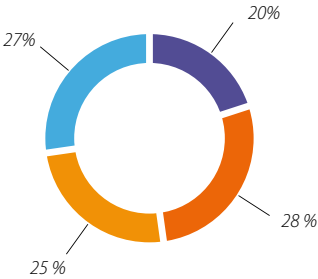


Source: ECOFYS

Origin of gas imports by Member state

EU Total in 2012

~ 16 Million TJ
[Gross calorific value]



Source: Eurostat

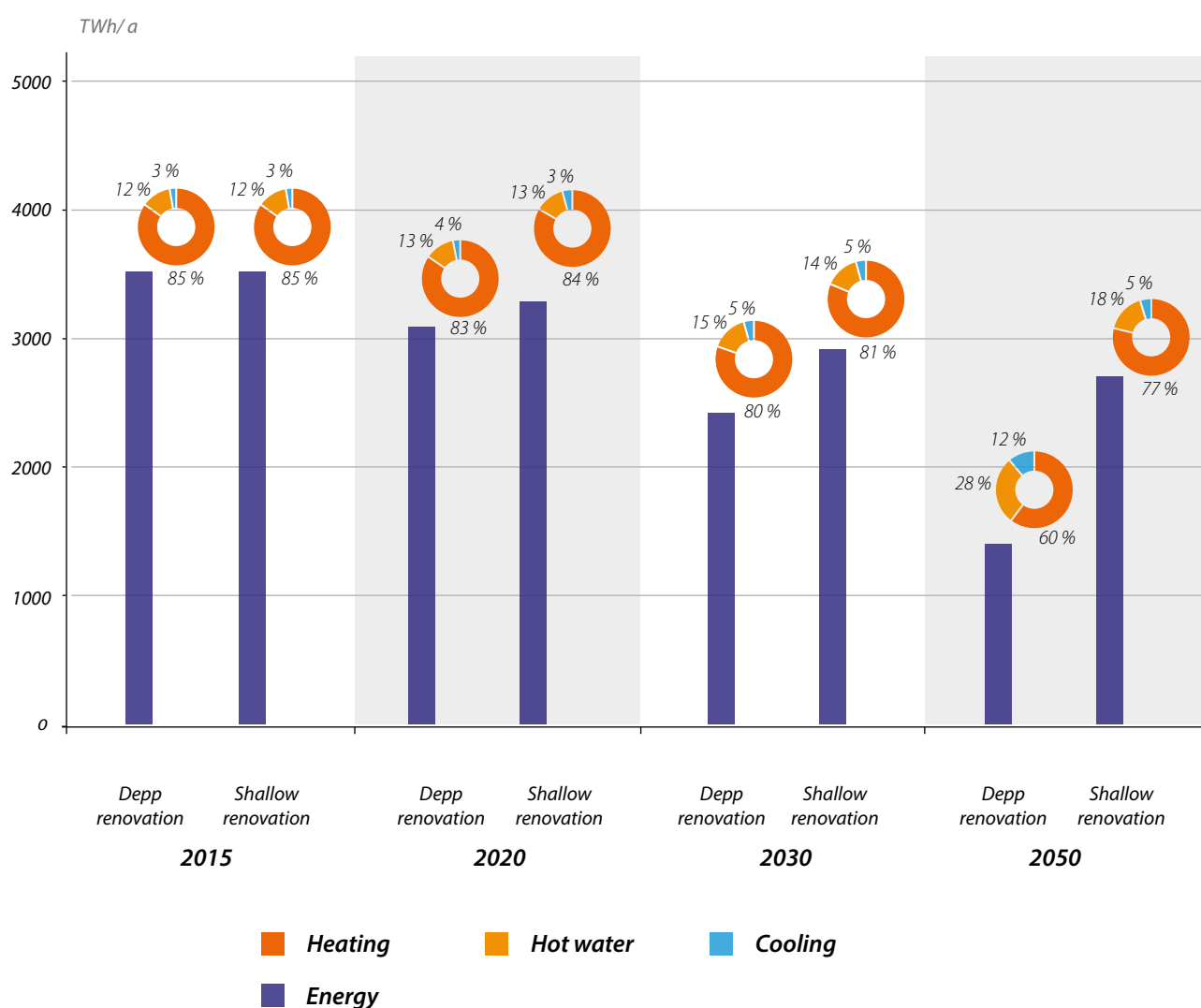
The Ecofys study²⁹ identifies programmes aimed at the comprehensive energy modernisation of existing buildings as the quickest and most sustainable means of eliminating this energy dependency. „While buildings use a significant 61% of all imported gas, the deep renovation scenario shows a reduction of the sectors

gas consumption of 95% by 2050 and of oil consumption by 97%. Thereby, the building sector can, quicker than other options, reduce its own imports by 20% by 2020, 60% by 2030 and 100% by 2050. ... The alternative, shallow renovation' with very high shares of renewable energy is 3.5 % more expensive than deep renovation.

Also further options to reduce dependencies do not show better economics...”

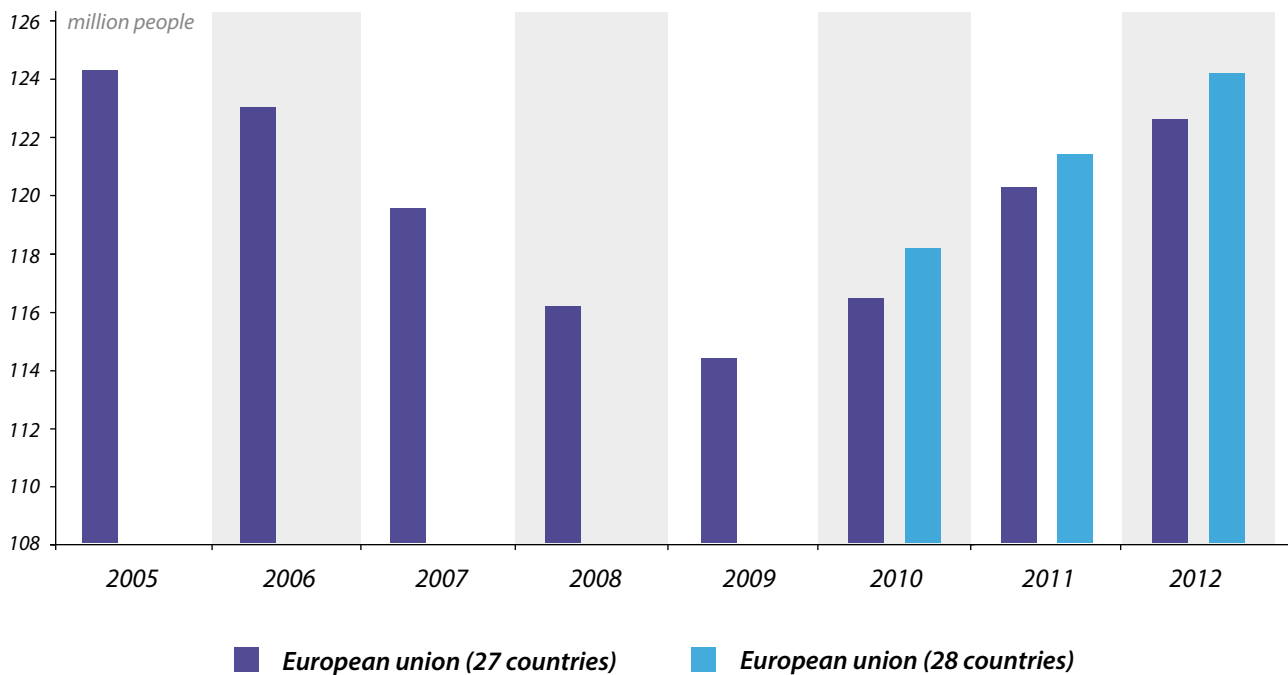
The EEFIG analysis also comes to this conclusion³⁰: „Energy efficiency investment is the most cost effective manner to reduce the EU's reliance, and expenditure, on energy imports costing over €400 billion a year.”

Final energy demand in the building sector for deep and shallow renovation scenarios



Source: ECOFYS

Number of people at risk of poverty or social exclusion, from 2005 to 2012



Source: Eurostat

Social and environmentally friendly

In its current „Technology Roadmap“, the International Energy Agency (IEA)³¹ identifies, in particular, a number of benefits for occupants offered by the modernisation of building envelopes. Such modernisation work can improve the level of comfort enjoyed by occupants as well as the „quality of life to millions of citizens, while offering significant non-energy benefits such as reduced health care costs and reduced mortality of „at risk“ populations.“ The alarming figures of the BPIE, which has been looking at the phenomenon of „energy poverty“ for several years, make clear just how necessary this is. A new study³² draws the following conclusion:

„Fuel poverty and general economic poverty are two different conditions, which are related. Since 2009, mainly due to the economic crisis, the number of people in Europe living at risk of poverty is constantly increasing, reaching more than 124 million people in 2012. ... Despite the fact that there is no common European definition, the importance of the problem as well as the severe health impacts caused by fuel poverty are widely recognised. Specifically, excess winter deaths, mental disability, respiratory and circulatory problems are adversely affected by fuel poverty.“

It is only in the last few years that the issue of energy poverty has received appropriate attention, even though high energy prices have long since represented a poverty

risk among social groups with a low level of income. „Vulnerable citizens in Europe are most severely impacted by the inefficiency of the building stock and rising energy prices. More and more EU citizens face fuel poverty and arrears in paying their utility bills,“ states the mentioned JRC study³³, which provides concrete figures: „In 2012, 11% of the population were unable to keep their homes warm in the winter and 19% lived in dwellings they could not keep comfortably cool in the summer.“ The situation is particularly serious in EU states with below-average per capita income, with more than 30% people suffering the effects of energy poverty in some cases. In many instances, energy costs in these households account for almost one-fifth of total expenditure.

The BPIE paper³⁴ assessed various options for tackling energy poverty and emphasized the significance of energy efficiency as an important tool: „As it is widely recognised, the most effective and sustainable way to deal with fuel poverty is by reducing the energy demand of the building through renovation.“ On the other hand, social tariffs, as offered to low-income households in some EU countries, do not represent a long-term answer to the problem.

Energy efficiency as a means of tackling poverty

It is also said to be counter-productive to assign responsibility for energy-efficient homes solely to their owners, who in southern Europe, in particular, are predominantly also their occupants. Those who have too little money for oil or gas are usually not in a position to invest in energy efficiency. The study thus identifies „a strong need for public financing support, from both national and EU funds, particularly in ways that leverage additional private funding.“ Such investment programmes make sense in any case: „Specifically, the implementation of energy efficiency measures in vulnerable households can create or maintain jobs in construction related sectors, reduce illness and death incidents caused by cold homes, rehabilitate poor districts and contribute in this way to social inclusion. At the same time, these actions support the energy and environmental goals of the EU. Therefore, these types of measures are a much better investment of public money, offering not only a palliative solution, but contributing to the wider social and economic objectives of the EU.“

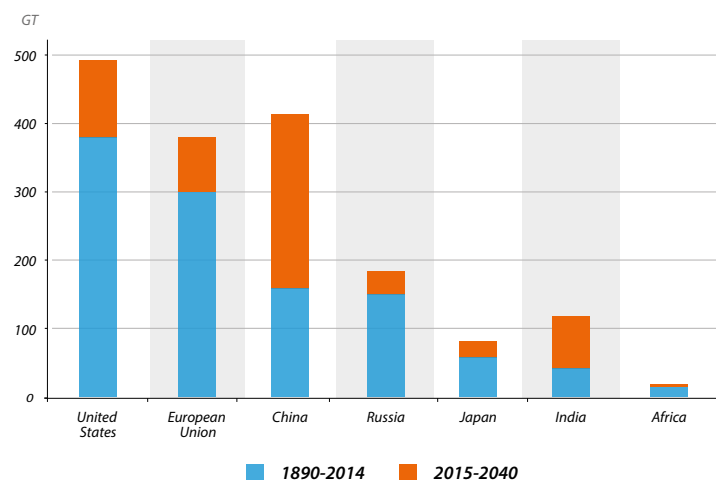
Needless to say, the energy modernisation of Europe's existing buildings remains essential if the EU objectives for the reduction in CO₂ emissions are to be achieved. The necessary requirements are summarised very well in the IEA's „Technology Roadmap“³⁵: „Transforming typical building renovation to make way for deep reductions in energy consumption – known as deep renovation – should be a high priority. Once established, building renovation will need to be doubled from its current rate of 1% per year to 2% per year, especially among continental northern hemisphere countries, where approximately 75% to 90% of current building stock will still be standing in 2050. As well as enabling permanent ongoing reductions in energy costs, deep renovation can reduce the capital cost of heating, ventilation and air-conditioning equipment.“

Responsibility on a global scale

To round off this line of argument, it may be helpful to broaden the perspective somewhat. Viewed globally, Europe likewise has a special responsibility, which has also emerged as a result of historical developments. The International Energy Agency's (IEA) special report entitled „Energy Climate and Change“ states that Europe, alongside the US, is responsible for an enormous share of the Earth's current CO₂ status and has been since it developed into a centre of industrialisation in the late 19th century.

This fact is being incorporated in the IEA's bridging strategy with which it wants to stop the further rise in energy-related emissions in the short term. The long-term objective of this bridging scenario is

Cumulative energy-related CO₂ emissions by region



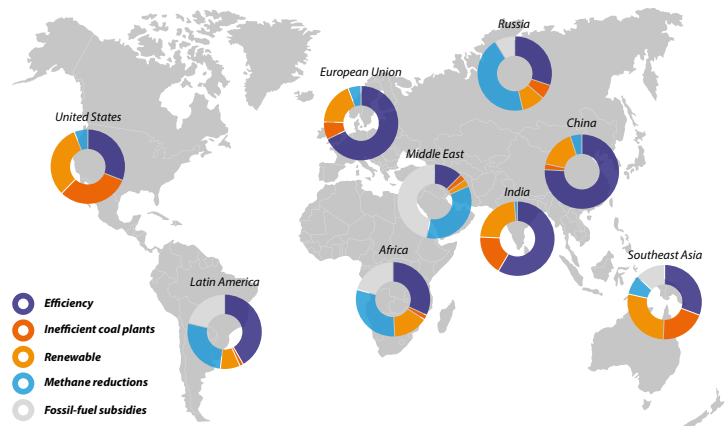
Source: OECD/IEA 2015, World Energy Outlook

to bring about the decarbonisation of the energy sector. In the near term, it will aim to achieve the two-degree targeted stipulated within international climate policy, thus limiting global warming to less than two degrees Celsius relative to the level recorded prior to the era of industrialisation.

The scenario provides for five measures which will have a differing level of impact in the various regions:

- Increase in energy efficiency in the industrial, building and transport sectors
- Rapid decommissioning of inefficient coal-fired power plants and a ban on new power plants of this kind
- Increase in investment in renewable energy technologies in the energy sector from USD 270 billion as at 2014 to USD 400 billion in 2030
- Abolition of subsidies for fossil fuels for end users by 2030
- Reduction in methane emissions during the production of oil and gas

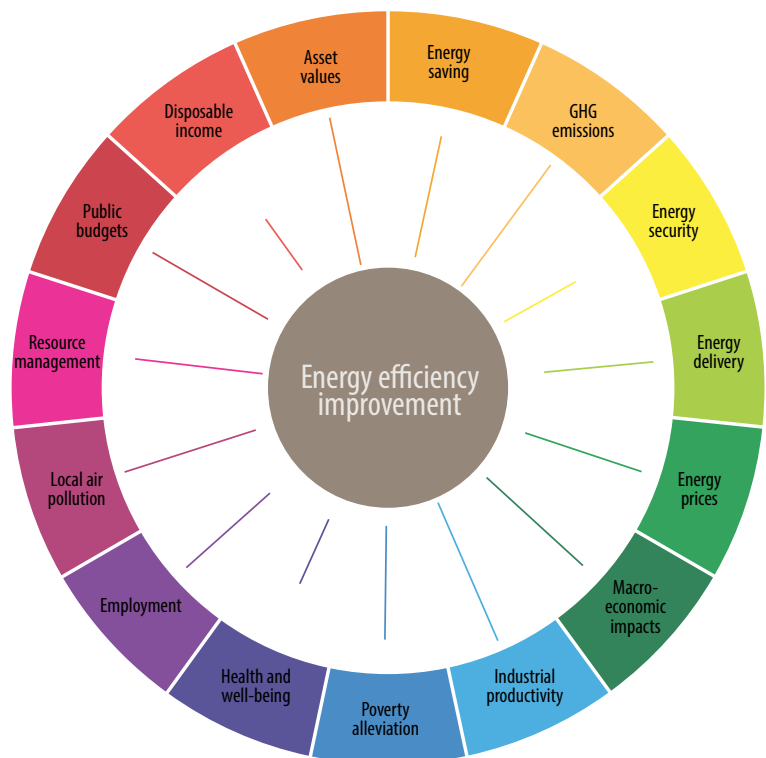
As the calculations show, the greatest potential for Europe lies in the area of energy efficiency. And, in turn, this challenge cannot be met without energy-saving buildings.



The measures in the Bridge Scenario apply flexibly across regions, with energy efficiency and renewables as key measures worldwide

Source: OECD/IEA 2015, World Energy Outlook

Positive impact of improvements in energy efficiency:³⁶



Source: IEA

10 recommendations for creating an energy-efficient Europe

The figures clearly show that there is still a long road ahead as we strive to achieve an energy-efficient building stock in Europe. Initial steps have been taken, but the lion's share of the work still lies ahead for all of us. Far greater efforts than before will be required in order to achieve Europe's political objectives and thus make a substantial contribution to the battle against global climate change. As the challenges facing future generations increase with each year that passes, decisive action is needed now. The following ideas could contribute to a successful outcome here:





Set new priorities.

On paper, there is agreement as regards EU policy: Energy-efficient buildings represent a key lever for achieving environmental policy objectives. However, the political measures in this area fall far short of what is required, as they focus almost exclusively on new buildings. This focus must be widened and aim to tap into the enormous potential offered by old properties. The annual renovation rate of existing buildings must therefore be at least doubled – to between 2% and 3%.

Establish Europe-wide standards.

Energy-efficient construction – both for new buildings and refurbishment – suffers from a lack of European harmonization. Although significant progress has been made or is at least in progress, important aspects are still blocked and turn out to be barriers to trade – for construction products as well as for construction services. Member states thus have to intensify their efforts to establish uniform standards.

Create investment security.

It is often difficult for real estate companies or housing associations to implement energy renovation measures in their existing buildings: On the one hand, they are frequently unable to offset the investments through additional income. On the other, the framework conditions for subsidies and similar funding often differ greatly from region to region. There is also

the fact that funding programmes are subject to regular changes. However, the entire sector needs framework conditions that are stable over the long term if it is to be able to take economically sustainable investment decisions. Funding programmes should also be open to technological advancements and not aim to benefit individual measures.

Allow for new renting models.

In particular, countries with a low percentage of home ownership are suffering from renovation backlogs, as landlords do not want to invest in measures that will solely benefit their tenants. New models, for instance flat-rate rental contracts including heating costs, could solve this problem and create the incentive for the comprehensive renovation of rented apartments.

Promote renewable energies appropriately.

It is understandable and makes sense that politicians like to bolster their image with investments in „green energy.“ However, these forms of energy remain expensive. It is therefore all the more important to promote energy efficiency measures, such as thermal insulation, with the same level of commitment – to ensure that the expensively generated eco-energy is not wasted. Only a significant reduction in energy requirements can bring about an effective and sustainable acceleration in the conversion from fossil and nuclear fuels to renewable energy sources.

Modernise social housing.

State and communal investments in energy-efficient social housing could represent a perfect win-win-win situation: Occupants would no longer face the risk of „energy poverty“ and in turn less public money would be required to subsidise the heating of apartments. The third „win“ would be gained by the construction sector, which would also benefit from the relevant investment programmes.

Improvement in renovation quality.

An energy modernisation project is often complex and property-specific. The renovation of old buildings, in particular, requires specialist experience and technical know-how. Investments in the education and ongoing training of planners, energy consultants and specialist craftsmen as well as the definition of minimum standards will serve to guarantee quality and consumer confidence. These measures will help to make a Europe-wide renovation drive a long-term success story.

Create modern funding instruments.

Many public funding programmes are based on the granting of cheap building loans for energy-efficient construction. In an environment of low interest rates, this model has now had its time. Modern funding instruments must therefore make use of subsidies

or tax breaks for energy-conscious building owners. This support would pay off for the economy as a whole, as the calculations show: Each euro invested in the funding would trigger a sum many times higher in terms of investment and tax income.

Promote communication.

People need to become aware of energy efficiency. To this end, local authorities or public building owners need to set a good example. At the same time, it is important to contextualise the links between environmental protection, supply security and resource scarcity and energy-efficient apartments and offices. Only in this way can European awareness of this common challenge be increased. There are two other convincing arguments in favour of energy renovation: It noticeably improves the level of home comfort in both winter and summer and leads to an increase in healthy living.

Improve the data basis.

Comparability is the key to establishing binding Europe-wide energy efficiency specifications. As the available studies show, this is exactly what is lacking, as much data in the member states is either collected using different methods or only in part. Comparable methods and uniform requirements as regards this data are essential, however, if we are to create standardised framework conditions and monitor the implementation of efficiency guidelines.

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 12 national ETICS associations, six major European supplying materials’ associations and seven supporting members, which include ETICS

manufacturers as well as research institutes. The EAE represents about 80 per cent of Europe’s revenue from ETICS. 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.

Members of EAE share these major goals:

Develop the system approach

EAE supports the establishment and control of quality measures on a European level and in each Member State. ETICS must be understood as a complete system. Manufacturers take care that the combination of components guarantees longterm performance. The most important issue was to develop the first European Application Guideline for ETICS. With the publication of this guideline common standards for the application of systems have been set.

Research and testing

In order to further develop the technical standards of ETICS EAE will initiate common projects of research and testing. By those projects ETITS will be further improved regarding their economic and ecologic long-term-performances. Different issues will be worked in various international working groups.

Develop the market

The various advantages of ETICS are going to be communicated by common public relations. The transfer of information will be improved by networking. The ETICS Forum has been established as a European platform for information and communication about thermal insulation.

Standardization and harmonization

EAE supports actively the process of harmonization and standardization. Many of our member companies operate internationally and will benefit from a barrier-free market. Thus we share our long-term experience and unique knowledge in order to implement norms that ensure the safe use of ETICS.

EAE represents the European ETICS industry at relevant authorities and on boards or working groups of the European Union and in European Associationin like CEN and EOTA. The EAE is a member of Construction Products Europe (CPR) and the European Council for Construction Research Development and Innovation (ECCREDI). Furthermore EAE is in contact with Associations and initiatives beyond European borders, e.g. in China, Japan and South Africa.

EAE members

Ordinary member



**ARGE 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



**Grupul Pentru Calitatea Sistemelor
Termoizolante „ETICS”**

Romania



**Zdruzenie pre
Zateplovanie Budov**

Slovakia



**Insulated Render and Cladding
Association**

United Kingdom



**İZODER ısı Su Ses ve Yangın
Yalıtımcıları Derneği**

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Extraordinary member

Sector associations



**European Manufacturers
of Expanded Polystyrene**



**European
Phenolic Foam Associaton**



**European Insulation
Manufacturers Association**



**PU Europe
European Association of the
polyurethane (PUR / PIR)
insulation industry**



**TECH-FAB Europe
European Association of
Technical Fabrics producers**



**EUROPROFILES
European Association of
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Supporting company members



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**Betek
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Germany



Sto SE & Co. KG aA

Germany

Supporting institutes



**Forschungsinstitut für
Wärmeschutz e.V. München**

Germany



Lucideon Ltd.

United Kingdom

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