

Keynote presentation Jochen Flasbarth

Energy Efficient Residential Housing: Chances and Challenges

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Introduction

Ladies and gentlemen,
it gives me great pleasure to be here, in my function as the president of the German Federal Environment Agency, to give the keynote speech at the International Forum “Towards an Action Plan for Energy Efficient Housing in the UNECE Region”.

Let me thank you for the invitation.

It is my firm conviction that energy efficiency and economic development are not mutually exclusive; energy efficient residential housing contributes to both: climate protection and economic growth. Energy efficient residential housing not only reduces greenhouse gas emissions and the need for energy imports, but also leads to more employment, a higher standard of living and a healthier life.

Energy efficiency as an answer to climate change and limited natural resources

Already today we can see changes in climatic conditions in our daily lives. In recent years we have experienced more heavy rainfall, stronger storms, and extremer heat waves in Europe and even more in other parts of the world. At the same time we are witnessing extremely destructive natural catastrophes. In 2002 flooding at the Elbe caused more than 20 billion euros in damages in Central Europe.¹ Hurricane Katrina in 2005 was the sixth strongest hurricane registered since 1851 – causing 125 billion dollars of damage, the most expensive natural catastrophe loss in history.² The power of extreme weather events destroys infrastructure, paralyses the economy and is fateful for many people.

In his renowned report, Sir Nicholas Stern, former Worldbank chief economist, investigated the economic consequences of climate change. Let me repeat his key message here, since I consider it extremely important: **The cost of mitigating climate change by cutting greenhouse gas emissions are moderate compared to the high cost of global warming.** Between one and two per cent of GDP are necessary to avoid the worst economic consequences of global warming – if we start to act now. Without action the cost of climate change would range between 5 to 20 per cent of world GDP.

As we prepare for the Climate Change Conference in Copenhagen, due to take place in only a few weeks, our generation still holds the key to laying the foundation for prosperity and wealth in coming centuries. However, scientists clearly tell us that a temperature increase by more than 2 degrees Celsius above the preindustrial level bears the risk of uncontrollable climatic consequences.

Besides the challenge of global warming, humankind is also faced with **a limited supply of fossil energy and natural resources** at the same time as global demand for products is increasing due to a growing population. To fill the gap between supply and demand it is crucial to increase energy and resource productivity.

Therefore I see energy efficiency as a key element to successfully address the challenges stemming from global warming and limited resources. It is the key to sustainable housing as well as to sustainable development as a whole .

¹ Sources: Munich Re (2003) „Topics. Annual Review: Natural Catastrophes 2002“ and DKKV (2003) „Hochwasservorsorge in Deutschland – Lernen aus der Katastrophe 2002 im Elbegebiet“, <http://www.dkkv.org/DE/publications/ressource.asp?ID=70>

² Munich Re (2006), Topics Geo Annual review: Natural catastrophes 2005 http://www.munichre.com/publications/302-04772_en.pdf

Emission reductions, energy efficiency and political goals

Ladies and gentlemen,

to fight global warming the **European Union** adopted an ambitious climate package last year. The EU committed to an **emission reduction target** of minus 20 per cent by 2020 compared to the base year 1990. This reduction will be raised to 30 per cent as soon as an international follow-up agreement to the Kyoto Protocol is in place. In addition, the European Union aims to increase renewable energies to a share of 20 per cent of final energy demand and increase energy efficiency to reduce EU energy consumption by 20 per cent by 2020.³

All these targets are milestones towards the **ultimate goal**: To limit global warming to a temperature increase of no more than **two degrees**. Of course the EU is only a small part of the world – however, it is economically strong. Ambitious and successful climate policies of some leading countries are the best argument to convince other countries to also commit to drastic emission reductions. Of course a carbon free economy by 2050 is a huge challenge. However, low carbon and no carbon economies will likely be the most competitive on world markets in the future as fossil energy resources are becoming scarcer and scarcer. Our goal must be to make a carbon neutral society a reality by the middle of the century, with heat, electricity and transportation based on renewable energies.

Germany is aiming to **reduce greenhouse gas emissions by 40 per cent** by 2020 compared with 1990. In order to reach this target Germany is pursuing a twin-track strategy: a reduction in energy consumption through energy efficiency measures, and the use of renewable energies. This means a target of 14% renewables for space heating and industrial heat and a share of 25 per cent of electricity from combined heat and power.

Energy use in housing has a huge impact on global warming. More than 1/3⁴ of CO₂ emissions within the European Union is directly caused by residential and commercial buildings – mainly to heat space and water.

There are **numerous possibilities for reducing emissions**. Greenhouse gas emissions can be avoided by

- **Better insulation** of buildings. This reduces energy use at the same time as it improves human health through a better comfort of living.
- **Modern heating systems** need less gas and oil, which reduces the need for expensive energy imports.

³ http://en.wikipedia.org/wiki/European_package_on_climate#cite_note-9

⁴ Council of the European Union (2009), Impact Assessment for the recast of the Energy Performance of Buildings Directive (EPBD)

- Using more **renewable energies** in the heating market can further reduce demand for fossil fuels and is the only way towards a sustainable energy use in the long run.

Good insulation, modern heating systems and improved windows are worthwhile also in **monetary terms**.⁵ If energy related investments are combined with other renovation activities – which is usually possible – emission abatement investments lead to net cost savings under current market conditions. This is true for investments to upgrade existing buildings to a good energy performance level as defined by the EU Energy Performance of Buildings Directive in both old and new EU member states.⁶ On the global scale, the IPCC estimates that about 30 per cent of projected greenhouse gas emissions of the building sector can be cut with net economic benefits by 2030.⁷ When talking about the cost of energy efficiency we have to keep in mind that energy prices are expected to rise. Therefore energy efficient solutions will become more urgent as well as more profitable every day.

⁵ UBA Forschungsbericht (2008) "Wirtschaftliche Bewertung von Maßnahmen des integrierten Energie- und Klimaprogramms (IEKP) - Wirtschaftlicher Nutzen des Klimaschutzes" Climate Change 14/2008, <http://www.umweltdaten.de/publikationen/fpdf-l/3517.pdf>, McKinsey (2009) „Kosten und Potenziale der Vermeidung von Treibhausgasemissionen in Deutschland“ http://www.bdi.eu/download_content/Publikation_Treibhausgasemissionen_in_Deutschland.pdf

⁶ Sources: Ecofys (2005) "Cost-Effective Climate Protection in the Building Stock of the New EU Member States Beyond the EU Energy Performance of Buildings Directive", <http://www.rockwool.com/files/rockwool.com/Energyper cent20Efficiency/Library/CostEffectiveClimateLeaflet.pdf> and Ecofys (2005) "Cost-Effective Climate Protection in the EU Building Stock" http://www.eurima.org/uploads/ModuleXtender/Documents/94/documents/ecofysIII_report_EN.pdf

⁷ IPCC, WG III SFP, p. 13, <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf>

The broader picture of energy efficient residential housing in Europe and Germany

Sometimes people recognise the threat of global warming but ask if ambitious reduction targets are economically too challenging. However, I see that as the **wrong question**. Instead, we need to ask:

- How long can we afford to do business as usual in residential housing?
- How long do we want to waste huge amounts of precious energy?
- How long do we want to be dependent on finite oil and gas supplies?
- How long can we accept energy poverty and unhealthy living conditions in run-down houses?

We have to stop seeing energy efficiency as an isolated issue. In looking for ways to improve living conditions in Eastern as well as in Western Europe we will find that raising energy efficiency is the key. Energy efficient residential housing contributes not only to climate protection but also to a higher standard of living. Energy efficient housing reduces the need for precious fossil resources, reduces spending on energy import and increases domestic demand. Energy efficient housing is a crucial factor to improve human health.

Due to lower income, **former socialist countries** are often particularly challenged to improve energy efficiency. However, we also have to see the large investment needs in those countries: in infrastructure and also in housing. Therefore I see new investments as a big opportunity for improving the comfort of living as well as the energy efficiency of housing. Such investment offers the real **chance for leapfrogging**. The model is not the buildings built in Western Europe in the 1980s, but the low and zero energy houses developed in recent years.

Energy efficiency goes beyond efficient housing: **district heating** is well developed at many places in Eastern Europe and will hopefully also become also more important elsewhere. In the face of the threat of global warming, interest in district heating is also growing in Western Europe. District heating raises the question not only of how to establish and maintain heating networks, but also of how regional planning can contribute to urban structures that are suitable for such solutions.

If you want to hear more about this, take a look at the conference programme for tomorrow: An expert from my Agency, from the **Spatial Environmental Planning section**, will talk about the question of how to see energy efficiency on a more strategic and integrated planning level. We believe that the spatial arrangement of buildings, of human settlements and their service infrastructure are key factors for increasing energy efficiency in housing, not only in Germany, but also in the international context. The envisaged UNECE action plan for energy efficient housing should therefore also incorporate these spatial planning climate protection issues.

A low carbon society and energy efficient housing: success stories

A low carbon and energy efficient society is more than just a vision. Numerous success stories exist even today. Let me mention some:

Large scale retrofitting of existing buildings in **eastern Germany**, that is, that part of the country that was formerly the GDR was quite successful. Today, the share of retrofitted houses in eastern Germany is around 50 per cent whereas it is below 20 per cent in western Germany.⁸

In its large scale **programme “Efficient homes” the German Energy Agency (DENA)** demonstrated that the energy demand of existing buildings can be reduced on average by 88 per cent - which is even 60 per cent below the strict current standard for new buildings in Germany.⁹ One example of such renovations is an apartment house in Berlin built in 1886. Its primary energy demand was reduced from over 270 to less than 40 kilowatt hours per square meter and year through insulation, solar energy, air conditioning with heat recovery, and a gas-fired condensing boiler.

The programme “50 Solar Energy Housing Estates in [the German State] North Rhine-Westphalia” has proved to be very successful.¹⁰ Besides promoting the use of solar energy the programme also demands high energy efficiency standards. To be eligible for public funding, solar energy housing estates have to meet strict requirements. 29 housing estates with about 2800 apartments have already been built, 18 housing estates are under construction.

The examples show that public funds are one success factor. However, what has also proved to be very important was the establishment of a **network of existing regional competence centres** to increase the multiplier effect of energy-efficient refurbishment, with new partners joining the network constantly. Within such networks highly qualified energy consultancies are essential.

⁸ This refers to houses represented by the GdW (Bundesverband deutscher Wohnungs-Immobilienunternehmen). The exact percentages are 50 per cent completely energetically modernized buildings in eastern Germany compared to 18.6 per cent modernized buildings in western Germany in 2007.

⁹ <http://www.dena.de/en/topics/buildings/projects/projekt/efficient-homes/>

¹⁰ <http://www.ea-nrw.de/solarsiedlungen/page.asp?TopCatID=6197&RubrikID=6197>

Challenges and policies

Ladies and gentlemen,

Let me now come to the challenges of energy efficient residential housing and the policies that are necessary for a sustainable development. Despite huge reduction potentials we have to acknowledge numerous **challenges and barriers** that have to be overcome to actually reduce emissions from residential housing.

- First of all, the **lifecycle of buildings** is long and investment needs are very large compared to other investment decisions. Residential houses are built to last 50 to 100 years and more. Investors have to take into account uncertainties with respect to energy prices, climatic conditions and the needs of an aging society.
- The long lifecycle of buildings means for Europe that 75 per cent of today's building stock will still exist in 2050.¹¹ Therefore we not only need energy efficient new buildings, we also need even more **ambitious renovation** of existing buildings that cuts emissions drastically. Unfortunately, today renovations are often undertaken without improving the buildings' energy performance. Energy related renovations are much cheaper if they are combined with regular renovations. Therefore renovations without improved energy efficiency are missed opportunities and a huge obstacle for future improvements.
- What we need are **strict minimum efficiency standards** not only for new buildings but also for retrofits. By 2020 we must discuss if a zero energy house instead of the passive house can become the standard for renovations.
- An additional problem is the poor enforcement of legal requirements. Estimates for Germany indicate that only 60 per cent of the required improvements are actually undertaken.¹² Therefore we need to have not only strict regulation but also a **strict enforcement of the law** so that energy efficiency and renewable energies will become common practice rather than best practice.
- A large obstacle in the energy saving refurbishment of existing buildings are **split incentives for landlords and tenants**. Landlords often hesitate to invest in energy efficiency since they do not expect to profit sufficiently. Tenants are reluctant to pay higher rents as long as they are not convinced that their operational costs will decrease. This problem of split incentives can be overcome by **better information and transparent markets**. Energy certificates can inform about the energy efficiency of a flat. Governments need to create conditions encouraging the widespread use of such certificates, so that market prices eventually also reflect the thermal state of the building. In Germany we are trying

¹¹ This holds for the European Union (Council of the EU (2009), Impact Assessment EPBD).

¹² Kleeman und Hansen (2005): Evaluierung der CO₂-Minderungsmaßnahmen im Gebäudebereich.

to incorporate the energy efficiency into the factors that determine the typical rent within a city or local community – which is a legal term denoting a non-binding recommended level of rent. The city of Darmstadt has gained very positive experience with this approach. With reference to the local rent index landlords can demand almost half a euro more per square meter and month if the building is classified as very energy efficient.¹³ This provides high incentive for renovations and allows tenants to judge the thermal state of a house.

- For **tenancy law**, we have proposed a provision which would require tenants to tolerate such renovations carried out by the landlord only if they meet at least the legal efficiency requirements for buildings. Such a provision would at the same time lead to improved enforcement of and compliance with the legal requirements, and could prevent a lot of unambitious renovation projects that would perpetuate a poor efficiency status for decades to come.
- In addition, some building owners and building contractors **know little** about thermal insulation and other possibilities for saving energy in buildings. Reservations from a structural and design point of view are also still widespread. Often, preference is given to renovations that materialise in the short term, such as the renovation of bathrooms or balconies, while the long-term benefits of improved thermal insulation, for example, are overlooked. It is therefore a high priority for governments to make information on energy efficient construction readily accessible to anyone who needs it. We need to systematically improve the qualification of people working in the construction sector, because modern energy efficient construction requires highly skilled workers.
- Private, non-commercial building owners often hesitate to make high financial investments for energy efficient buildings. **Publicly supported loans and also direct subsidies** have proved very effective in overcoming this barrier. Public funding for improving the energy performance of buildings should also make sustainable housing affordable for low income groups and reduce energy poverty.

I am sure that many of the issues I have addressed not only apply to Germany, but that these or similar problems also exist in all UNECE countries. It is obvious therefore, that improved cooperation between our countries' competent authorities in tackling this common task would be very helpful and desirable.

¹³ See also UBA (2009) „Konzeption des Umweltbundesamtes zur Klimapolitik“, p. 74.

Action Plan for Energy Efficient Housing

Excellencies, Ladies and Gentlemen,

Despite all these obstacles and barriers, what we need for an Action Plan for Energy Efficient Housing is actually quite simple. The three cornerstones are:

- We need **cross-sectoral policies like energy taxation and emissions trading** so that energy prices reflect the economic as well as the ecological truth.
- Before the end of the next decade we need to talk about **zero energy homes as the minimum efficiency standard** for new as well as for existing buildings. Under such conditions the necessary wide **use of renewable energies will be a matter of course.**
- We need **public funds** so that energy poverty can be overcome and energy efficient buildings are affordable also for low income groups. An intelligent public funding programme can overcome financial barriers to energy efficiency investments and ensure that information needs of investors are addressed.

Economic opportunities of an Action Plan on Energy Efficient Housing

Such an Action Plan is not only a challenge but also presents major opportunities. They are numerous and justify all the efforts which are undertaken. Energy efficiency not only reduces greenhouse gas emissions, but it is also a business opportunity, since it is highly cost-effective even under current market conditions. Thus, it is economically as well as environmentally beneficial. Market studies project a growing demand for **energy efficiency technologies**. The global market potential of these technologies was estimated to be around 450 billion euro in 2005, and is projected to grow to over 900 billion euro by 2020.¹⁴

The market for energy efficiency and environmental goods and services is a huge opportunity for our economies. Let me tell you about the **German experience**. In past decades, German and European environmental policy has pointed the way with targets and limit values in many fields. Of course this required substantial investments. However, there are numerous examples where German companies are now world market leaders. These include the fields of renewable energies, energy efficiency and air pollution control. The facts speak for themselves:

- Germany is yet again the world champion in the export of potential environmental goods.
- In 2006, Germany's share of world trade was 16 per cent. This corresponds to an export volume of 56 billion euro.
- The export of potential environmental goods is also an important source of employment. Around 1.8 million people work in the environmental sector in Germany. This is already 4.5 per cent of the total labour force.

Therefore, it is not sufficient to only look at upfront investment costs when deciding on the most economical solution. We also have to take into account the **positive long term effects**: Energy efficient buildings lower operational as well as environmental costs through ambitious environmental policies. They create a demand for innovative solutions and create jobs for highly trained workers in the construction sector.

But also beyond the building sector energy efficient houses can create hundreds of thousand **new jobs** and sustainable economic growth. Improved energy efficiency through better heat insulation boosts the purchasing power of homeowners and tenants as their heating costs drop. Modernisation of heating systems in buildings also cuts the demand for imports of gas and heating oil, which in turn will stimulate domestic consumption and counteract Europe's high level of dependency on energy imports. At the same time, the large-scale investments necessary to remediate building stock will open up new employment opportunities, mainly in the construction

¹⁴ UBA/BMU (2009) "Umweltwirtschaftsbericht 2009", p. 98

industry and in related services such as construction financing. Studies show that in Germany speedy and thorough implementation of climate protection measures in buildings alone will create over 350,000 jobs by 2020.¹⁵ Eastern European EU member states can create up to 185,000 new jobs by implementing the EU Energy Performance of Buildings Directive.¹⁶ In sum, this will stimulate the economy and provide growth and employment.

Therefore the **economic stimulus programmes** currently being launched worldwide to counter the economic recession must not be geared to conserving existing structures; they must lead to the restructuring of our economies towards greater efficiency and less carbon.

One possibility in that direction are public funds like the “**Energy-Efficient Construction**” programme of the public German KfW-Bank. This programme supported retrofits with almost 6 billion euro in the last four years and further increased in volume in response to the world financial and economic crises. The funds are used to finance low-interest loans and subsidies for measures to improve energy efficiency and for energy-efficient new buildings. In 2008, over 100,000 loans and subsidies worth 6.4 billion euros were granted. Between 2006 and 2008, some 800,000 flats were rehabilitated or built to particularly high energy-efficiency standards, resulting in an annual reduction in CO₂ emissions of almost 2.4 million tonnes.

Ladies and Gentlemen,

let me come to **the end**. Global warming is already a reality today. We have to act now to avoid high damages in the future. Increasing energy efficiency in residential housing is one of the most important fields to demonstrate and prove that a low carbon society is more than just a vision but can become a reality in Europe by the middle of this century.

¹⁵ UBA Forschungsbericht (2009) „Gesamtwirtschaftliche Wirkungen von Energieeffizienzmaßnahmen in den Bereichen Gebäude, Unternehmen und Verkehr“, Climate Change, <http://www.umweltdaten.de/publikationen/fpdf-l/3763.pdf>

¹⁶ Number refers to the 8 new members Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Ecofys (2005): Cost-Effective Climate Protection in the Building Stock of the New EU Member States <http://www.rockwool.com/files/rockwool.com/Energy%20Efficiency/Library/CosteffectiveClimateReport.pdf>