

**Cost-Effective
Climate Protection**
in the EU Building Stock

Europe's Energy Challenge

Reducing Dependence – Reducing Emissions

Europe is facing a double energy challenge. On one hand, growing demand for energy is expected to lead to a reliance on foreign energy supplies of 70% by 2030. On the other hand, Europe needs to drastically reduce CO₂ emissions well beyond the 8% currently agreed under the Kyoto Protocol in order to effectively combat climate change. These two energy challenges are coupled with the immediate concern of bolstering Europe's competitiveness as part of the Lisbon Agenda. Therefore, any solutions to this double challenge must be cost-effective.

The Role of Buildings – Ecofys I (2002)*

With 40% of Europe's energy used in buildings, buildings must play a vital role in any policy that hopes to overcome these challenges. However, in order to determine the energy saving potential that exists from buildings, Eurima asked Ecofys, one of the leading European consultants on energy and environmental analyses, to investigate. The results were surprising:

More than 50% of the energy used in buildings could be reduced leading to an annual saving of approximately 400 million tonnes of CO₂ - almost the total EU commitment made in Kyoto.

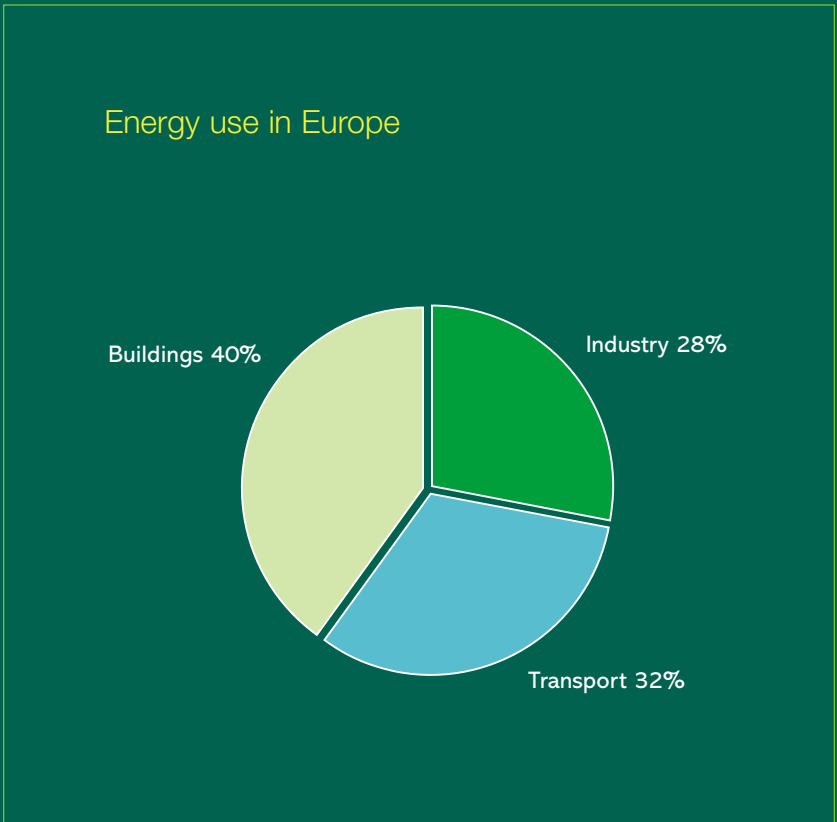
The Sufficiency of EU Legislation – Ecofys II (2004)**

Given the fact that it is possible to reduce over half of all energy use in buildings through insulation alone, the question arises of how much of this potential is being captured by current EU rules. Eurima again asked Ecofys to investigate. Again the results were surprising:

The Energy Performance of Buildings Directive (EPBD) was shown to capture only 10% of the technical potential.

The Cost-effectiveness of Action – Ecofys III (2005)^{***}

Knowing that so much energy could be saved from buildings and that current EU rules are insufficient, Eurima once again asked Ecofys to investigate – this time to see how cost-effective action would be.



* The Contribution of Mineral Wool and other Thermal Insulation Materials to Energy Saving and Climate Protection in Europe

** Mitigation of CO₂ Emissions from the Building Stock - Beyond the EU Directive on the Energy Performance of Buildings

*** Cost-Effective Climate Protection in the EU Building Stock

Insulation in Buildings - a Great Investment for Europe

Key Findings from Ecofys III

More than cost-effective: Action to reduce energy use in buildings is not only cost-effective but can provide Europe with large cost-savings, even when including capital costs. Ecofys III demonstrates that by 2010 there would be an annual return on investment of 7.5 billion EURO, rising to over 13 billion EURO per year by 2015. In addition, Europe would get for free:

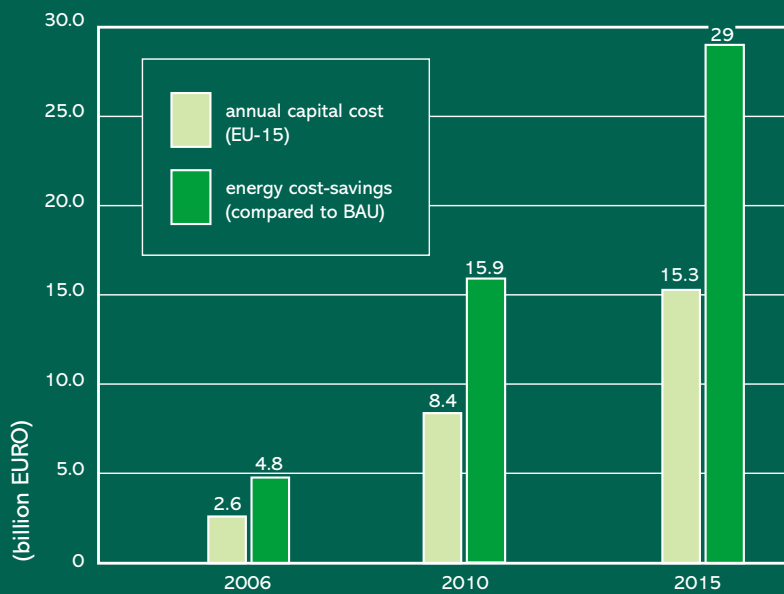
- up to 300,000 new jobs, mainly in the sector of refurbishment of buildings
- improved quality of living in comfort and health
- improved air quality, particularly in urban areas
- improved competitiveness in what is likely to become a more carbon constrained world

The whole of Europe has work to do: Although, the largest and most cost-effective potential for improved energy efficiency in buildings is in the warm (e.g. Spain and Italy) and moderate (e.g. Germany, UK and Belgium) climatic zones of Europe, there is still cost-effective action that can take place in Europe's cold climatic zone.

Every renovation is an opportunity that must not be missed: Ecofys III demonstrates that when improved levels of insulation are coupled with the normal renovation cycle, the measures always provide a good return on investment – this is a clear call for all buildings to be captured by legislation.

Energy efficiency is good, insulation is best: The findings are clear; energy efficiency is the first and most cost-effective way to both reduce energy use and reduce emissions of carbon dioxide. In addition, the report demonstrates that among the different measures to reduce energy use in buildings that insulation has the potential to provide the highest return on investment.

Annual capital cost vs energy cost-savings



Behind the Headlines

When are Measures Most Cost-effective?

Coupled measures versus non-coupled: Adding insulation is found by Ecofys III to always produce cost savings when the measures are done at the same time as other renovations are occurring. For example, the additional cost of upgrading the thermal properties of a roof will be less significant if it is done at the same time as the roof is being repaired. However, even when the action is done solely to upgrade the insulation levels it is often still cost-effective. In terms of non-coupled insulation upgrades two areas are of particular note:

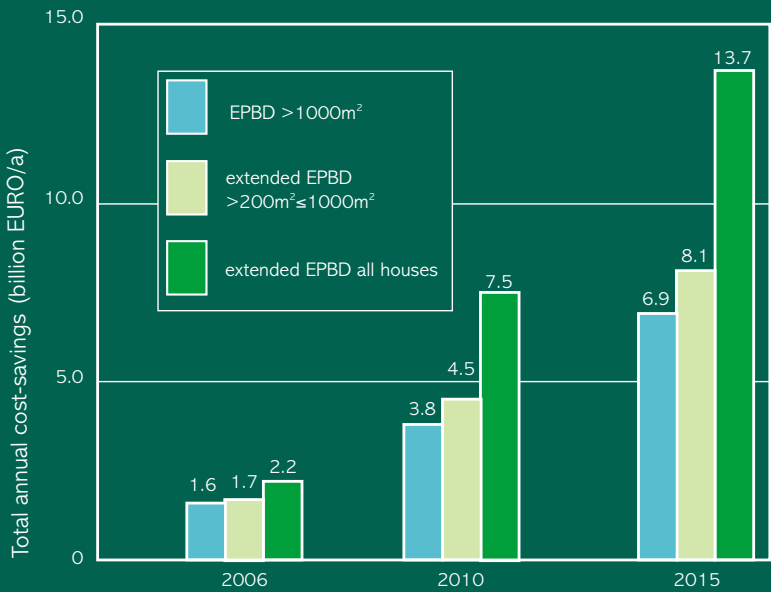
- **Roof and cavity wall insulation:** Due to the lower costs of fitting roof and cavity wall insulation, they provide a return on investment in all European countries. In warm and moderate climatic zones the benefits are significant.
- **Southern Europe:** Due to low current standards of insulation in the warm climatic zone, non-coupled renovations almost always provide a cost-saving. With the increased level of air-conditioning in southern Europe, this finding suggests that buildings will put an increased strain on electricity demand, if insulation levels are not addressed.

Are the Current EU Rules Cost-effective?

The Energy Performance of Buildings Directive saves Europe money: Taking 2010 as an example, it is expected that by then the EPBD will lead to an annual capital investment cost of 3.9 billion EURO. However, the annual energy costs savings from buildings will be leading to an annual saving of 7.7 billion EURO. This is a profit for Europe of 3.8 billion EURO a year. By 2015 the annual profit will be 6.9 billion EURO a year.

Extending the EPBD extends the profits: Taking again 2010 as a reference year, extending the rules on renovation to all buildings (at the moment all buildings below 1000 m² are not covered) would lead to an annual profit of 7.5 billion EURO a year. By 2015 this would increase to 13.7 billion a year.

Total cost-savings (EU-15)



Beneath the Calculations

How were the Calculations Made?

The climatic regions

EU 15 – this current study only looked at countries from the former EU 15:

- **Cold:** Finland and Sweden
- **Moderate:** Austria, Belgium, Denmark, France, Germany, Ireland, Luxembourg, The Netherlands, United Kingdom
- **Warm:** Greece, Italy, Portugal, Spain

The costs

Capital costs - two approaches were taken:

- **Non-coupled:** In this scenario all costs including the total labour costs, materials, applicable taxes, overheads as well as the profits needed to undertake the energy saving measure.
- **Coupled:** In this scenario it is presumed that a renovation measure is taking place (e.g. for a leaky flat roof) and only the additional costs related to improving the thermal characteristics are included.

Operational and maintenance costs:

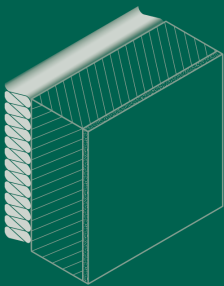
- **Energy costs:** The energy costs are based on standard prices for 2002 and adjusted for different national energy mixes, with an expected rate of increase of 1.5% per year included. They do not take into account recent increases in oil prices or that individual homeowners tend to pay higher energy costs.
- **Maintenance costs:** The maintenance costs for insulation are negligible but when comparing insulation against other measures such as replacement boilers then the annual maintenance costs for these measures are taken into account.

The lifecycle

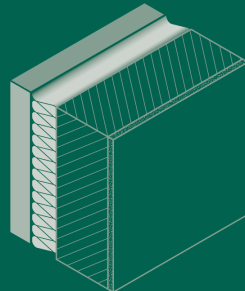
A period of 30 years was taken as the lifetime of the measures in terms of its cost-effectiveness and saving potential. In reality, insulation measures often perform as long as the house itself, reaching an effective lifetime of 70-100 years.

Investigated measures:

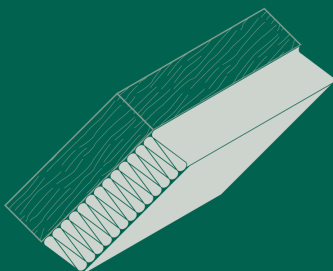
- Insulation of exterior wall
- Insulation of roof
- Insulation of cellar/ ground floor
- Replacement of windows
- Replacement of heat generation
- Feasible packages of measures
- U-values according to expert forecast for the EPBD standard



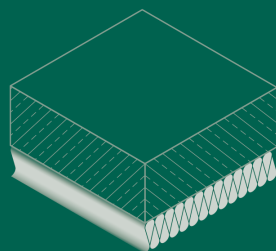
External insulation



Cavity insulation

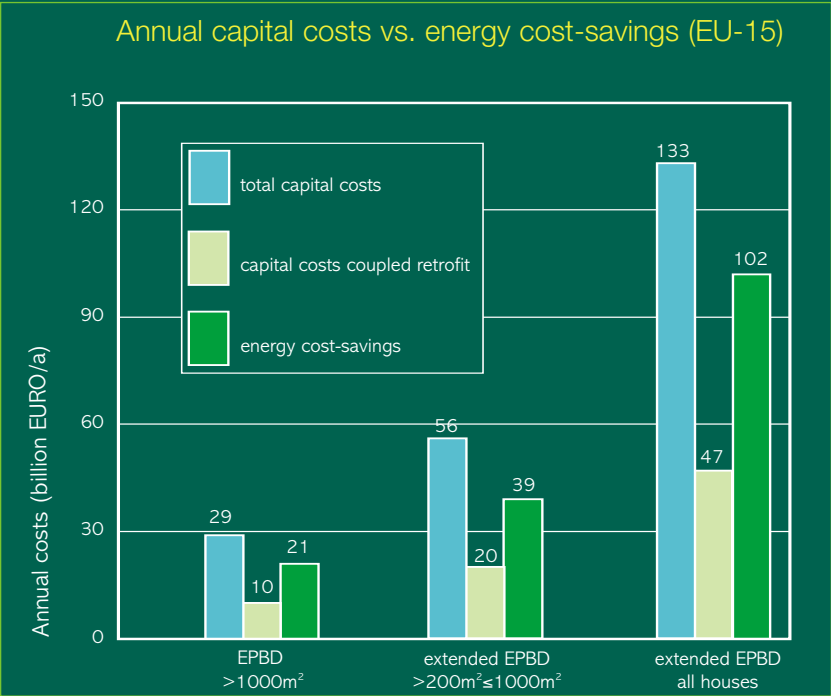
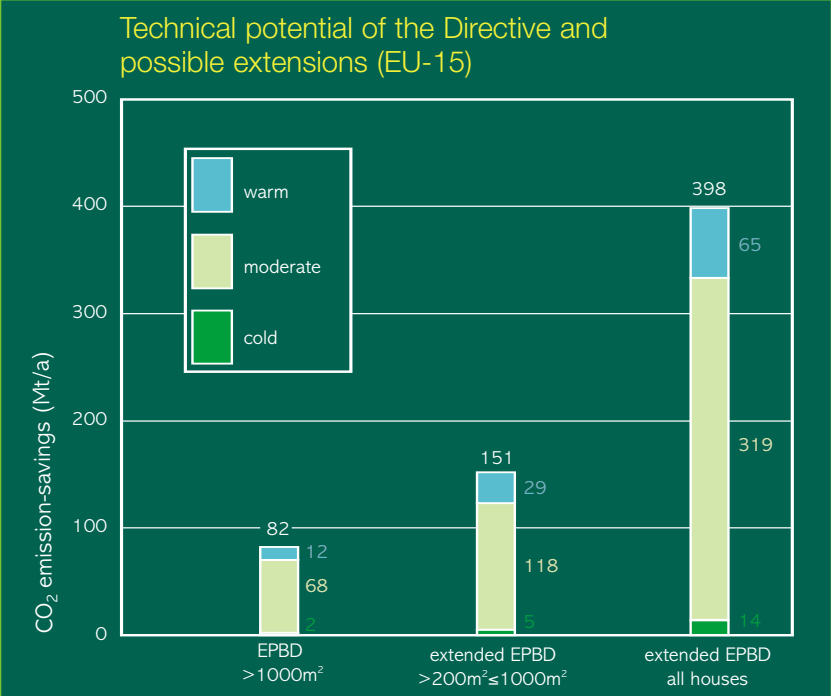


Insulating methods for pitched and flat roofs

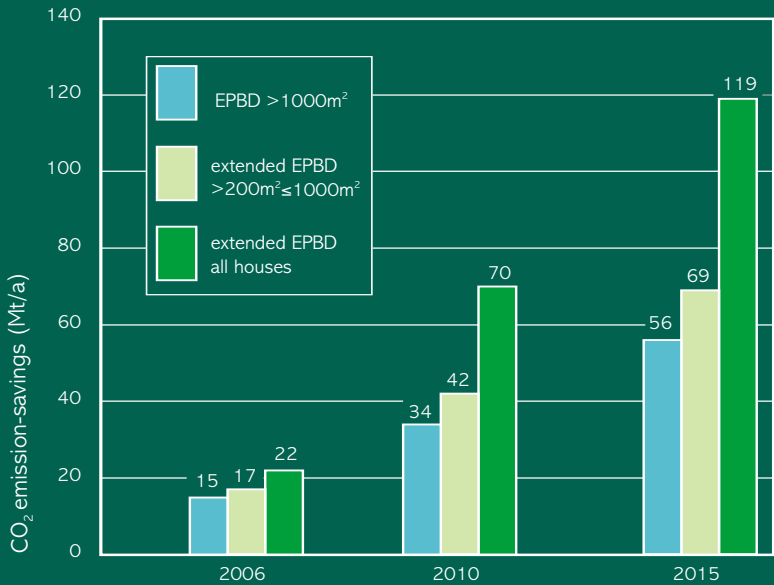


Insulation of the cellar ceiling

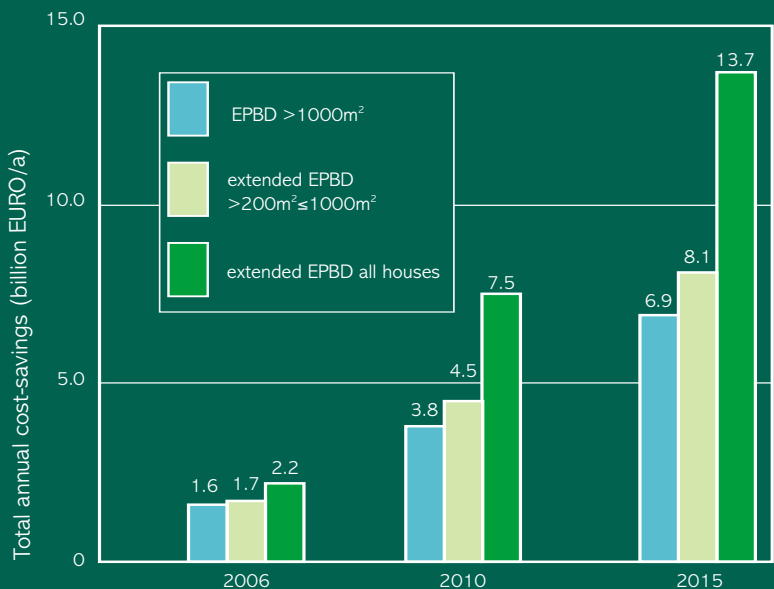
Inside the Figures



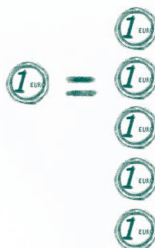
Temporal evolution of CO₂ emission-savings of the EU-15 building stock



Total cost-savings (EU-15)



For more information on the potential of insulation or to download a copy of the ECOFYS report, please go to www.eurima.org



EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION

375 Avenue Louise, Box 4
1050 Brussels, Belgium
Phone: +32 (0)2 626 2090
fax: +32 (0)2 626 2099
info@eurima.org - www.eurima.org