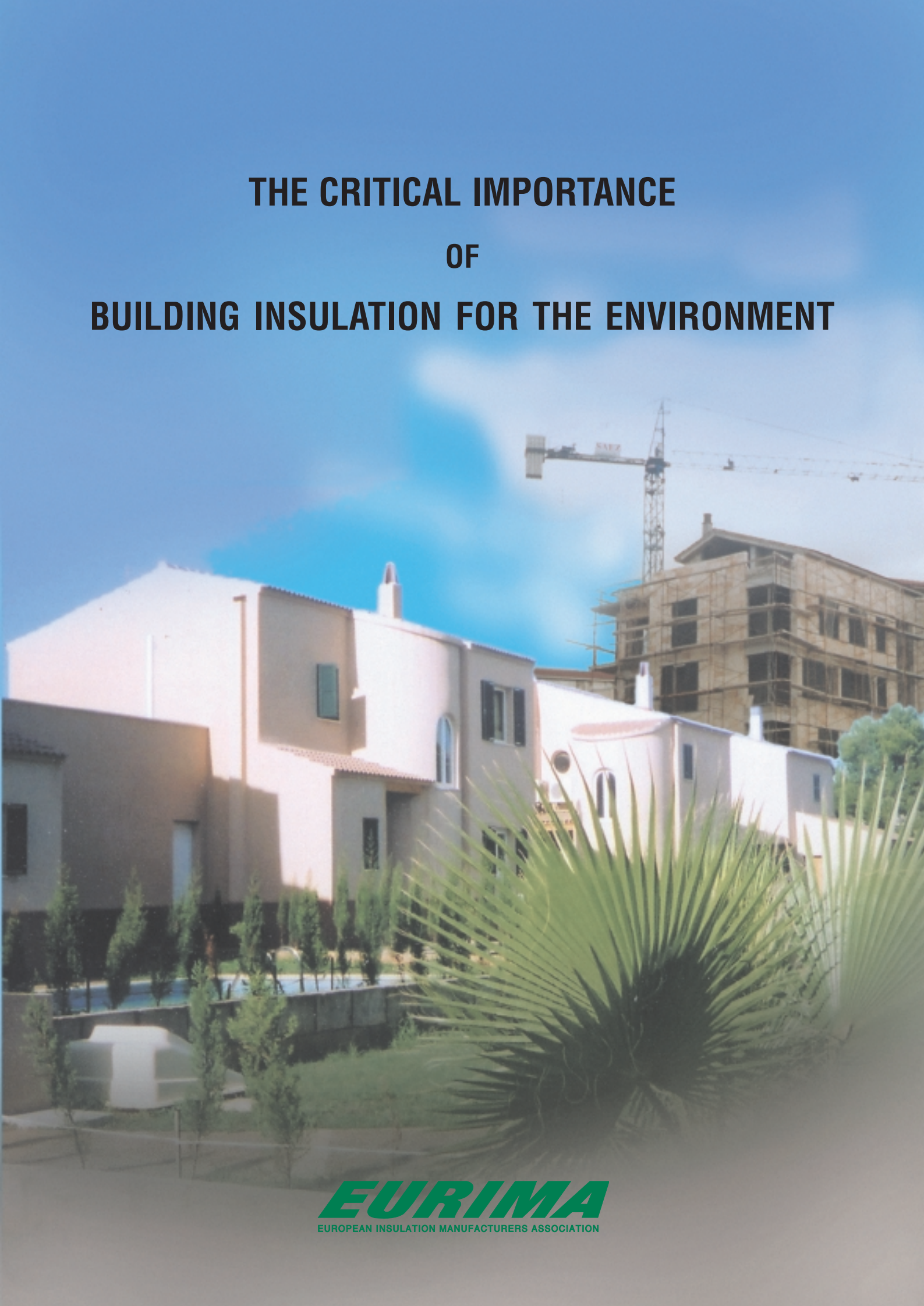
# THE CRITICAL IMPORTANCE

# OF

# BUILDING INSULATION FOR THE ENVIRONMENT



EURIMA

EUROPEAN INSULATION MANUFACTURERS ASSOCIATION

The Building Insulation report is printed in English, French and German. Copies are available on request from:
EURIMA, Avenue Louise 375 – Bte 4, B-1050 Brussels, Belgium. Tel: +32-2-626 20 90 E-mail: **info@eurima.org**

It can also be downloaded, in any of the EC languages, from EURIMA's website: **www.eurima.org**



Notes:

1. All $CO_2$ figures in the survey have been calculated on the basis of using domestic fuel oil as the energy source. This applies to all tables referencing $CO_2$ emissions and energy losses.
2. Because of the difficulties in obtaining reliable data on house types in the various countries, calculations involving dwelling types have been based on a standardised European house: i.e. a dwelling with a 100 $m^2$ external wall area, a 125 $m^2$ roof area, and a 75 $m^2$ floor area.

# Contents



EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

# The critical importance of building insulation for the environment

For the past 20 years, EURIMA has studied the development of thermal insulation standards in new dwellings in Europe. Traditionally, these studies have focused upon the thickness (mm) of mineral wool insulation prescribed and applied in new construction. An updating survey completed in 2001, showed continued progress in insulation standards in several countries, particularly in central Europe. Unsurprisingly perhaps, in view of their climatic conditions, the Scandinavian countries – headed by Sweden - retain their position at the top of the list, showing how far the rest of Europe needs to go. The south continues to lag behind, despite European regulations demanding improved standards in order to meet Kyoto targets. The picture is the same for insulation thickness in walls and roofs.

Although these previous studies give us an accurate picture of the situation, the insulation thickness view is a rather simplistic one. It makes no attempt to weight the different countries, nor does it take into consideration their respective climates. In this new study, we have re-evaluated the figures in the different countries to take account of population sizes and degree-days, i.e. the number of days per annum where heating is required. All performances are compared with Swedish standards.

Expressed in this way, the results throw new light upon the additional potential for energy savings in some northern countries, but they clearly indicate that the major efforts to save energy must be concentrated in the south and in countries with large populations.

Significant progress could also be made in almost all European countries, by increased standards of insulation thickness in walls and roofs. For instance, applying Swedish levels of insulation in countries like Belgium, Spain and Italy, would yield savings in energy losses of up to 90%. Across Europe as a whole, energy savings in excess of 50% could be achieved by applying Swedish standards:

U = 0.15 W/m$^2$K for walls
U = 0.10 W/m$^2$K for roofs

Countries with large populations such as the UK, Germany, France, Spain and Italy, represent the largest potential for energy savings; or in the words of our industry for insulation materials. The total energy loss from dwellings as calculated in our study is based on present day regulations for new construction. However, many old buildings have little or no insulation, and there is substantially greater potential for savings in the existing building stock. A multiplying factor of two to four could be applied to arrive at a more realistic figure of the actual loss, or potential energy saving, from dwellings.

Assuming that standards of living will grow, particularly in southern Europe, then tightening of insulation levels will be urgently required as energy consumption increases, e.g. by the increased use of air conditioning. Unless standards are improved, then the energy consumption required to increase comfort levels in dwellings will surpass the energy savings made through existing insulation levels.

We know that energy use in buildings accounts for more than 40% of all $CO_2$ emissions in Europe, but only Austria and the UK have plans for their buildings sector to achieve anything like 40% savings. So the challenge is to maintain pressure on national legislation to improve insulation standards. Contemporary studies of public attitudes to global warming and climate change also indicate poor awareness of the critical importance of buildings for the environment. People clearly still do not understand that their individual actions to improve building insulation can have a major impact on reducing $CO_2$ emissions.

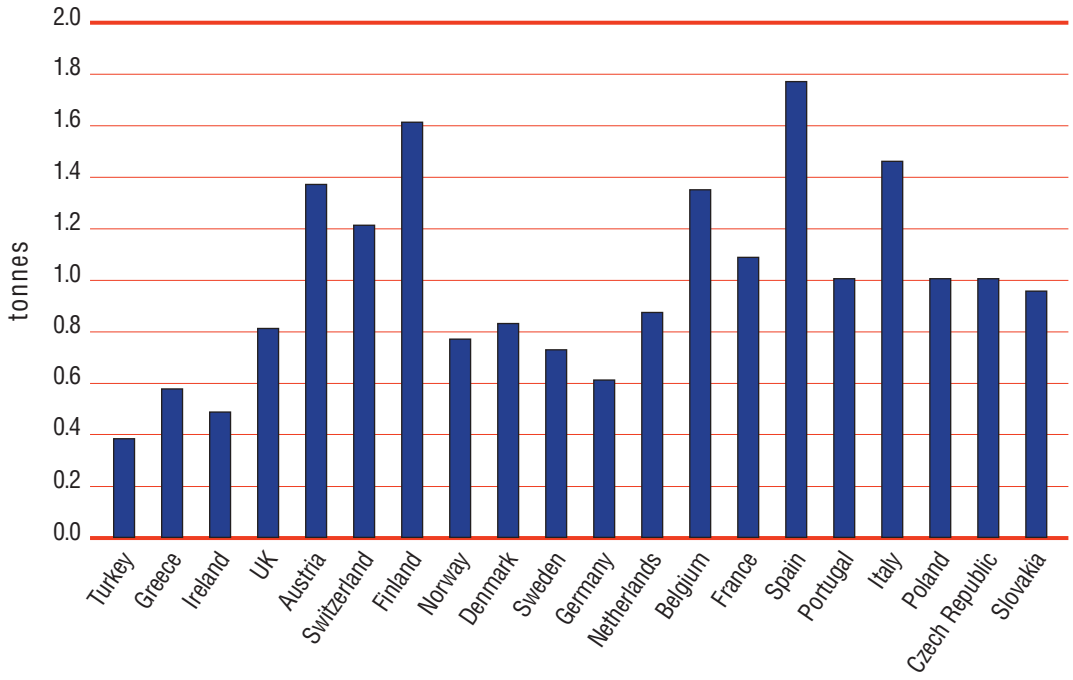
**Conclusions:**

- *Potential energy savings from increased insulation levels in new and existing buildings are still enormous.*
- *The south of Europe and particularly the populated countries represent the largest potential.*
- *Roof and wall U values of 0.10 W/m$^2$K and 0.15 W/m$^2$K respectively, should be standard for new construction in all European countries: and possibly for existing buildings.*
- *Potential savings in energy consumption from dwellings could account for most (possibly all) of the reduction in $CO_2$ emissions needed to meet the Kyoto targets.*
- *Increasing comfort levels may offset savings from existing insulation levels.*
- *Political authorities, together with the mineral wool industry, should step up marketing efforts for thicker insulation levels.*

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Per capita $CO_2$ emissions per year from dwellings

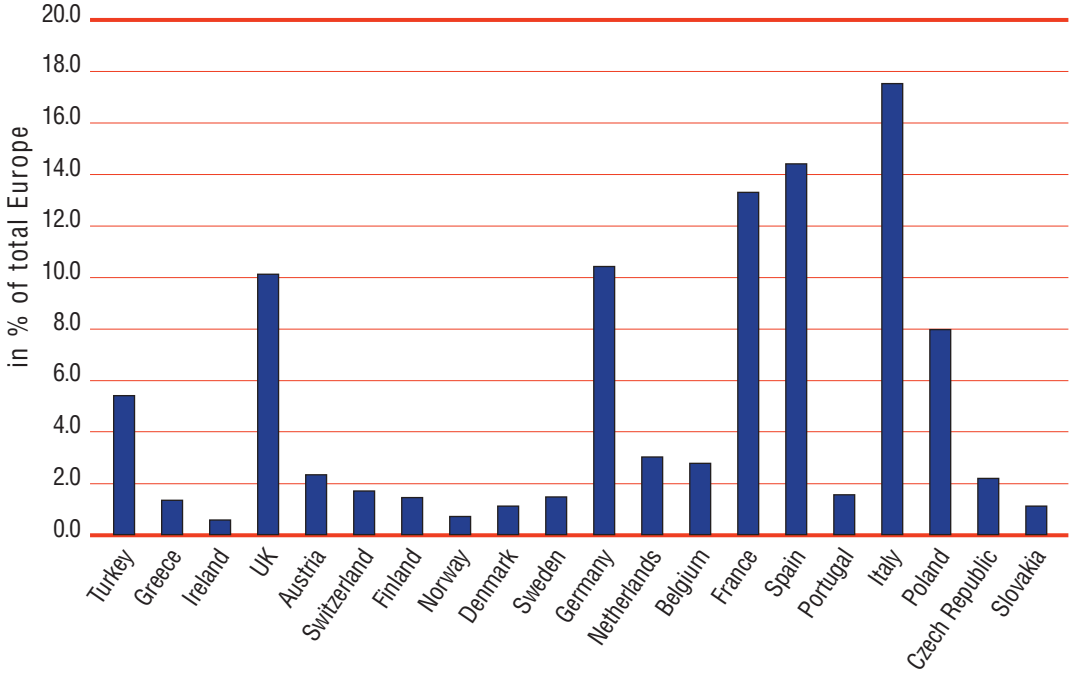
**Table 1**




| tonnes | |
|---|---|
| Spain | 1.787 |
| Finland | 1.632 |
| Italy | 1.488 |
| Austria | 1.394 |
| Belgium | 1.390 |
| Switzerland | 1.213 |
| France | 1.098 |
| Poland | 1.011 |
| Czech Republic | 1.010 |
| Slovakia | 0.967 |
| Netherlands | 0.886 |
| Denmark | 0.843 |
| UK | 0.823 |
| Norway | 0.777 |
| Portugal | 0.751 |
| Sweden | 0.738 |
| Germany | 0.634 |
| Greece | 0.582 |
| Ireland | 0.504 |
| Turkey | 0.393 |

## Total $CO_2$ emissions per year from dwellings

**Table 2**

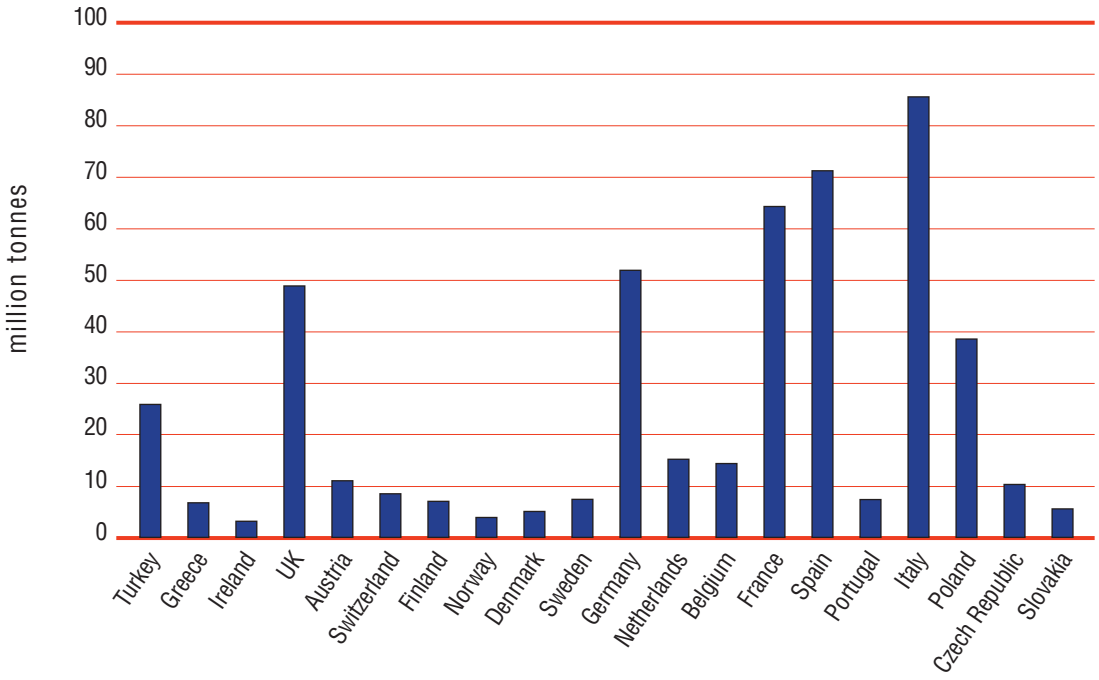



| % | |
|---|---|
| Italy | 17.5 |
| Spain | 14.5 |
| France | 13.2 |
| Germany | 10.6 |
| UK | 10.1 |
| Poland | 7.9 |
| Turkey | 5.3 |
| Netherlands | 3.0 |
| Belgium | 2,9 |
| Austria | 2.3 |
| Czech Republic | 2.1 |
| Switzerland | 1.8 |
| Finland | 1.7 |
| Portugal | 1.5 |
| Sweden | 1.3 |
| Greece | 1.3 |
| Slovakia | 1.0 |
| Denmark | 0.9 |
| Norway | 0.7 |
| Ireland | 0.4 |
| | 100.0 |

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Total $CO_2$ emissions per year from dwellings

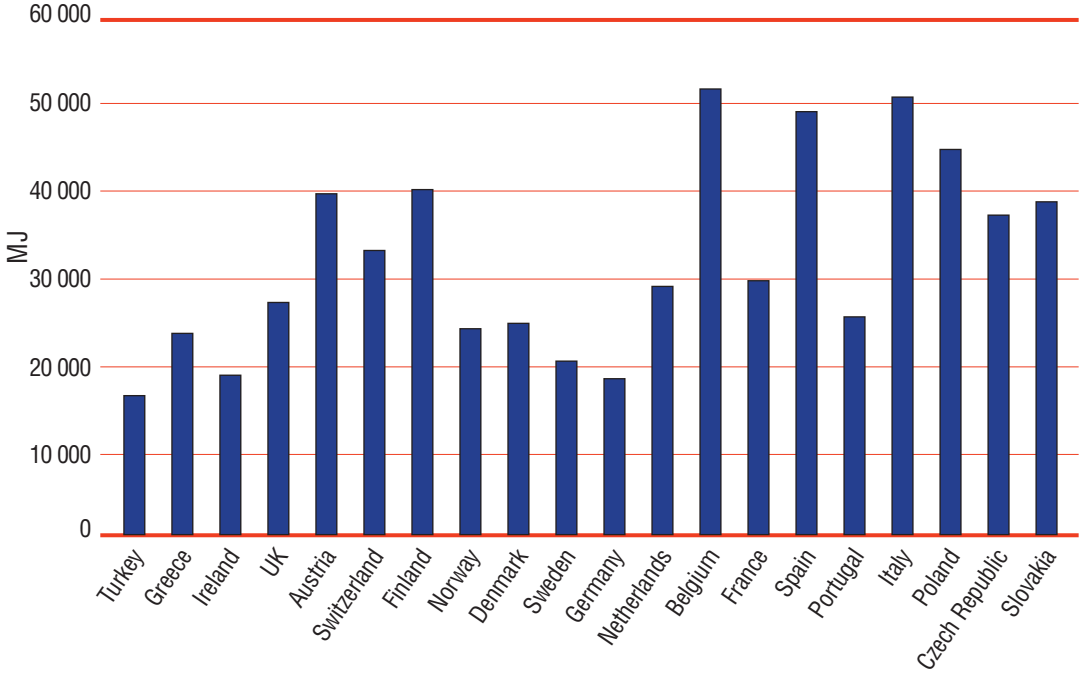
**Table 3**




| million tonnes per year | |
|---|---|
| Italy | 86.028 |
| Spain | 71.309 |
| France | 64.671 |
| Germany | 51.967 |
| UK | 49.400 |
| Poland | 39.010 |
| Turkey | 25.948 |
| Netherlands | 14.616 |
| Belgium | 14.318 |
| Austria | 11.290 |
| Czech Republic | 10.406 |
| Switzerland | 8.852 |
| Finland | 8.488 |
| Portugal | 7.536 |
| Sweden | 6.576 |
| Greece | 6.172 |
| Slovakia | 4.933 |
| Denmark | 4.550 |
| Norway | 3.498 |
| Ireland | 1.931 |

## Energy loss per year per dwelling

**Table 4**

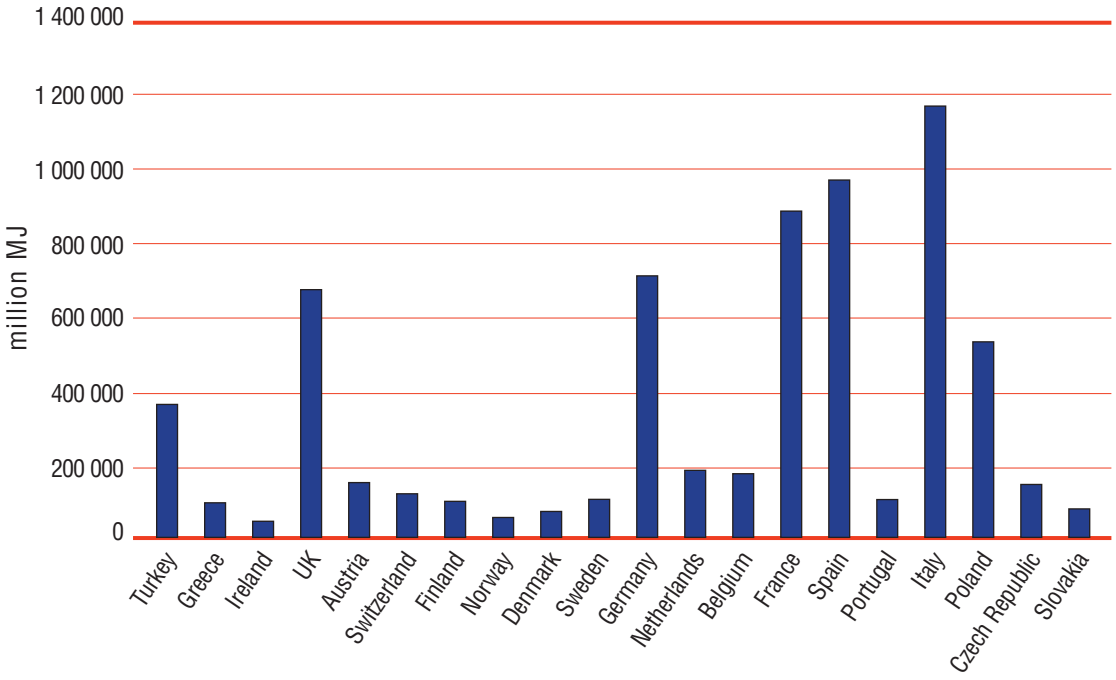



| MJ per year | |
|---|---|
| Belgium | 52 380 |
| Italy | 50 365 |
| Spain | 49 235 |
| Finland | 45 412 |
| Poland | 44 372 |
| Austria | 40 216 |
| Slovakia | 39 139 |
| Czech Republic | 37 066 |
| Switzerland | 33 235 |
| France | 29 901 |
| Netherlands | 29 528 |
| UK | 27 181 |
| Portugal | 25 426 |
| Denmark | 24 548 |
| Norway | 24 036 |
| Greece | 23 643 |
| Sweden | 20 701 |
| Ireland | 19 236 |
| Germany | 18 883 |
| Turkey | 15 941 |

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Total energy loss per year from dwellings

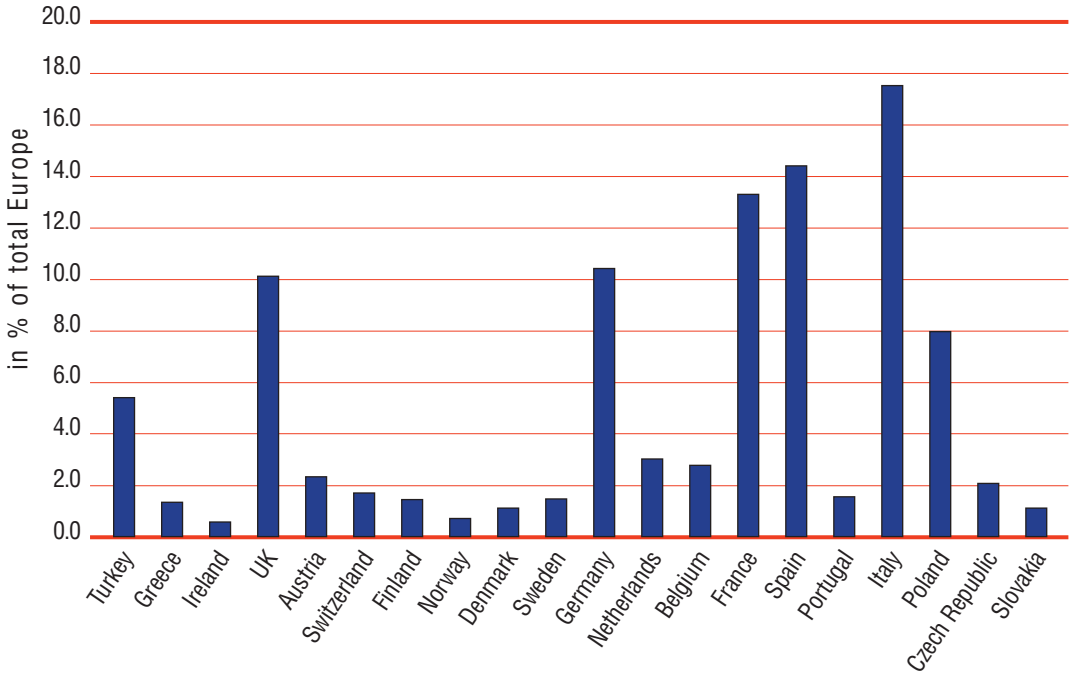
**Table 5**




| | Million MJ per year |
|---|---|
| Italy | 1 164 442 |
| Spain | 965 212 |
| France | 875 361 |
| Germany | 703 401 |
| UK | 668 663 |
| Poland | 528 032 |
| Turkey | 351 229 |
| Netherlands | 197 836 |
| Belgium | 193 806 |
| Austria | 152 821 |
| Czech Republic | 140 849 |
| Switzerland | 119 811 |
| Finland | 114 892 |
| Portugal | 102 008 |
| Sweden | 89 016 |
| Greece | 83 540 |
| Slovakia | 66 771 |
| Denmark | 61 590 |
| Norway | 47 352 |
| Ireland | 26 142 |
| | 6 652 777 |

## Total energy loss per year from dwellings

**Table 6**

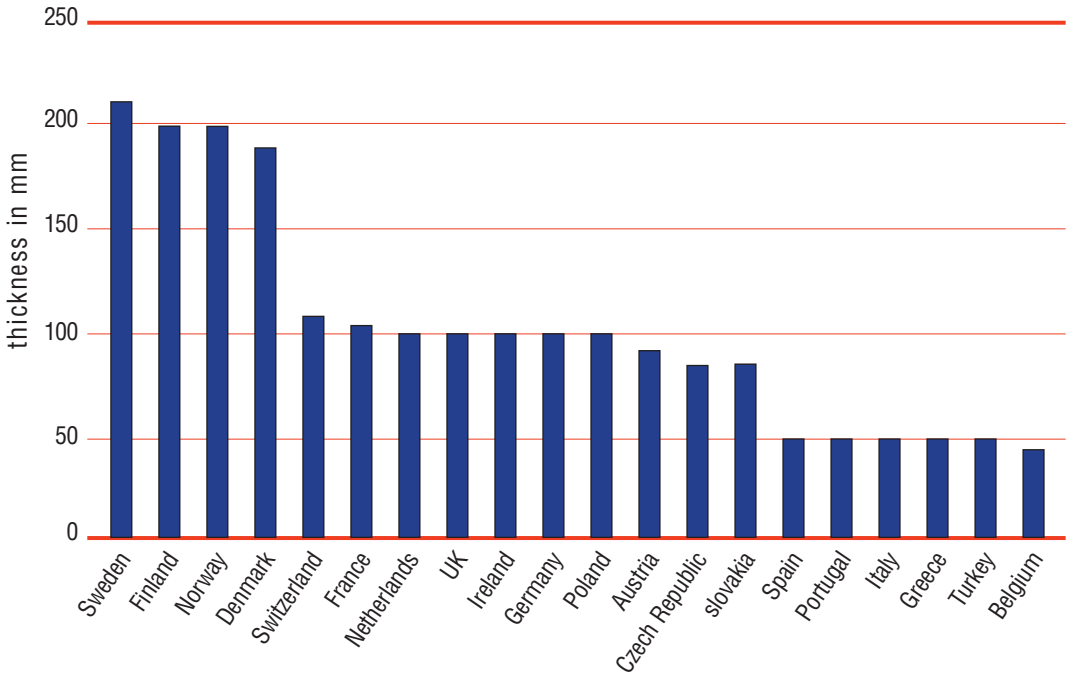



| | % |
|---|---|
| Italy | 17.5 |
| Spain | 14.5 |
| France | 13.2 |
| Germany | 10.6 |
| UK | 10.1 |
| Poland | 7.9 |
| Turkey | 5.3 |
| Netherlands | 3.0 |
| Belgium | 2.9 |
| Austria | 2.3 |
| Czech Republic | 2.1 |
| Switzerland | 1.8 |
| Finland | 1.7 |
| Portugal | 1.5 |
| Sweden | 1.3 |
| Greece | 1.3 |
| Slovakia | 1.0 |
| Denmark | 0.9 |
| Norway | 0.7 |
| Ireland | 0.4 |
| | 100.0 |

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Insulation thickness walls - Europe 2001

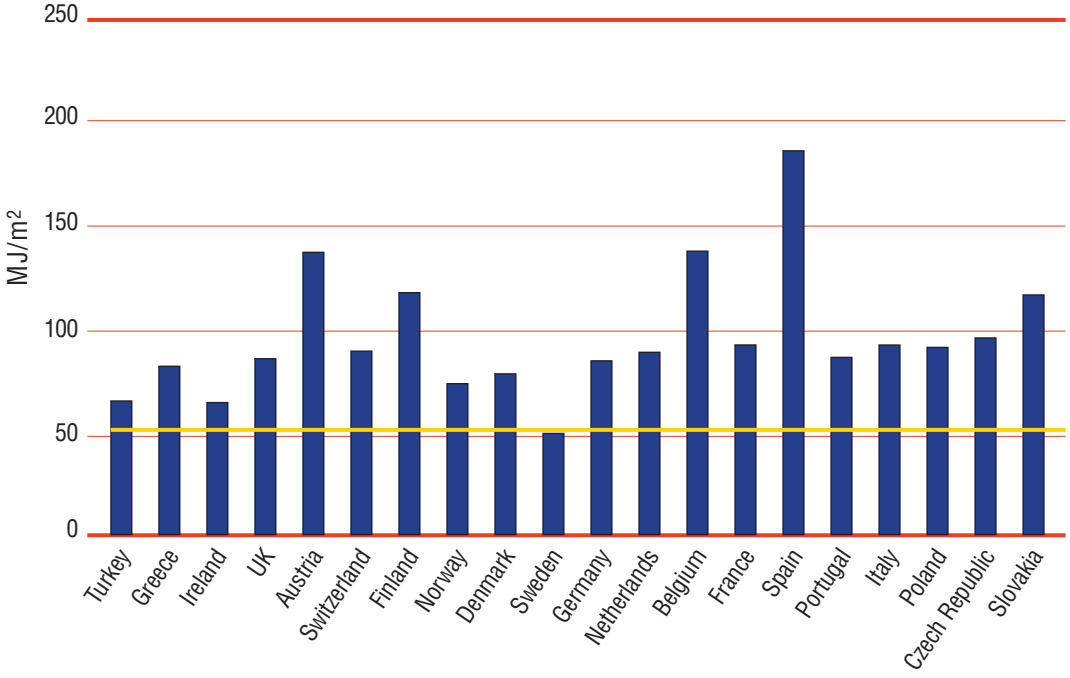
**Table 7**




| thickness in mm | |
|---|---|
| Belgium | 45 |
| Turkey | 50 |
| Greece | 50 |
| Italy | 50 |
| Portugal | 50 |
| Spain | 50 |
| Slovakia | 80 |
| Czech Republic | 80 |
| Austria | 90 |
| Poland | 100 |
| Germany | 100 |
| Ireland | 100 |
| UK | 100 |
| Netherlands | 100 |
| France | 110 |
| Switzerland | 120 |
| Denmark | 175 |
| Norway | 200 |
| Finland | 200 |
| Sweden | 220 |

## Energy loss through walls - Europe 2001

**Table 8**

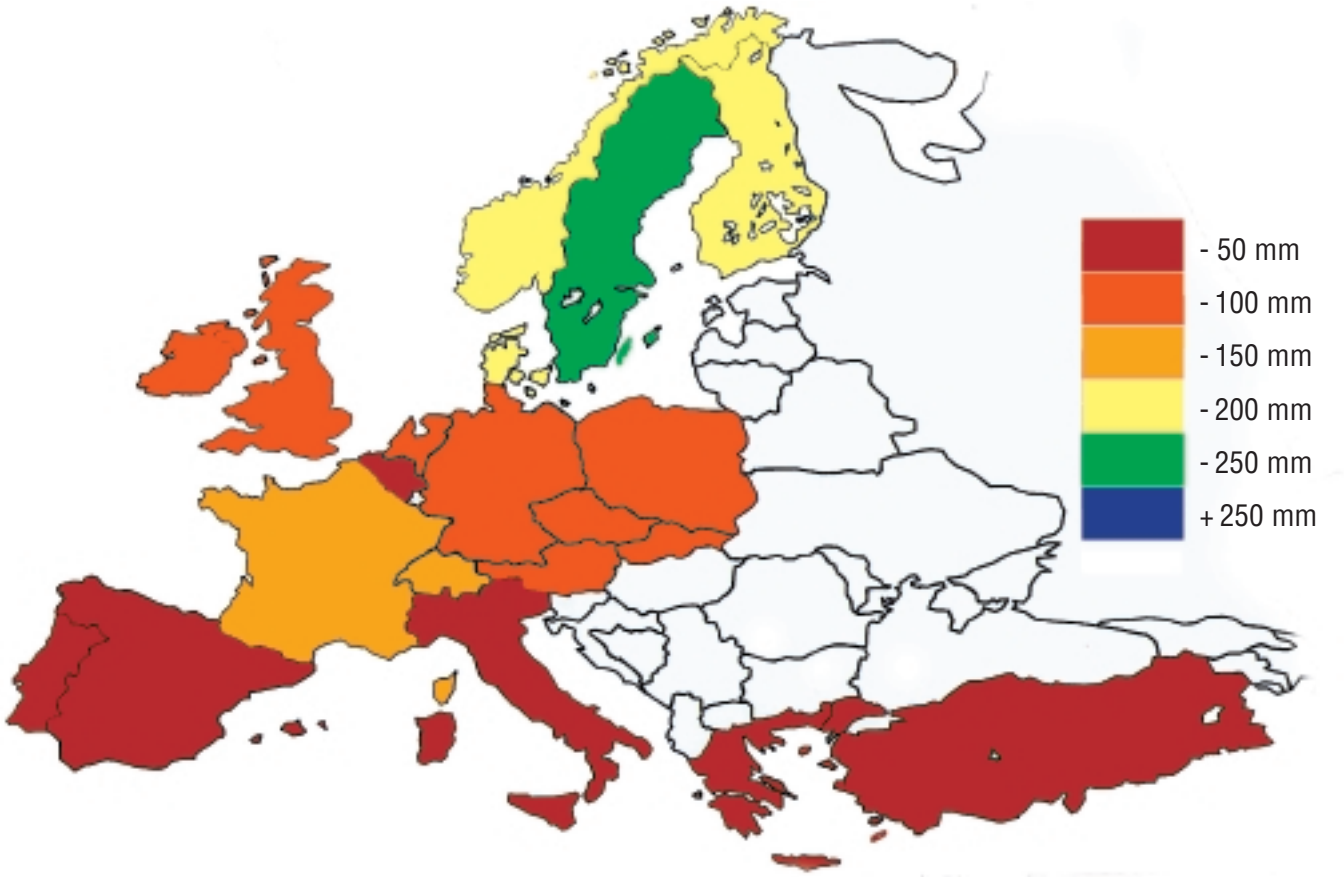



| MJ/m² per year | |
|---|---|
| Spain | 180 |
| Austria | 133 |
| Belgium | 130 |
| Finland | 121 |
| Slovakia | 119 |
| Czech Republic | 98 |
| France | 93 |
| Italy | 90 |
| Poland | 88 |
| Netherlands | 88 |
| Switzerland | 87 |
| Portugal | 83 |
| Germany | 83 |
| UK | 83 |
| Denmark | 80 |
| Greece | 79 |
| Norway | 76 |
| Turkey | 69 |
| Ireland | 67 |
| Sweden | 52 |

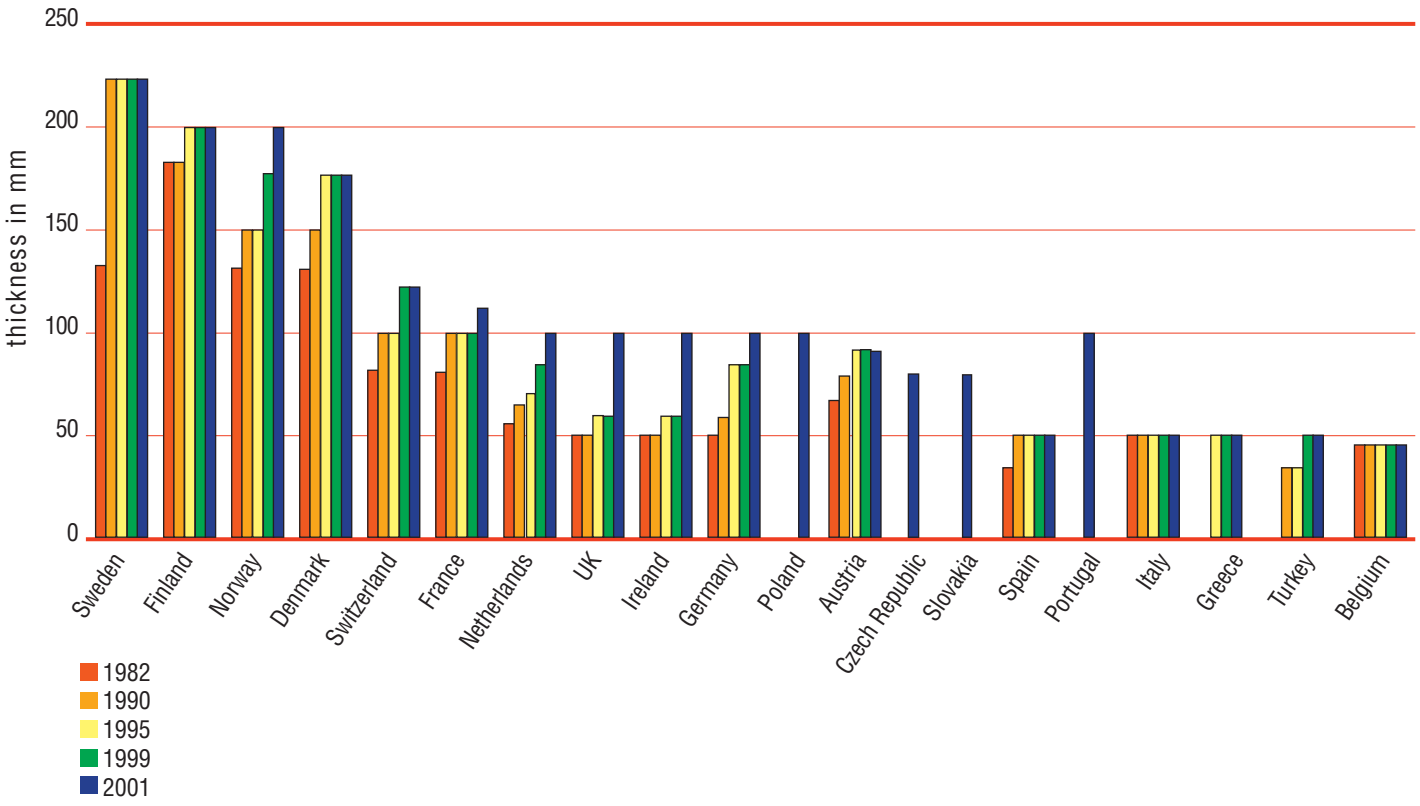
Current energy loss
Recommended maximum energy consumption

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Insulation thicknesses walls - Europe 2001 Table 9



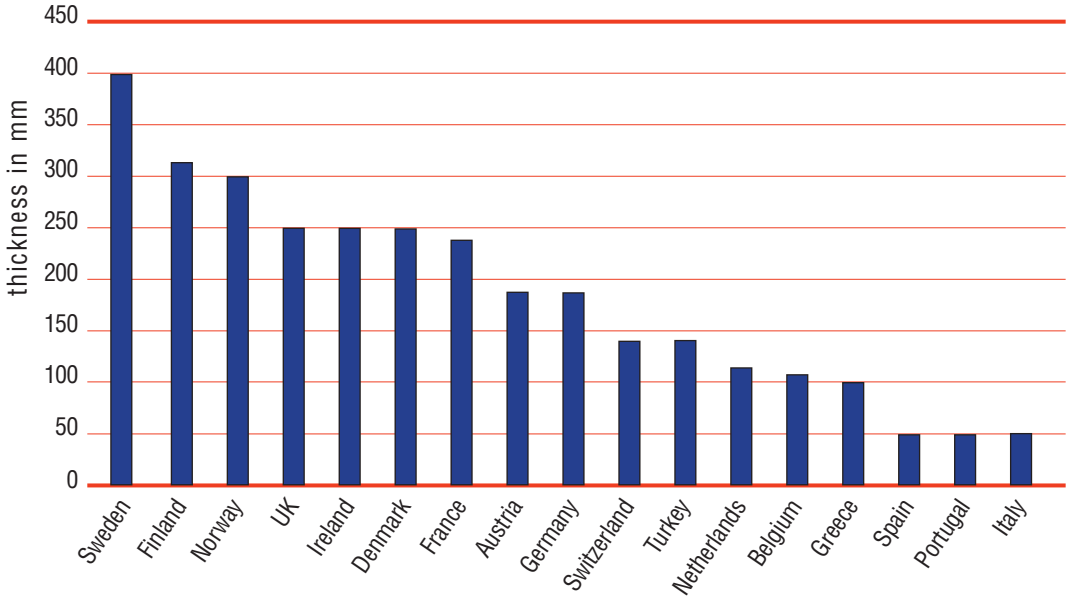

## Insulation thickness walls - Europe 1982 - 2001 Table 10




EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Insulation thickness roofs - Europe 2001

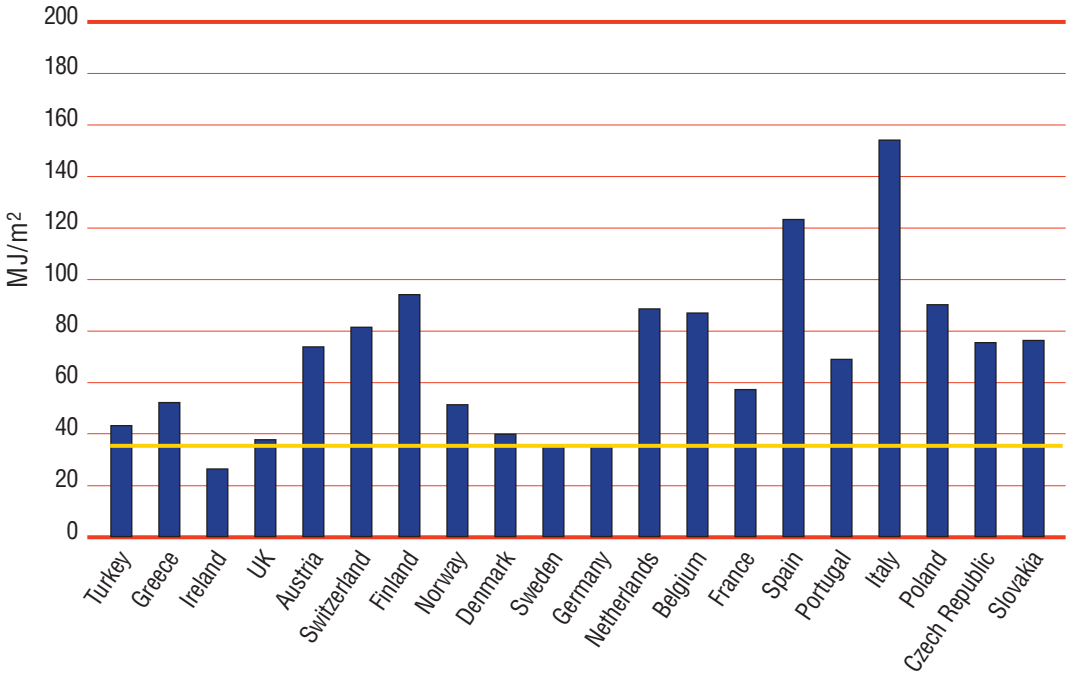
**Table 11**




| thickness in mm | |
|---|---|
| Italy | 50 |
| Portugal | 50 |
| Spain | 50 |
| Greece | 100 |
| Belgium | 109 |
| Netherlands | 111 |
| Turkey | 140 |
| Switzerland | 140 |
| Germany | 180 |
| Austria | 180 |
| France | 240 |
| Denmark | 250 |
| Ireland | 250 |
| UK | 250 |
| Norway | 300 |
| Finland | 320 |
| Sweden | 400 |

## Energy loss through roofs - Europe 2001

**Table 12**

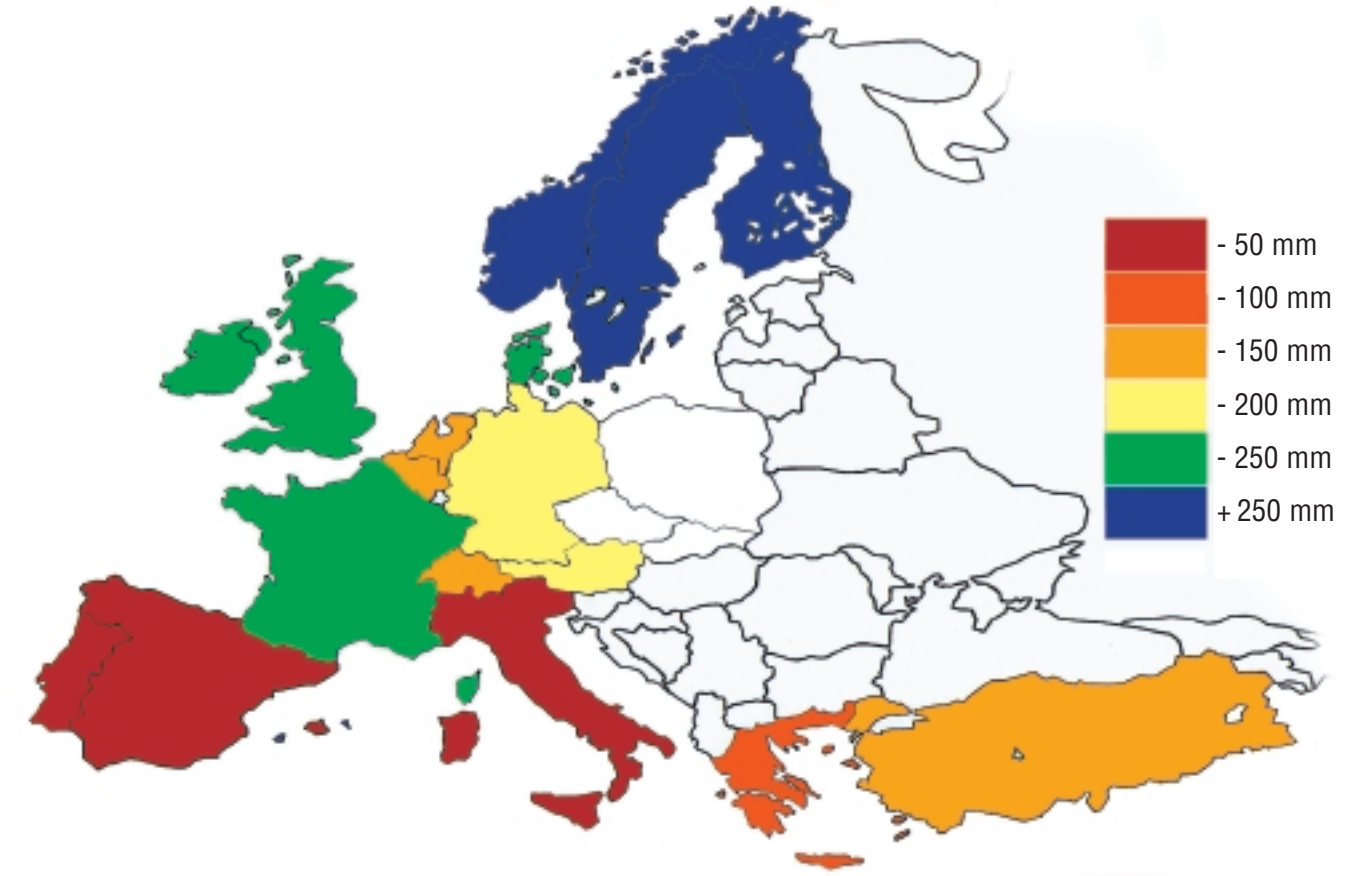



| MJ/m² per year | |
|---|---|
| Italy | 156 |
| Belgium | 130 |
| Spain | 124 |
| Finland | 95 |
| Netherlands | 88 |
| Poland | 88 |
| Switzerland | 81 |
| Czech Republic | 78 |
| Slovakia | 78 |
| Austria | 73 |
| Portugal | 69 |
| France | 58 |
| Greece | 53 |
| Norway | 52 |
| Turkey | 43 |
| Denmark | 40 |
| UK | 38 |
| Germany | 36 |
| Sweden | 35 |
| Ireland | 27 |

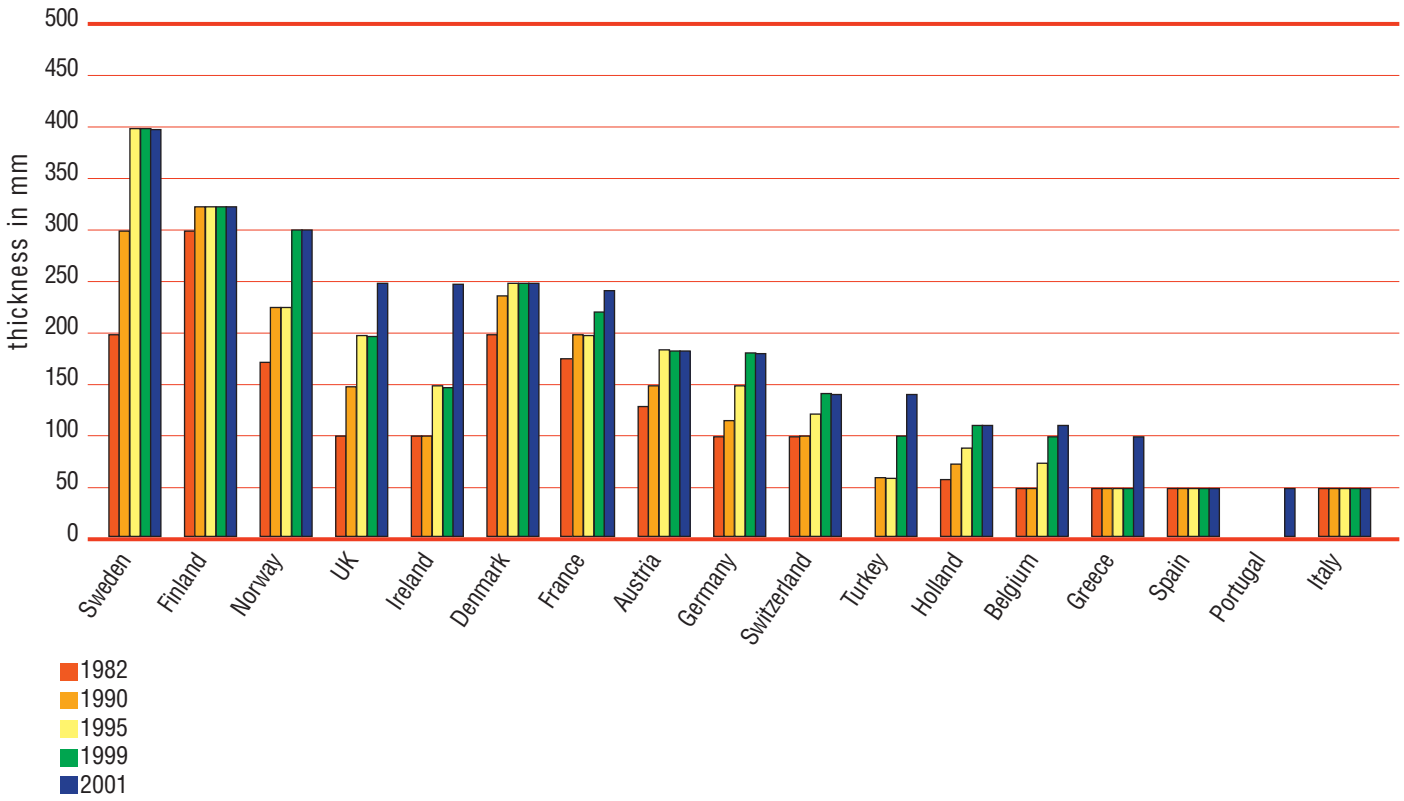
Current energy loss
Recommended maximum energy consumption

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

## Insulation thickness Roofs - Europe 2001 Table 13




## Insulation thickness roofs - Europe 1982 to 2001 Table 14




EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION
www.eurima.org

Avenue Louise 375
bte 4
BE-1050 Brussels
Belgium
Tel: +32 2 626 20 90
Fax: +32 2 626 20 99
E-mail: info@eurima.org

EURIMA
EUROPEAN INSULATION MANUFACTURERS ASSOCIATION

www.eurima.org