



# **AIEA Presentation**

## **Building Energy Rating**

**Presentation prepared in conjunction with  
Tipperary Institute**

[www.aiea.ie](http://www.aiea.ie)



## Introduction to the AIEA

- ✍ 16 Local Energy Agencies in Ireland.
- ✍ Association of Irish Energy Agencies (AIEA) formed in November 1998.

## Central Aim of the AIEA

- ✍ The overall common aim of the constituent member of the Association is to promote renewable energy, energy efficiency and the rational use of energy, to improve the quality of the environment and to contribute to sustainable development.







## ***Mission Statement:***

**“The Association of Irish Energy Agencies (AIEA) is an All-Ireland body assisting the development and implementation of energy policy and best practice in an impartial and effective manner at local, national and EU level, through its own actions and by strengthening the capabilities of its members”**

## **Structure of the AIEA**

**The AIEA is a self-governing organisation, which provides both a critical mass and a sense of continuity for its constituent member energy agencies. It can also provide a coherent and coordinated voice at local, national and European levels**

**Current officers include**

-  **Chairman**
-  **Secretariat**
-  **Treasurer**
-  **PR Team**
-  **Training Officer**

**[www.aiea.ie](http://www.aiea.ie)**



## Local Energy Agency Activities

-  Energy awareness and dissemination to the general public
-  Energy management services to the Local Authorities
-  Involvement in Local, National and European Energy Projects
-  Sustainable energy training
-  Energy Policy Development

SEANCE Project



**AIEA**  
ASSOCIATION OF IRELAND ENERGY AGENCIES



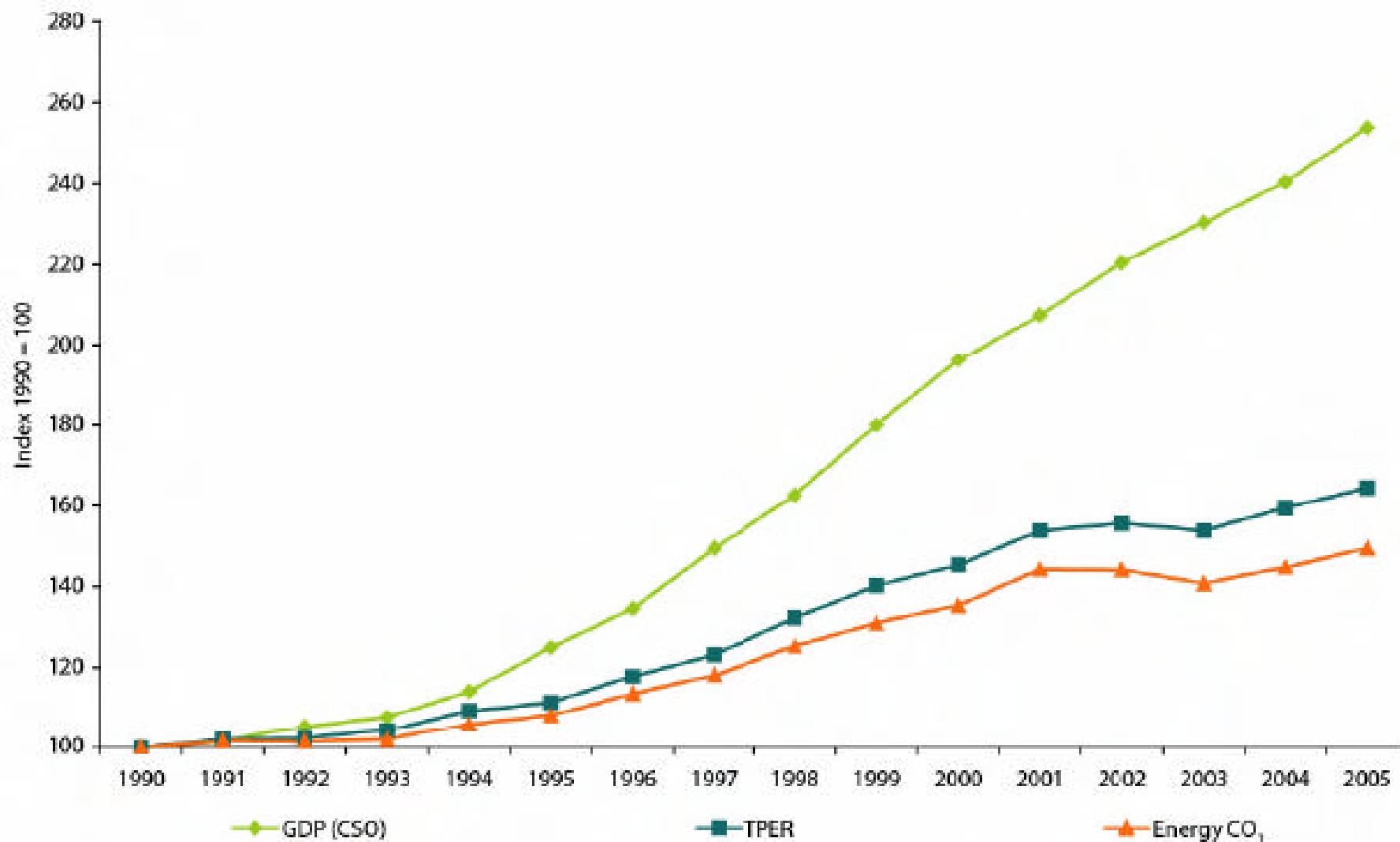
E-mail: [info@aiea.ie](mailto:info@aiea.ie)  
Website: [www.aiea.ie](http://www.aiea.ie)

<b>Bellinagh Energy Agency</b>	Tel: (051) 952 40 897 Telephone: (0503) 31 30 12 Email: <a href="mailto:info@bellinaghenergyagency.ie">info@bellinaghenergyagency.ie</a>
<b>Cahore / Keshmoy Energy Agency</b>	Tel: (086) 814 3871 Email: <a href="mailto:info@cahorekeshmoyenergyagency.ie">info@cahorekeshmoyenergyagency.ie</a>
<b>COOMRA</b>	Tel: (01) 45 0488 Email: <a href="mailto:group@coomra.ie">group@coomra.ie</a>
<b>Cork City Energy Agency</b>	Tel: (021) 884 1388 Email: <a href="mailto:info@corkcityenergyagency.ie">info@corkcityenergyagency.ie</a>
<b>Cork County Energy Agency</b>	Tel: (022) 43 41 57 Email: <a href="mailto:info@cccenergyagency.ie">info@cccenergyagency.ie</a>
<b>County of Energy de Binn Fhionn</b>	Tel: (074) 937 2222
<b>Fingal Regional Energy Agency</b>	Tel: (01) 718 3837 Email: <a href="mailto:info@fingalenergyagency.ie">info@fingalenergyagency.ie</a>
<b>Gaforey Energy Agency Limited</b>	Tel: (081) 366 834 Email: <a href="mailto:info@gaforeyenergyagency.ie">info@gaforeyenergyagency.ie</a>
<b>Kerry Energy Agency</b>	Tel: (066) 718 3370 Email: <a href="mailto:info@kerryenergyagency.ie">info@kerryenergyagency.ie</a>
<b>Limerick City Energy Agency</b>	Tel: (020) 234 210 Email: <a href="mailto:info@limerickcityenergyagency.ie">info@limerickcityenergyagency.ie</a>
<b>Mayo Energy Agency</b>	Tel: (086) 713 7611 & Email: <a href="mailto:info@mayoenergyagency.ie">info@mayoenergyagency.ie</a>
<b>Monaghan Energy Agency</b>	Tel: (01) 853 80 00 Email: <a href="mailto:info@monaghanenergyagency.ie">info@monaghanenergyagency.ie</a>
<b>Offaly Energy Agency</b>	Tel: (086) 814 3871 Email: <a href="mailto:info@offalyenergyagency.ie">info@offalyenergyagency.ie</a>
<b>Sligo Regional Energy Agency</b>	Tel: (071) 853 80 00 Email: <a href="mailto:info@sligoregionalenergyagency.ie">info@sligoregionalenergyagency.ie</a>
<b>Wexford Energy Agency</b>	Tel: (053) 943 234 Email: <a href="mailto:info@wexfordenergyagency.ie">info@wexfordenergyagency.ie</a>
<b>Wick Energy Agency</b>	Tel: (043) 91 47 400 Email: <a href="mailto:info@wickenergyagency.ie">info@wickenergyagency.ie</a>
<b>WUDAB</b>	Tel: (028) 943 234 Email: <a href="mailto:info@wudab.ie">info@wudab.ie</a>

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# Energy, GDP and CO<sub>2</sub>







# Residential Sector in Ireland

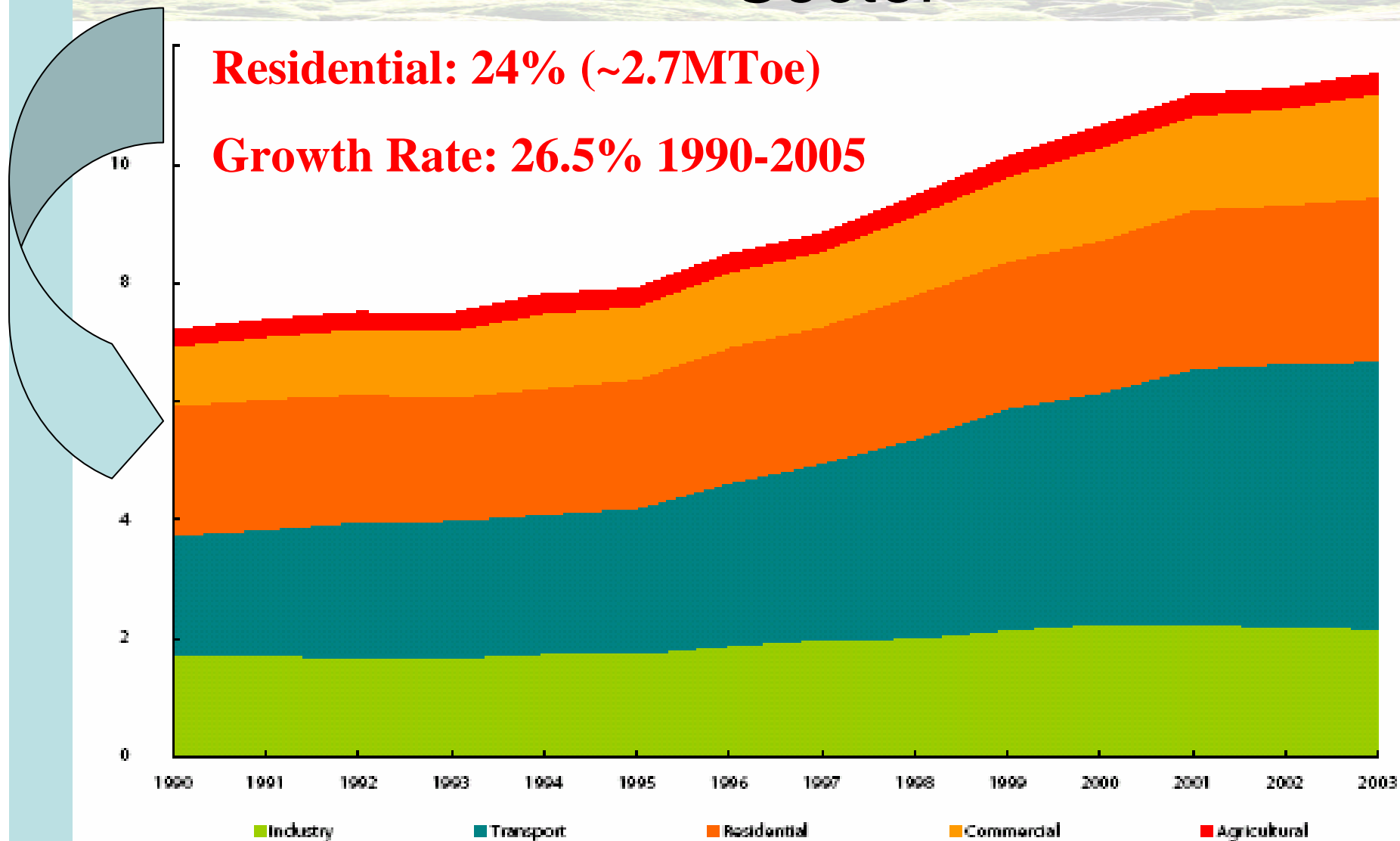
- Significant growth area in past 10 years
  - 70 to 80,000 new housing units per annum
- Significant changes in
  - Building regulations
  - Building types and methods
  - Concentration of building I.e. urban vs rural
- Less change in relation to building form & tenure
  - Still primary focus on detached/semi-detached which is owner/occupied



# Total Final Consumption by Sector

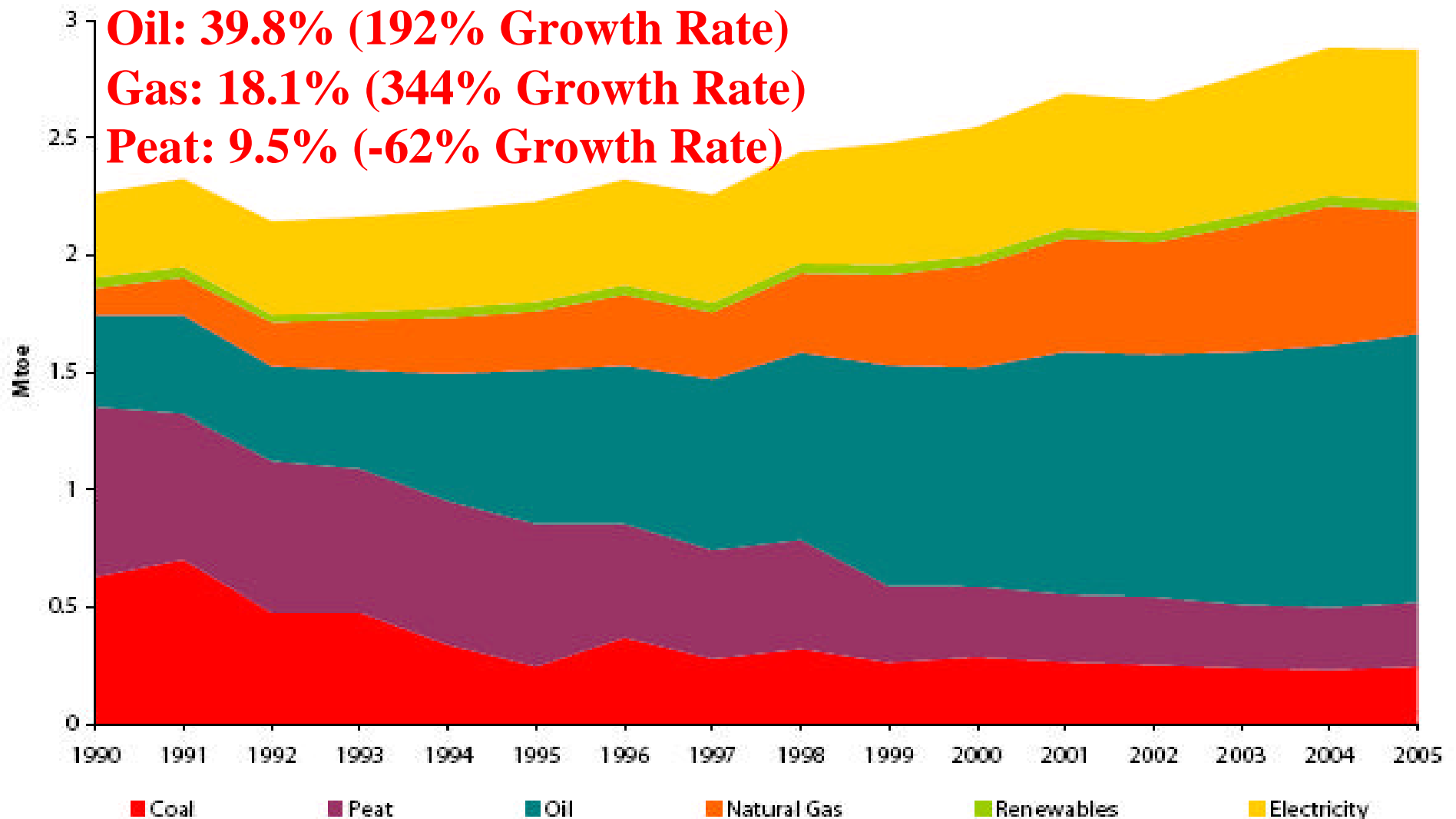
**Residential: 24% (~2.7MToe)**

**Growth Rate: 26.5% 1990-2005**



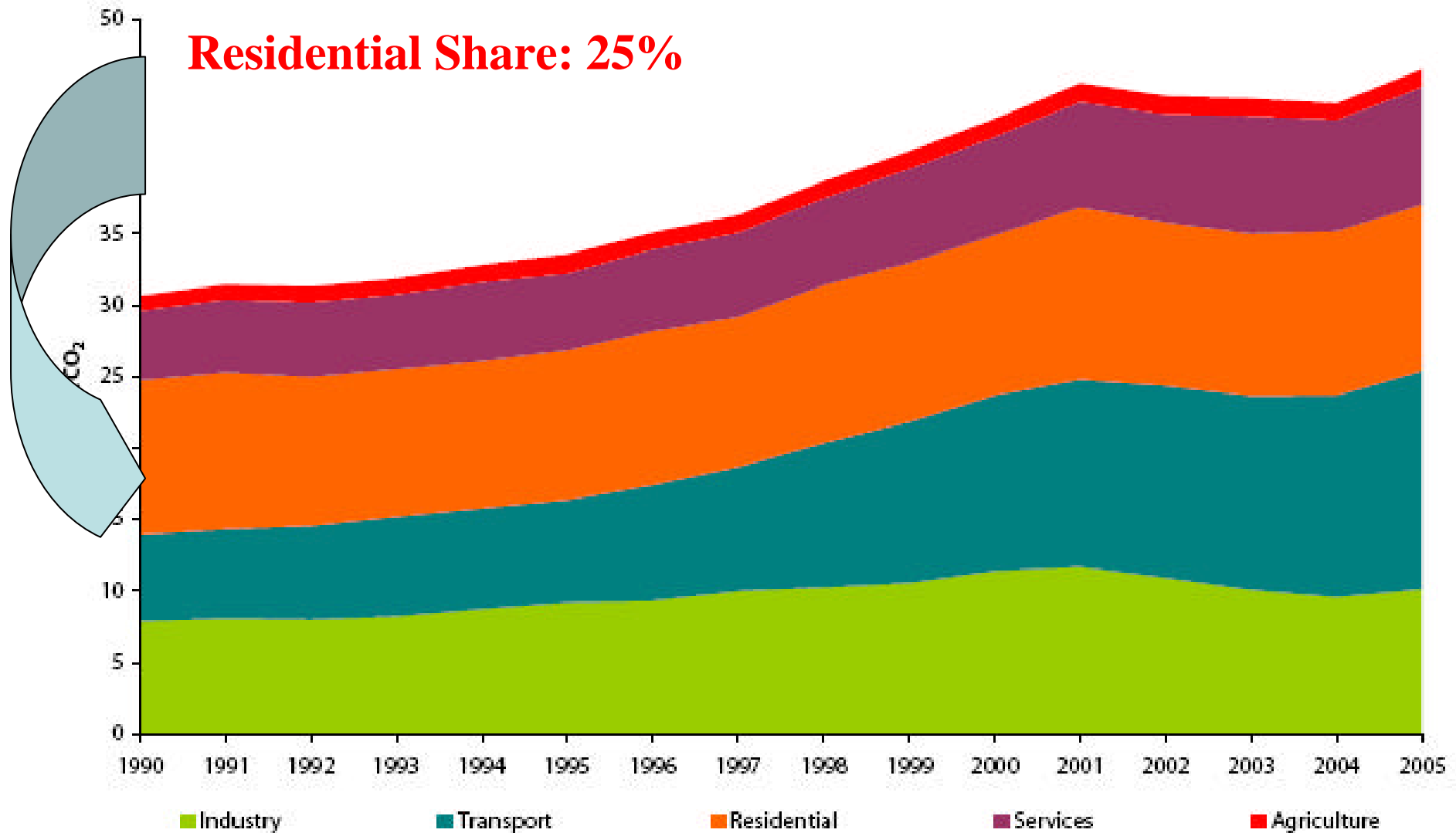


# Residential Sector by Fuel



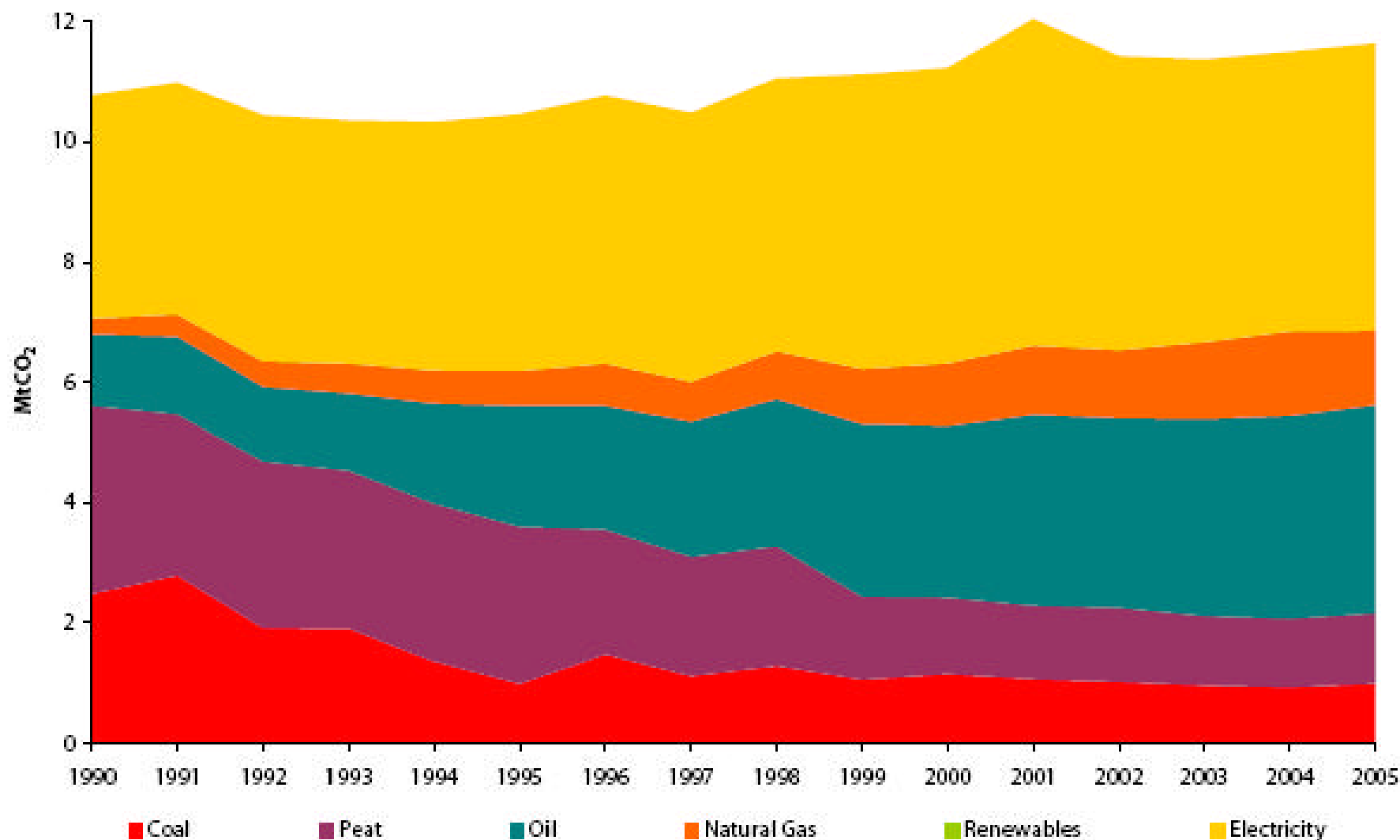


# CO<sub>2</sub> Emissions by Sector



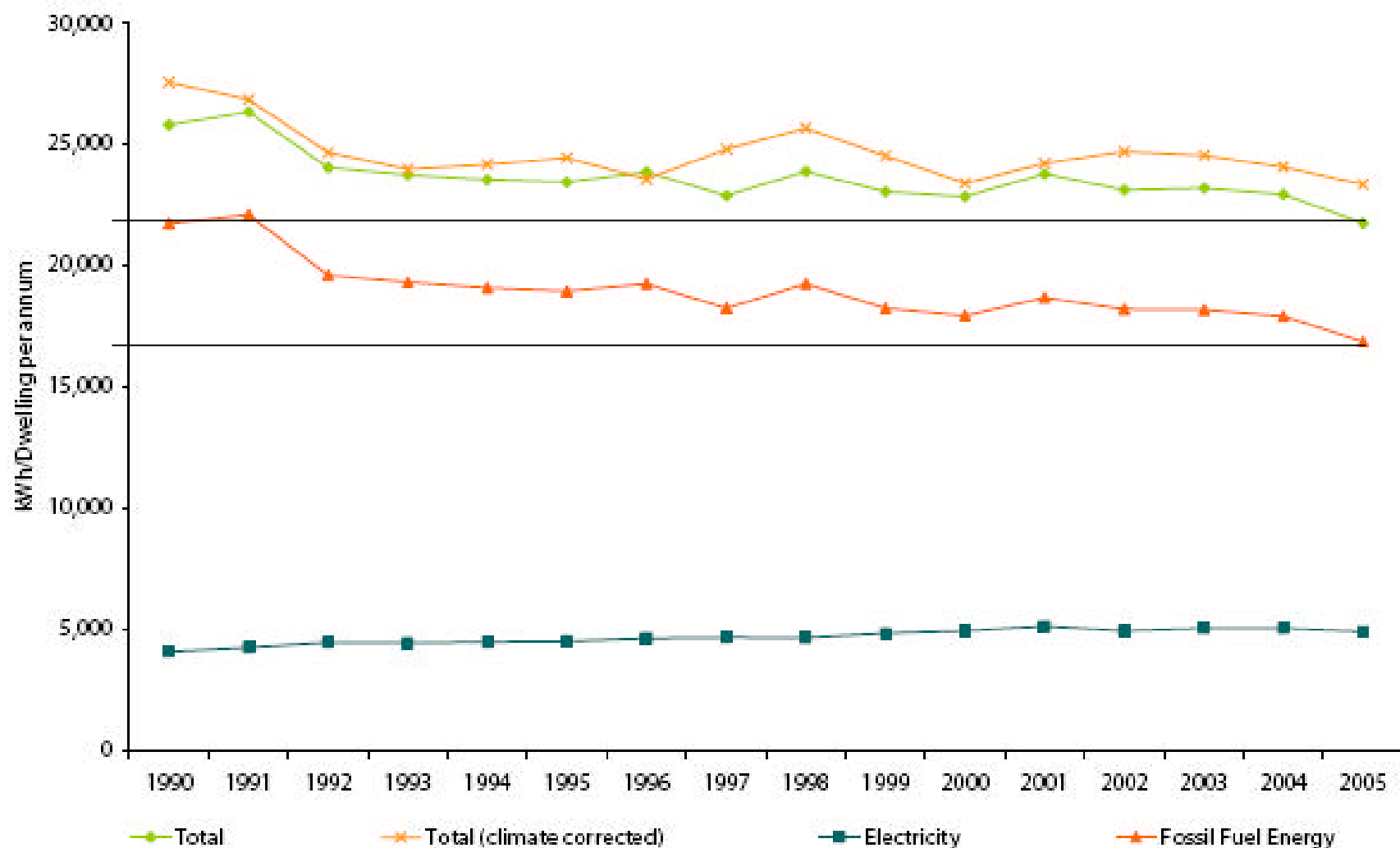


# Residential Sector CO<sub>2</sub> by Fuel



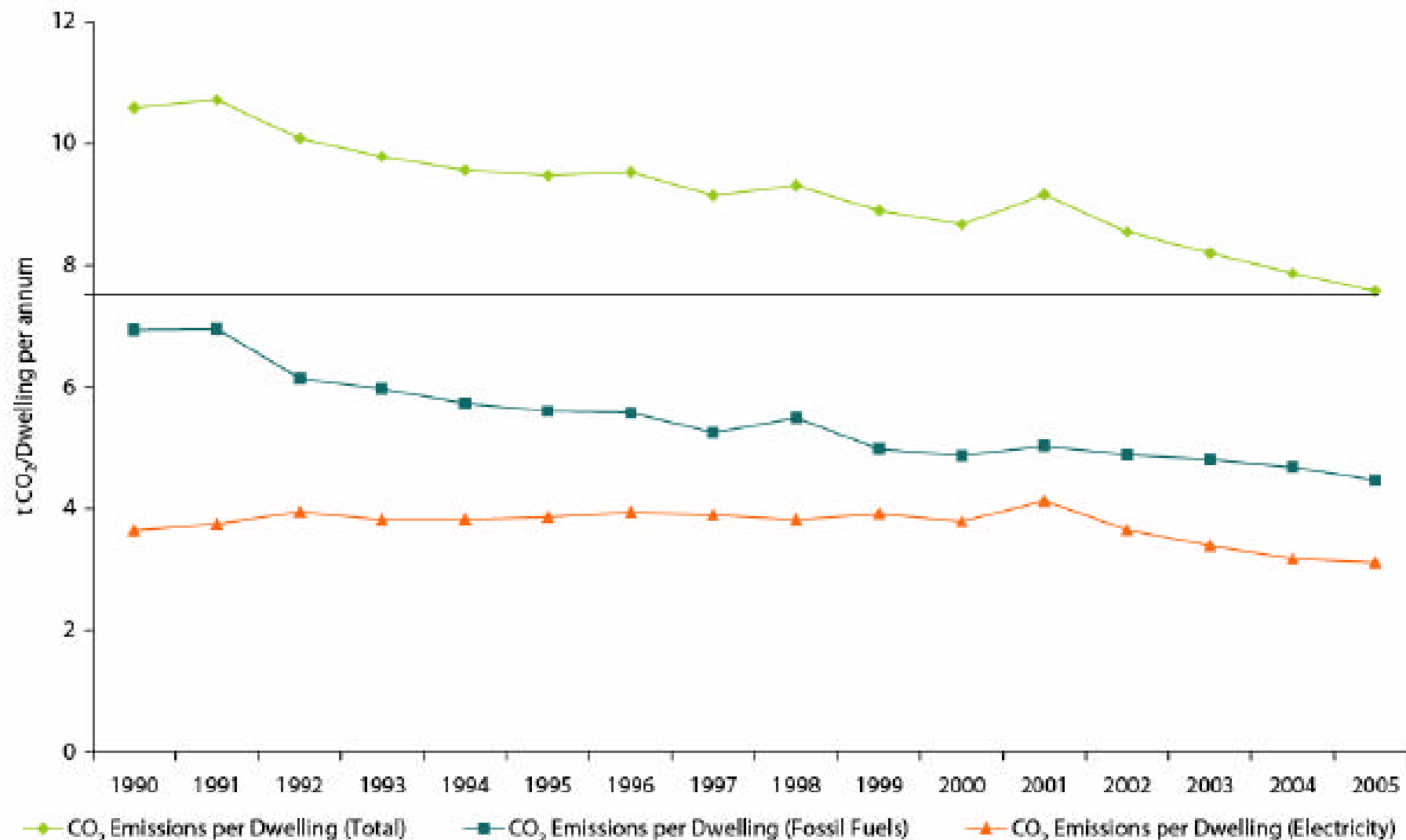


# Energy Intensity Residential Sector





# Emissions Residential Sector



Source: SEI, 2004

Source: SEI, 2006



# House Types

Total houses – by Type 2002

Dwelling Type	2002 Number	2002 % of Total	1990 % of Total
Detached House	602,969	46.1	54.2
Semi-Detached House	355,765	27.2	18.7
Terraced House	258,976	19.8	23.2
Flat / Apartment <sup>60</sup>	83,709	6.4	3.8
Other	5,232	0.4	0.1
<b>Total</b>	<b>1,307,958</b>	<b>100<sup>61</sup></b>	<b>100</b>

Source: ESRI, CSO and SEI

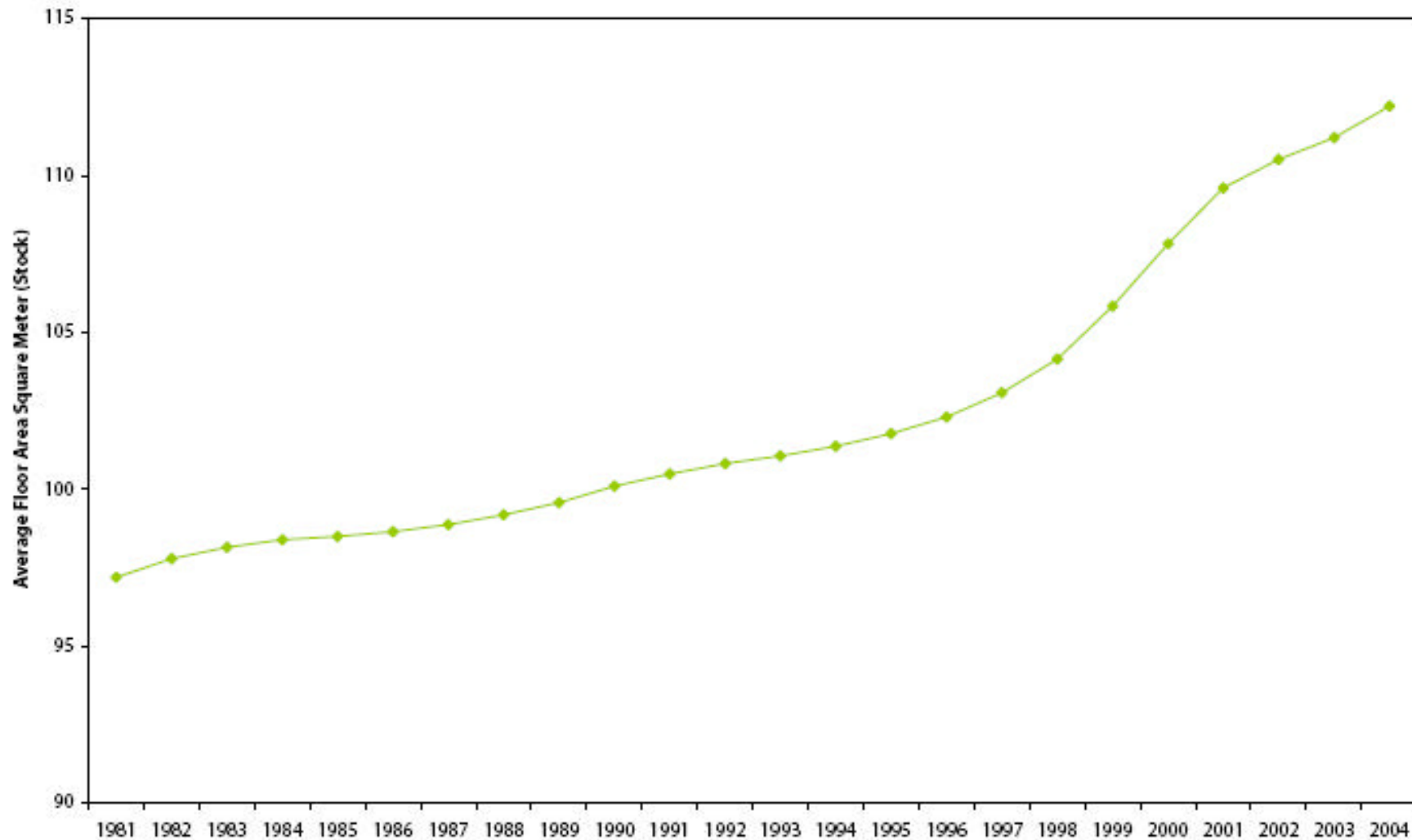
New houses – by Type

Completed Dwellings	Growth % 1992 – '04	Annual Average % Growth 1992-'04	Shares %	
			1992	2004
Detached House	283	11.8	16.0	17.7
Semi-Detached House	400	14.4	34.2	49.3
Terraced House	64	4.2	7.0	3.3
Flat / Apartment	329	12.9	17.0	21
Other	17	1.3	25.8	8.7
<b>Total</b>	<b>247</b>	<b>10.9</b>	<b>100</b>	<b>100</b>

Source: DEHLG



# Average Floor Area (m<sup>2</sup>)

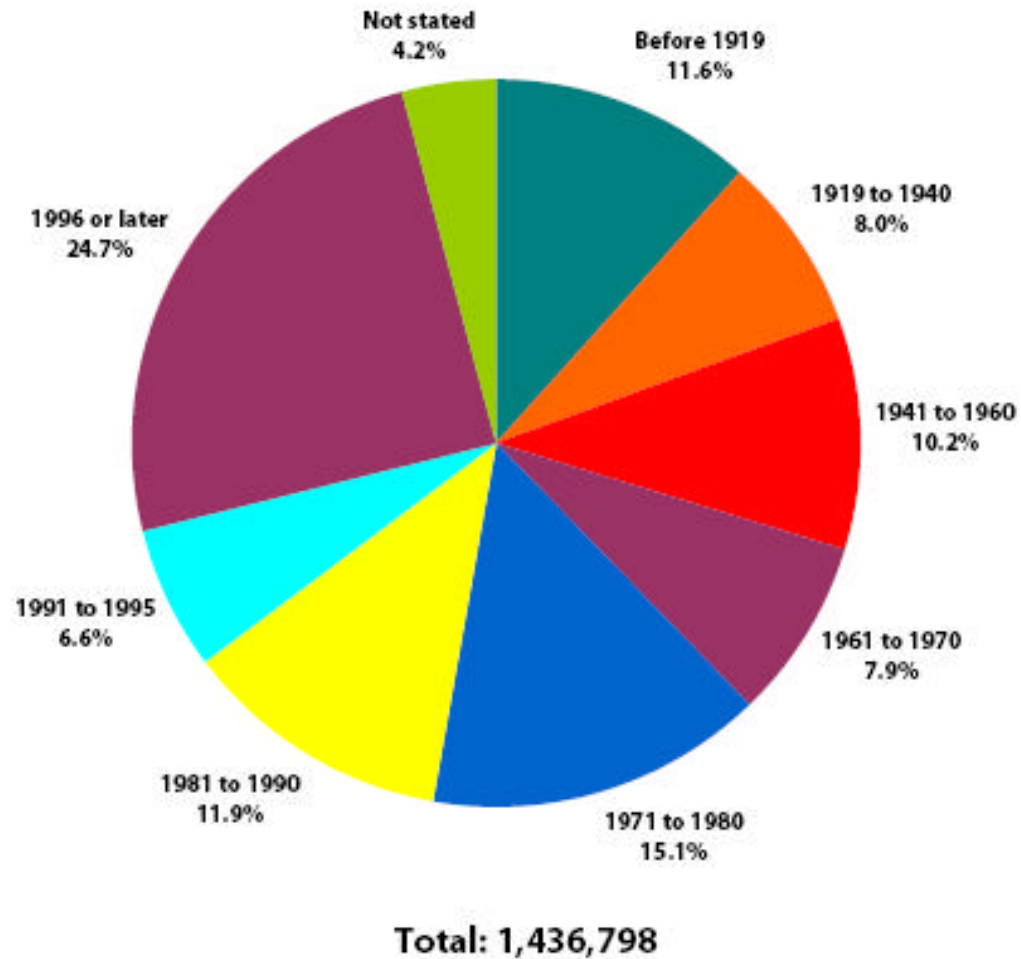


Source: SEI and CSO

Source: SEI, 2005



# Period of Construction



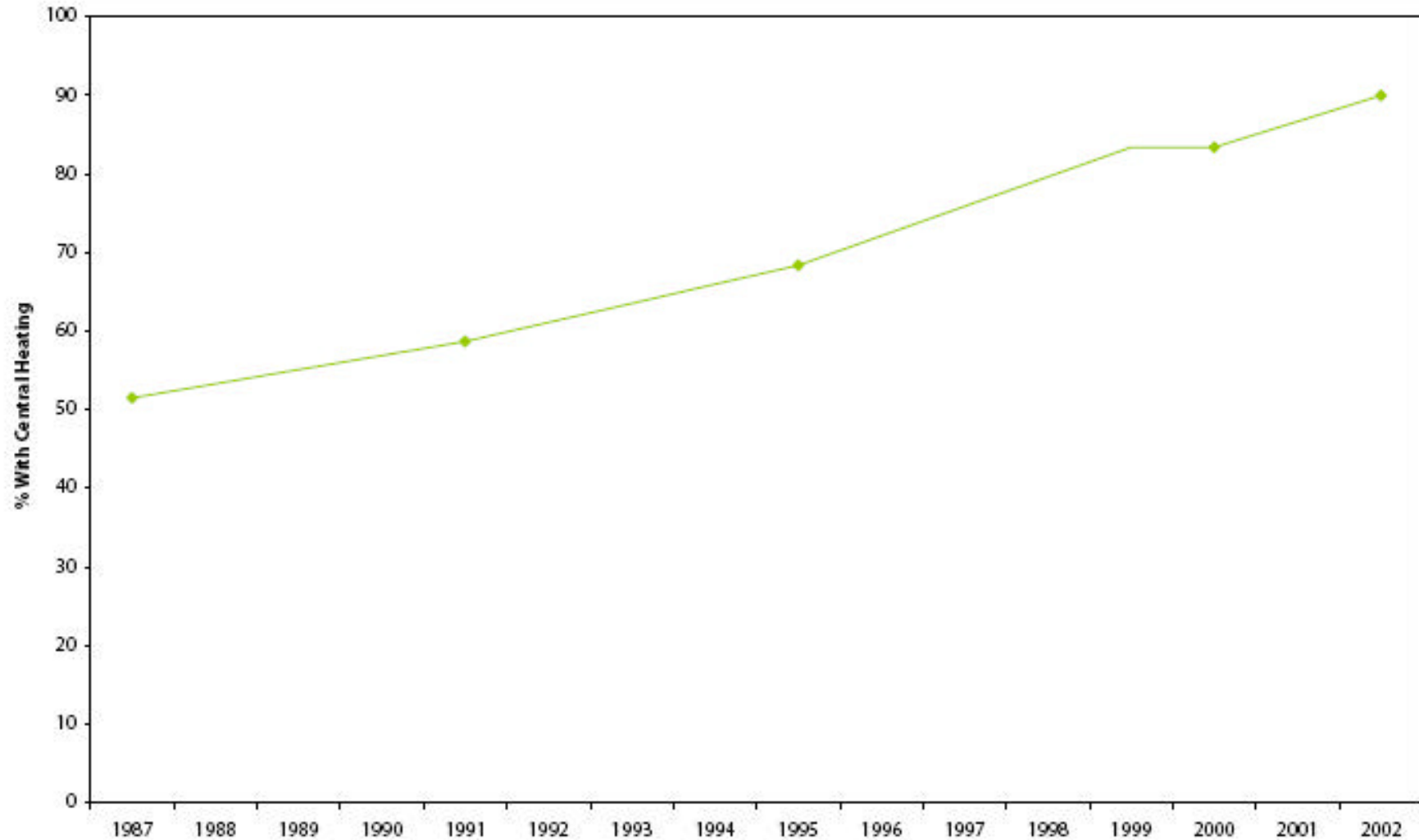
Source: CSO, ESRI and SEI

[www.aiea.ie](http://www.aiea.ie)

Source: SEI, 2005



# Central Heating

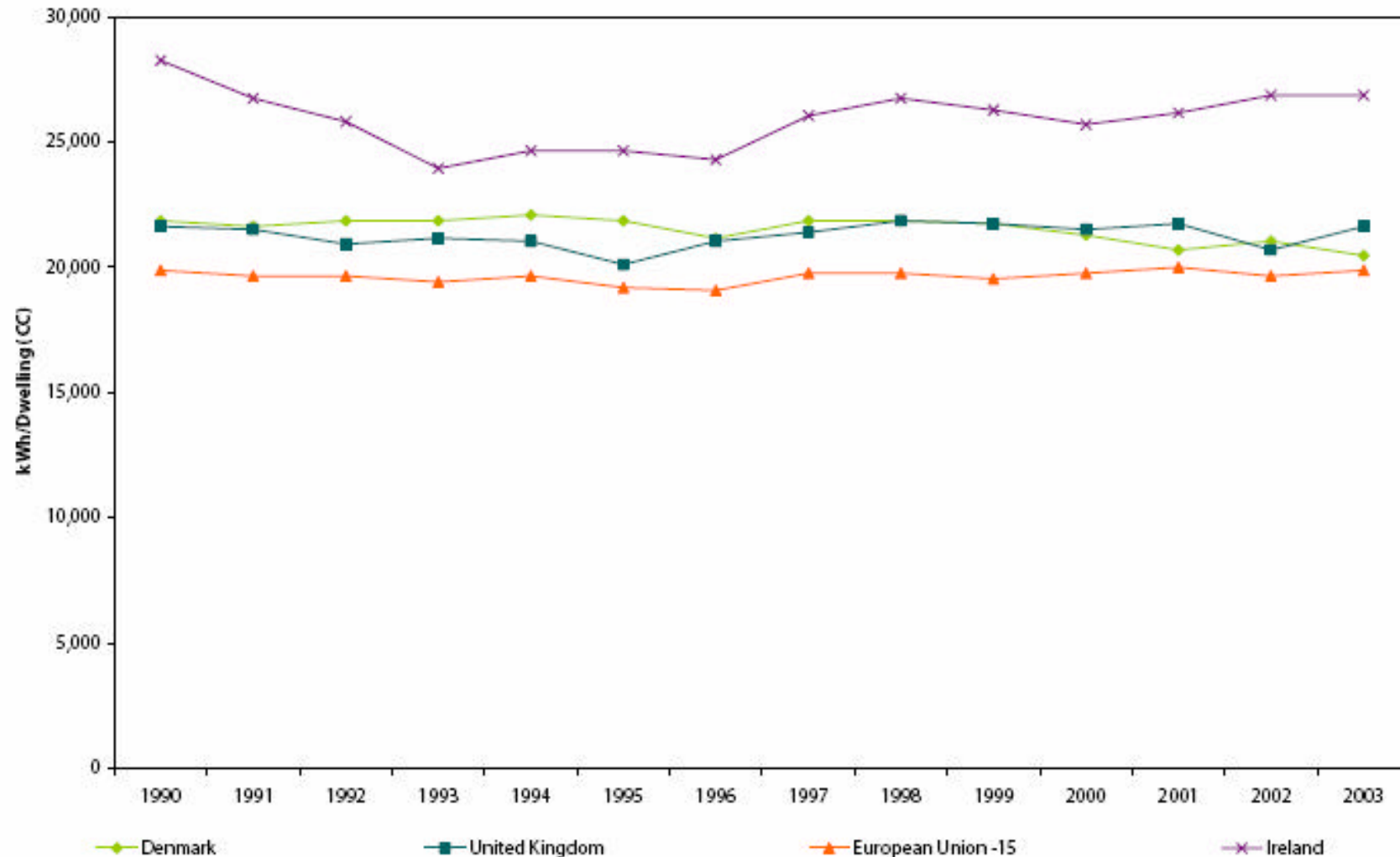


*Note that the trend is interpolated linearly for years where data are not available.*

*Source: CSO and ESRI*



# International Comparison – Energy Consumption

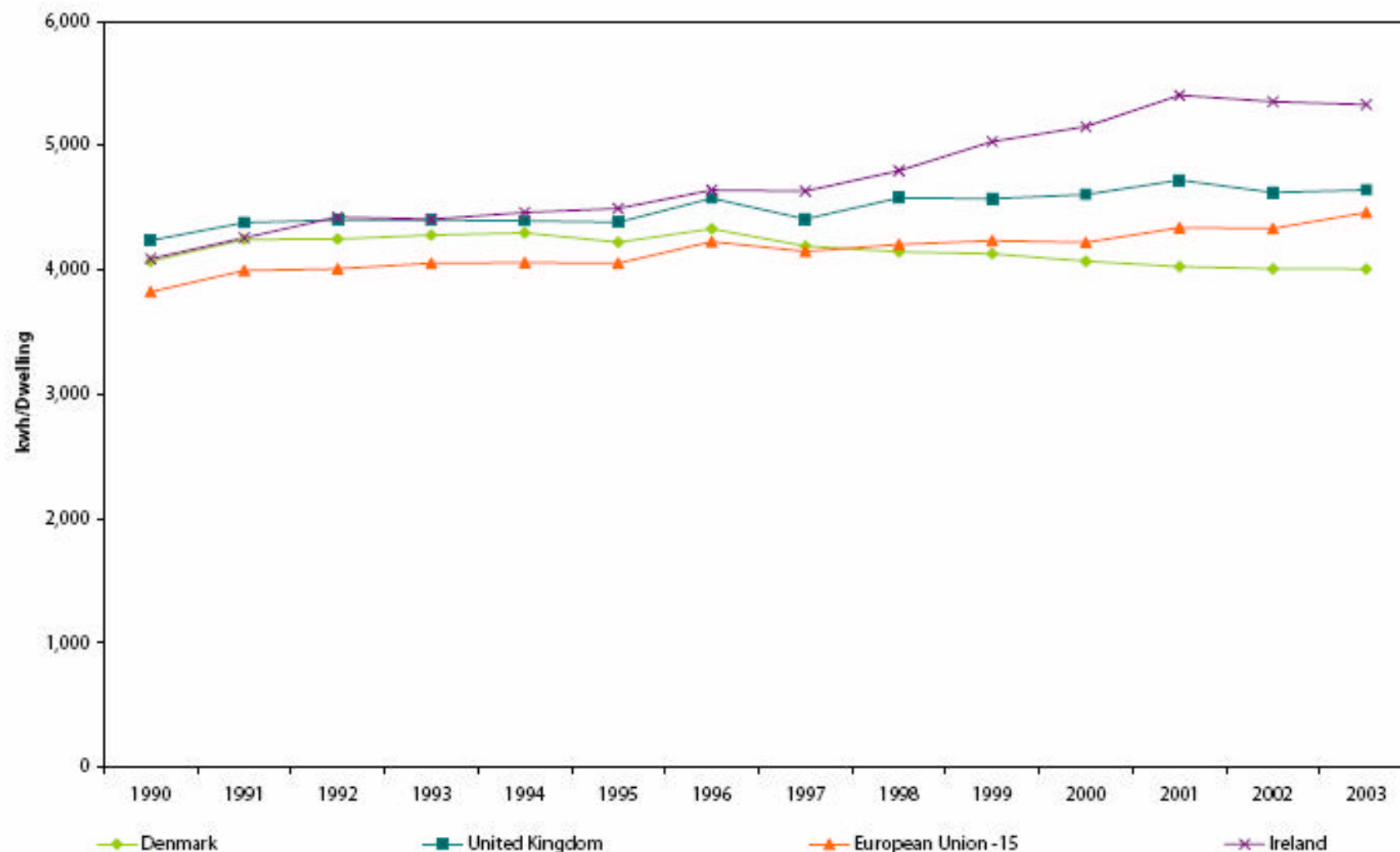


Source: Odyssee

Source: SEI, 2005



# International Comparison – Electricity Consumption

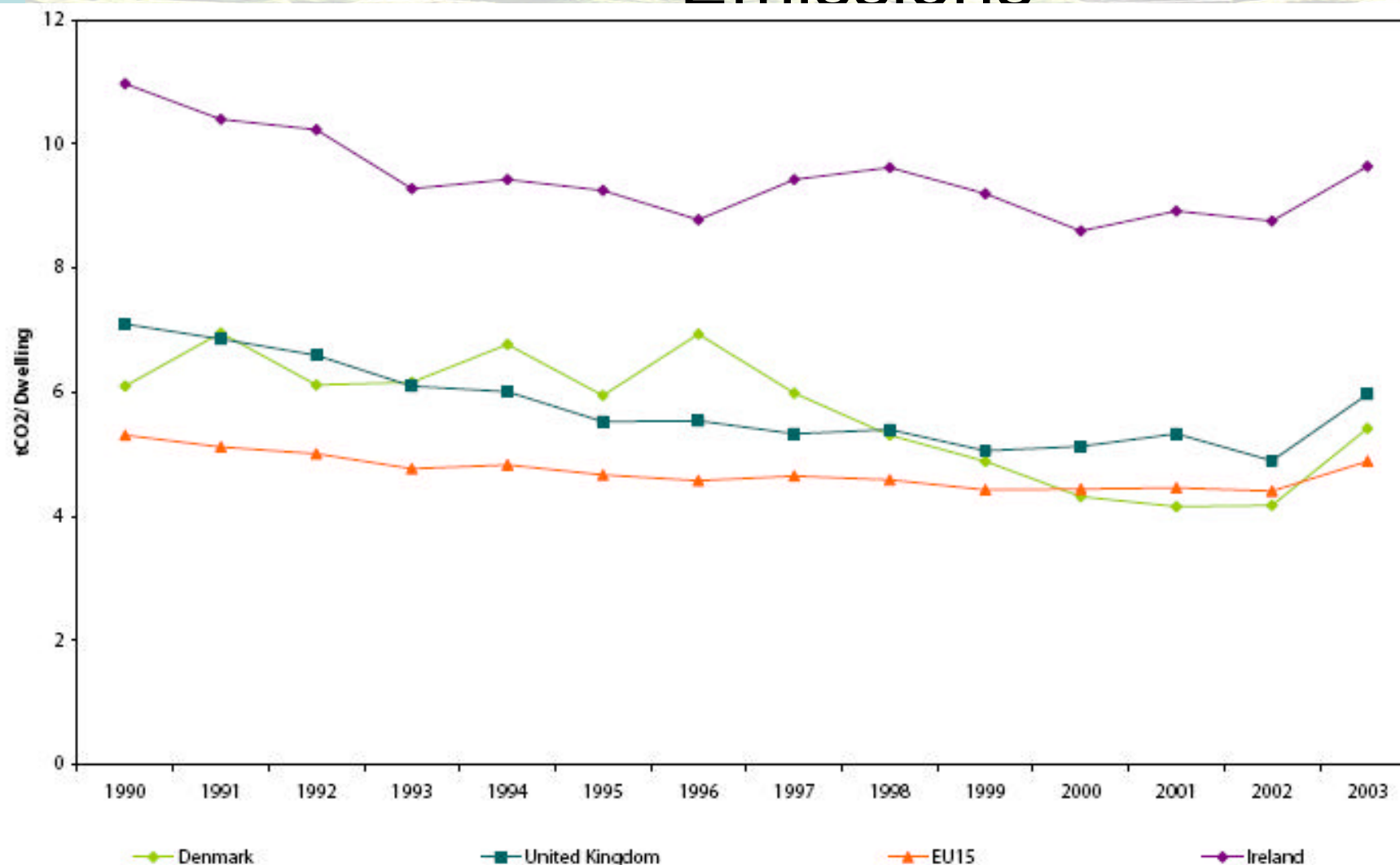


Source: Odyssee

Source: SEI, 2005



# International Comparison – Emissions



Source: Odyssee

Source: SEI, 2005





# Energy Performance Buildings Directive

EN

Official Journal of the European Communities

**DIRECTIVE 2002/91/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 16 December 2002  
on the energy performance of buildings**





# Energy Performance of Buildings Directive

- ***Directive 2002/91/EC*** on energy performance of buildings
- Adopted on 16/12/2002
- Transposed into Irish Law by 04/01/2006
- Integrated with Building Regulation Part L
- Tight timescale!
- Possible 3 year extension until 04/01/2009 for Articles 7, 8, 9 due to lack of accredited experts





# EPBD – Time table Ireland

## January 2007

- ✍ BER for new dwellings

## July 2008

- ✍ BER for new non-residential buildings
- ✍ BER for new public service buildings



## January 2009

- ✍ BER for existing dwellings
- ✍ BER for existing non-residential buildings
- ✍ BER for existing public service buildings





# EPBD – Requirements

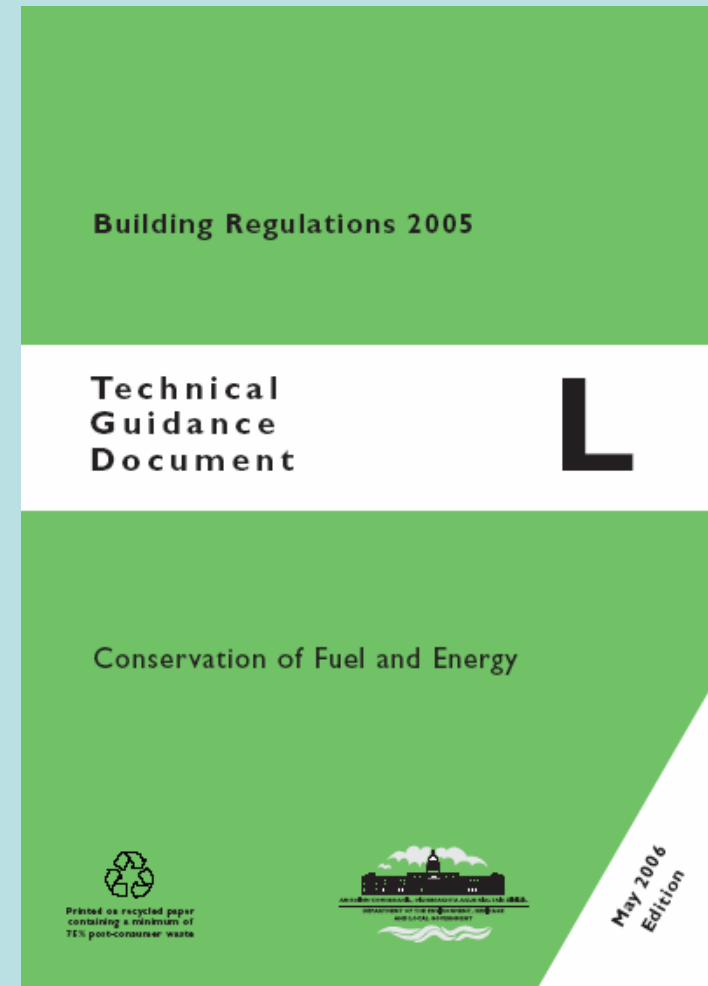
- ✍ Minimum energy performance requirements – new buildings & major renovations (“material alterations”)
- ✍ BER and Advisory Report - new & existing buildings when constructed, sold or rented
- ✍ BER Public Service Buildings (continuous requirement)
- ✍ Feasibility assessment of Alternative Energy Systems (AES) (new buildings >1,000m<sup>2</sup>)
- ✍ Energy efficiency of boilers and heating systems
- ✍ Inspection of air-conditioning systems (>12 kW)



# Building Regulation – TGD Part L 2005

0.1.1 The aim of Part L of the First Schedule (L1) to the Building Regulations is to limit the use ***of fossil fuel energy and related CO<sub>2</sub> emissions arising from the operation of buildings***, while ensuring that occupants can achieve adequate levels of lighting and thermal comfort.

Buildings should be designed and constructed to achieve this aim as far as is practicable.







# Building Regulation – TGD Part L 2005

- ***Conservation of Fuel & Power (L1)***
- ***Dwellings (L2) and Buildings (L3)***
- ***Issue 2005 (Effective since 1st July 2006)***
- ***Transitional Arrangements:***
  - *not applicable where works commenced on/before 30/06/06, or*
  - *planning applied for on/before 30/06/06 and substantial works commenced prior to 30/06/08*
- ***BER - New Dwellings Jan 2007***
  - *applicable only where planning applied for on/after 01/01/07 and substantial works commenced prior to 30/06/08*





# PART L Compliance

## 1. Carbon Dioxide Emission Rating (CDER)

*v's*

Maximum Permitted CDER

*together with*

2. Elemental Method, OR  
Overall Heat Loss Method

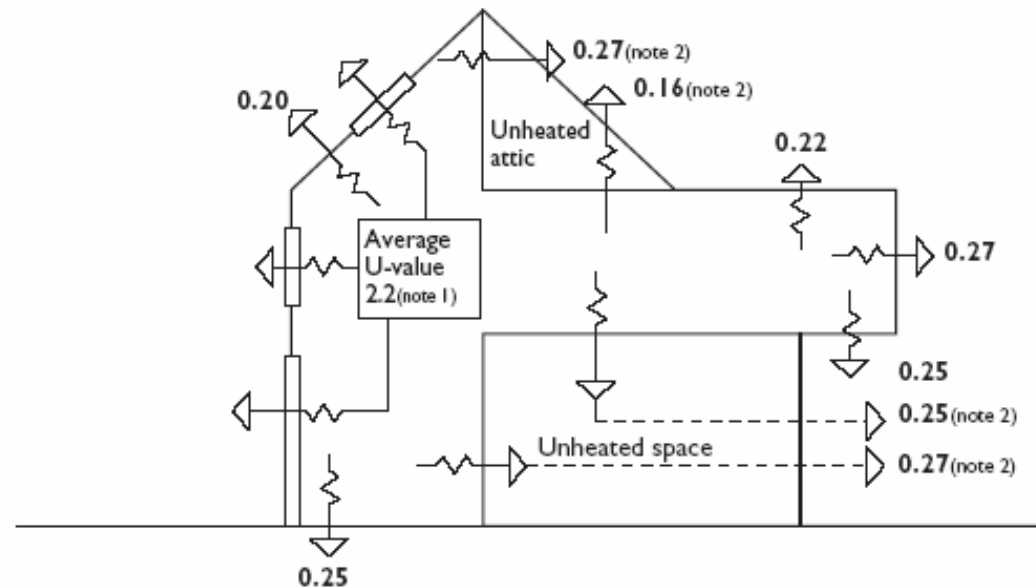


# Building Regulation – Part L 2006

Diagram 2

### Para 1.2.3.1

### Elemental Heat Loss Method Summary of average elemental U-values



## NOTES

1. Windows, doors and rooflights should have maximum U-value of  $2.2 \text{ W/m}^2\text{K}$  and maximum opening area as set out in Table 6. However areas and U-values may be varied provided the total heat loss through these elements is not increased.
2. The U-value includes the effect of unheated voids or other spaces.



# Elemental Method

Maximum Average U-Values (W/m<sup>2</sup>K)

<i>Element</i>	<i>2005 New Build</i>	<i>2005 Existing</i>
<i>Roof (Horizontal)</i>	<i>0.16</i>	<i>0.35</i>
<i>Roof (Sloping)</i>	<i>0.20</i>	<i>0.35</i>
<i>Roof (Flat)</i>	<i>0.22</i>	<i>0.35</i>
<i>Walls</i>	<i>0.27</i>	<i>0.60</i>
<i>Ground Floors</i>	<i>0.25</i>	<i>-</i>
<i>Other Floors</i>	<i>0.25</i>	<i>0.60</i>
<i>Windows/Doors</i>	<i>2.20</i>	<i>2.20</i>



# GLAZING

## Area v's U-Value

<i>Glazing Type</i>	<i>U-Value <math>U_{ope}</math> (W/m<sup>2</sup>K)</i>	<i>Glazing Area <math>A_{ope}</math> (% Floor Area)</i>
<i>TG Low-E Argon 12mm</i>	<i>1.40</i>	<i>42.7</i>
<i>DG Low-E Argon 20mm</i>	<i>1.80</i>	<i>31.5</i>
<i>DG Low-E 16mm</i>	<i>2.20</i>	<i>25.0</i>
<i>DG Low-E 10mm</i>	<i>2.60</i>	<i>20.7</i>
<i>DG 8mm</i>	<i>3.00</i>	<i>17.7</i>
<i>DG 5mm</i>	<i>3.30</i>	<i>15.9</i>





# Overall Heat Loss Method

Maximum Average U-Value ( $U_m$ )

<i>Area of <u>ALL</u> Exposed Elements/Volume (<math>A_t/V</math>)</i>	<i>Max Average U-Value <math>U_m</math> (<math>W/m^2 K</math>)</i>
<i>1.2</i>	<i>0.40</i>
<i>1.1</i>	<i>0.41</i>
<i>1.0</i>	<i>0.43</i>
<i>0.9</i>	<i>0.45</i>
<i>0.8</i>	<i>0.48</i>
<i>0.7</i>	<i>0.51</i>



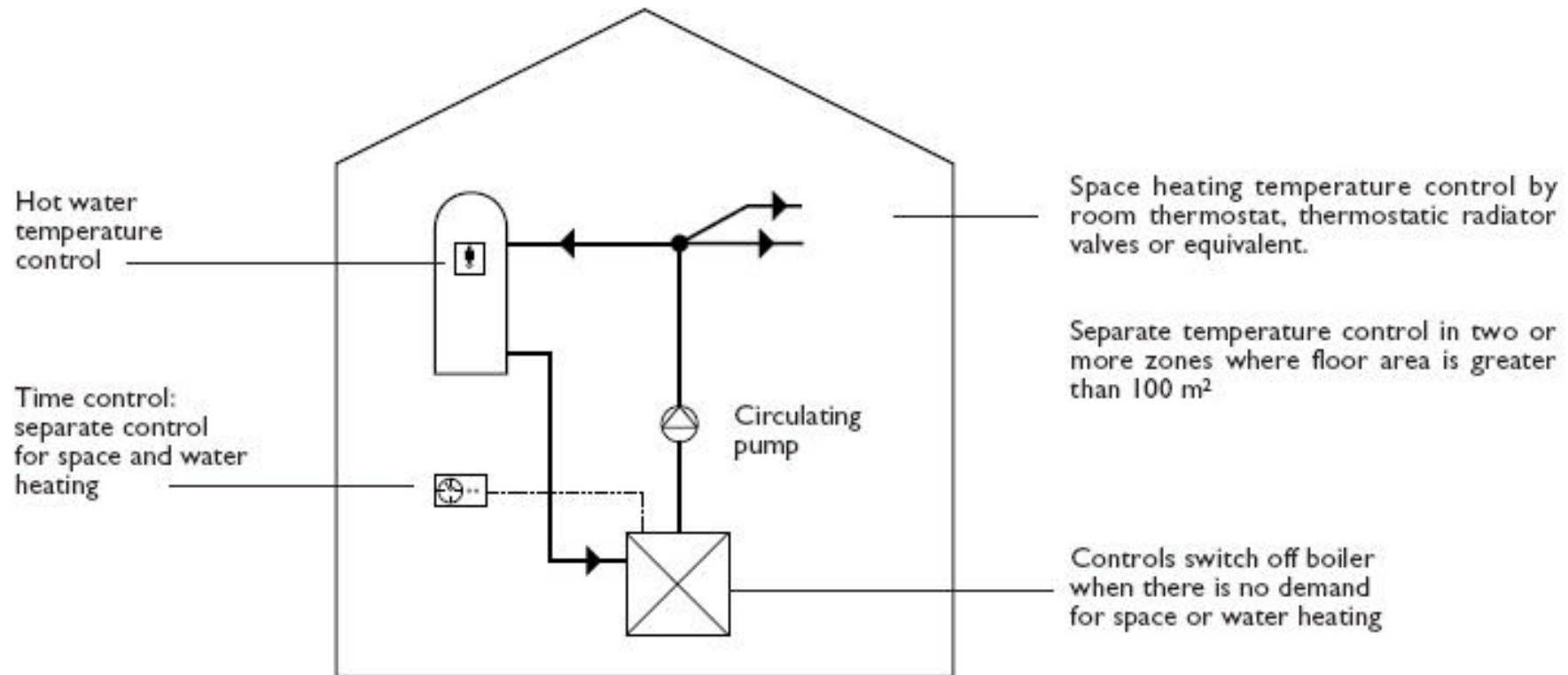
# Overall Heat Loss Method

*“In addition to meeting compliance with maximum average U-Value ( $U_m$ ), average elemental values should not exceed”*

<b>ROOFS</b>	<b><math>0.25 \text{ W/m}^2\text{K}</math></b>
<b>WALLS</b>	<b><math>0.37 \text{ W/m}^2\text{K}</math></b>
<b>GRD FLOORS</b>	<b><math>0.37 \text{ W/m}^2\text{K}</math></b>



# Section 1.3 Controls for Space and HWS Systems



## NOTES:

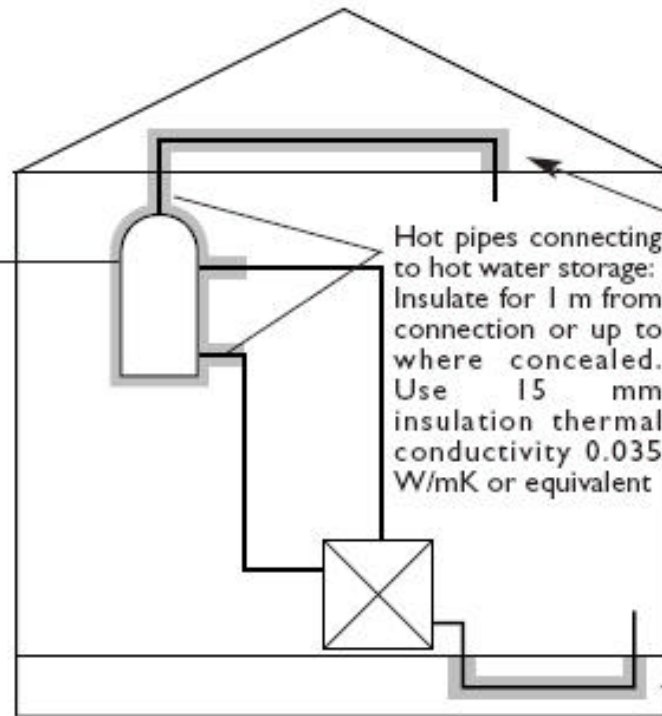
1. For dwellings heated other than by central heating boiler, a similar level of control should be achieved.
2. For solid fuel fired systems, sufficient permanent heat load to satisfy slumber conditions must be maintained.



# Insulation of Vessels/Pipework

Provide

- (a) factory applied insulation  
or
- (b) alternative meeting  
requirements  
specified in Para. 1.4.2



Heating and hot water pipes in unheated space:

Provide thermal insulation

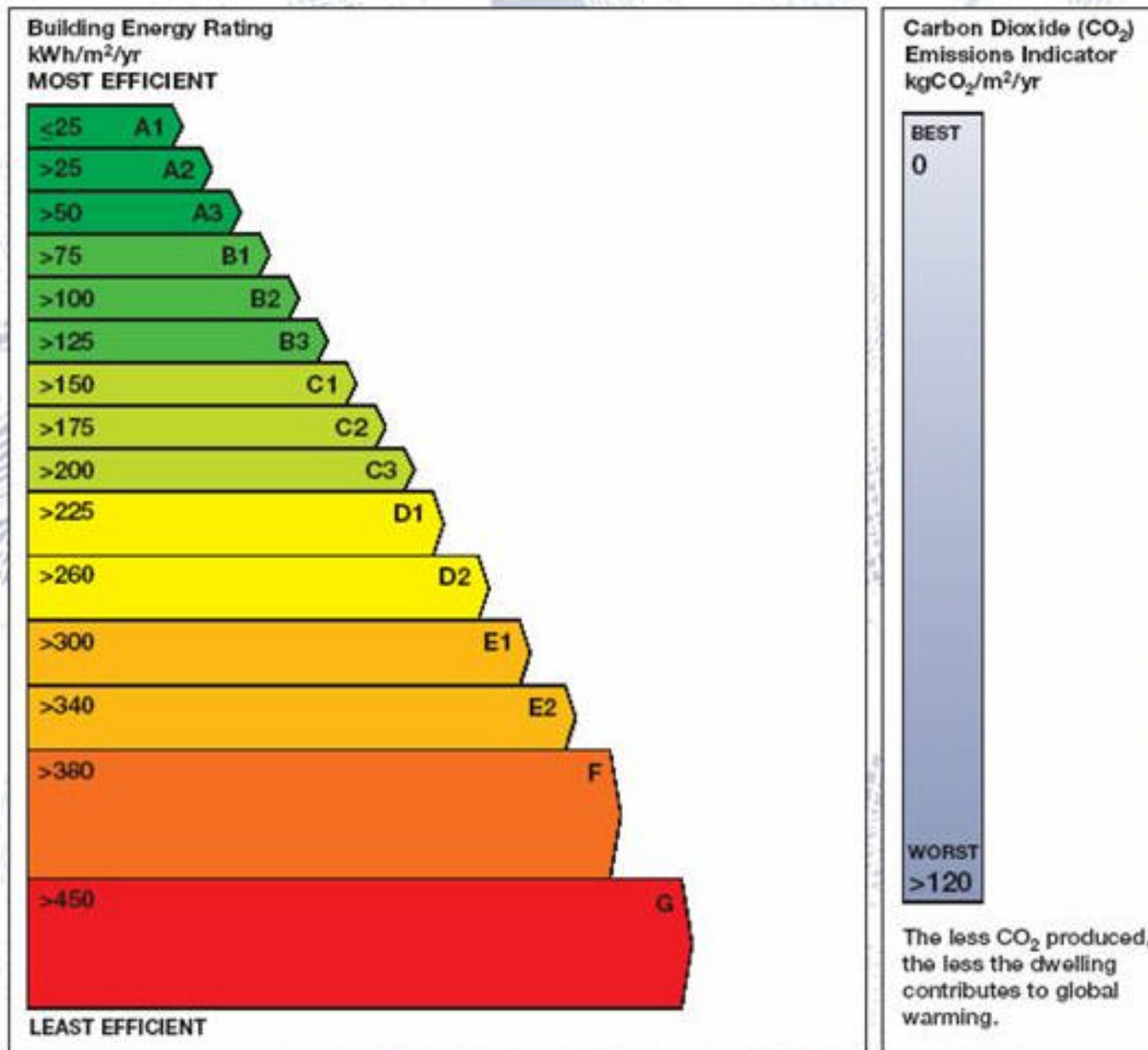
- (a) with thermal conductivity of not greater than 0.035 W/mK and minimum thickness of pipe outside diameter or 40 mm whichever is the lesser, or,
- (b) to BS 5422: 2001



# CDER

- Compliance to a Maximum Permitted CDER
- Calculated using Dwelling Energy Assessment Procedure (DEAP)
  - Space Heating fuel type (main and secondary)
  - HWS fuel type (main and supplementary) - Solar Thermal
  - Air Infiltration Testing/Ventilation Systems
  - Pumps, fans, (primary electricity consumption)
  - lighting (primary electricity consumption)
  - Renewable Energy Electricity Integration
  - Summertime Overheating/Structure Thermal Mass
  - Individual/Group Heating Systems (including CHP)
- Primary Energy Consumption (system efficiency)
- BER Label Data ( $kWh/m^2/year$ ,  $kgCO_2/m^2/year$ )  
www.aiea.ie





**IMPORTANT:** This BER is calculated on the basis of data provided to and by the BER Assessor, and using the version of the assessment software quoted above. A future BER assigned to this dwelling may be different, as a result of changes to the dwelling or to the assessment software.



# Building Energy Labels

## Building Energy Rating (BER)

BER version 3.1.2

BER for the building obtained below is:

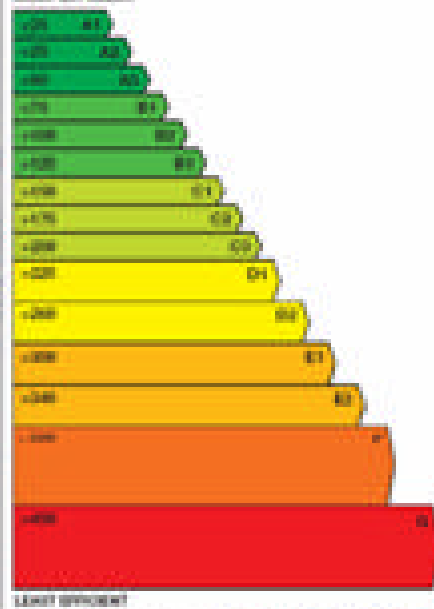
Name of House:  
Street Name One, Street Name Two,  
Street Name One, Street Name Two,  
County Name One, County Name Two

BER Number: XXXXXXXXXX  
Date of Issue: Day Month Year  
Valid Until: Day Month Year  
BER Assessor No.: XXXX  
Assessor Company No.: XXXX

The Building Energy Rating (BER) is an indication of the energy performance of the building. It covers energy use for space heating, water heating, ventilation and lighting, calculated on the basis of standard assumptions. It is expressed as primary energy use per unit floor area per year (kWh/m<sup>2</sup>/yr).

A rated property is the most energy efficient and will tend to have the lowest energy bills.

Building Energy Rating  
kWh/m<sup>2</sup>/yr  
current assessment



Carbon Dioxide (CO<sub>2</sub>)  
Emissions Indicator  
kg/m<sup>2</sup>/yr



The low CO<sub>2</sub> provides the best the building contributes to global warming.

**IMPORTANT:** The BER is calculated on the basis of data provided to and by the BER assessor and using the version of the assessment software (dated 2006). A future BER is subject to the rating may be affected, as a result of changes to the building or to the assessment software.

- 1997 Building Regulations equated to a Maximum Permitted Heat Energy Rating of 160 – 190 kWh/m<sup>2</sup>/year

{BER 225 - 255 kWh/m<sup>2</sup>/year D1/D2}

- 2002 Building Regulations equated to a Maximum Permitted Heat Energy Rating of 100 – 130 kWh/m<sup>2</sup>/year
- {BER 125 - 155 kWh/m<sup>2</sup>/year B3/C1}

- BER “A” rated buildings will need to consume less than 75 kWh/m<sup>2</sup>/year (primary energy)

- “Passive” buildings have a rating of <15 kWh/m<sup>2</sup>/year (heating),  
<42 kWh/m<sup>2</sup>/year (Heating & HWS)





# EPBD – Other Components

-  **Regular review of Building Regulations (5 years)**
-  **DEAP Demonstrating compliance with Part L**
-  **DEAP Producing BER**
-  **AES feasibility assessment for large new buildings**
-  **Increased potential exposure & liability for non-compliance with Part L**





# B.E.R.- Market Impact

- ✍ **Energy rating as marketing tool: market edge**
- ✍ **Impact building design**
- ✍ **Demand for higher spec buildings**
- ✍ **Potential impact on property values?**
- ✍ **New market for energy efficient services and products**
- ✍ **Cost of energy ratings**
- ✍ **Potential impact on property transaction times**



# Dwelling Energy Assessment Procedure

= kWh/m<sup>2</sup>/year

## Dwelling dimensions



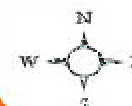
## Fabric Heat Losses



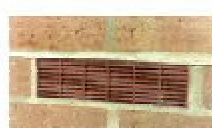
## Hot Water System



## Heat Gains



## Ventilation Rates



## Boiler Efficiency Database







# B.E.R. & EPBD – Further Information

[www.epbd.ie](http://www.epbd.ie)

[www.kyotobuildings.net](http://www.kyotobuildings.net)

[www.diag.co.uk](http://www.diag.co.uk)

[www.enper.org](http://www.enper.org)

[www.bre.co.uk](http://www.bre.co.uk)

[www.aiea.ie](http://www.aiea.ie)





# **Cert in Building Energy Rating**

**Tipperary Institute, in conjunction with AIEA,  
running a Certificate in Building Energy Rating**

## **Contact Details**

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**Web: [www.tippinst.ie](http://www.tippinst.ie)**







**Thank you for your time**

For more information on the AIEA or your local energy agency  
Log on

[www.aiea.ie](http://www.aiea.ie)

[www.aiea.ie](http://www.aiea.ie)

