# Module 1

# Energy Statistics and Legislation

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## Statistics

- 1.1.1Statistics for Residential Energy Use
- 1.1.2 Potential for Energy Savings

## Legislation

- 1.2.1 EPBD2002/91/EC
- 1.2.2 Directive 2006/32/EC

# Module 1.1

# Energy Statistics

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This module is sub-divided into two sections

- 1.1.1 Statistics for Residential Energy Use
- 1.1.2 Potential for Energy Savings

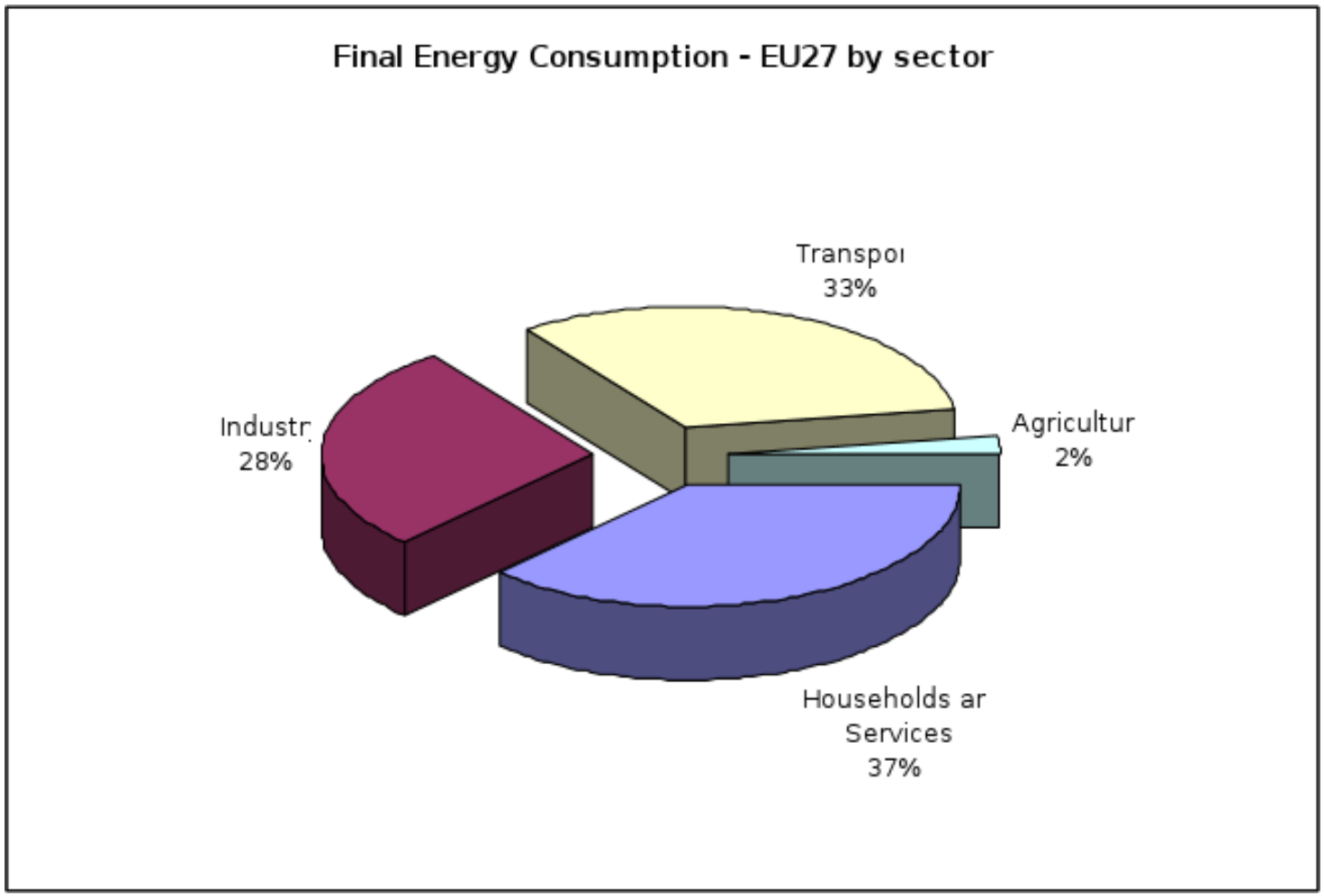
# Module 1.1.1
# Statistics for Residential Energy Use

On completion of this module learners will be able to:

- Quantify residential primary energy use as a percentage of a country's total primary energy use
- Quantify the breakdown of domestic primary energy use into its constituent parts

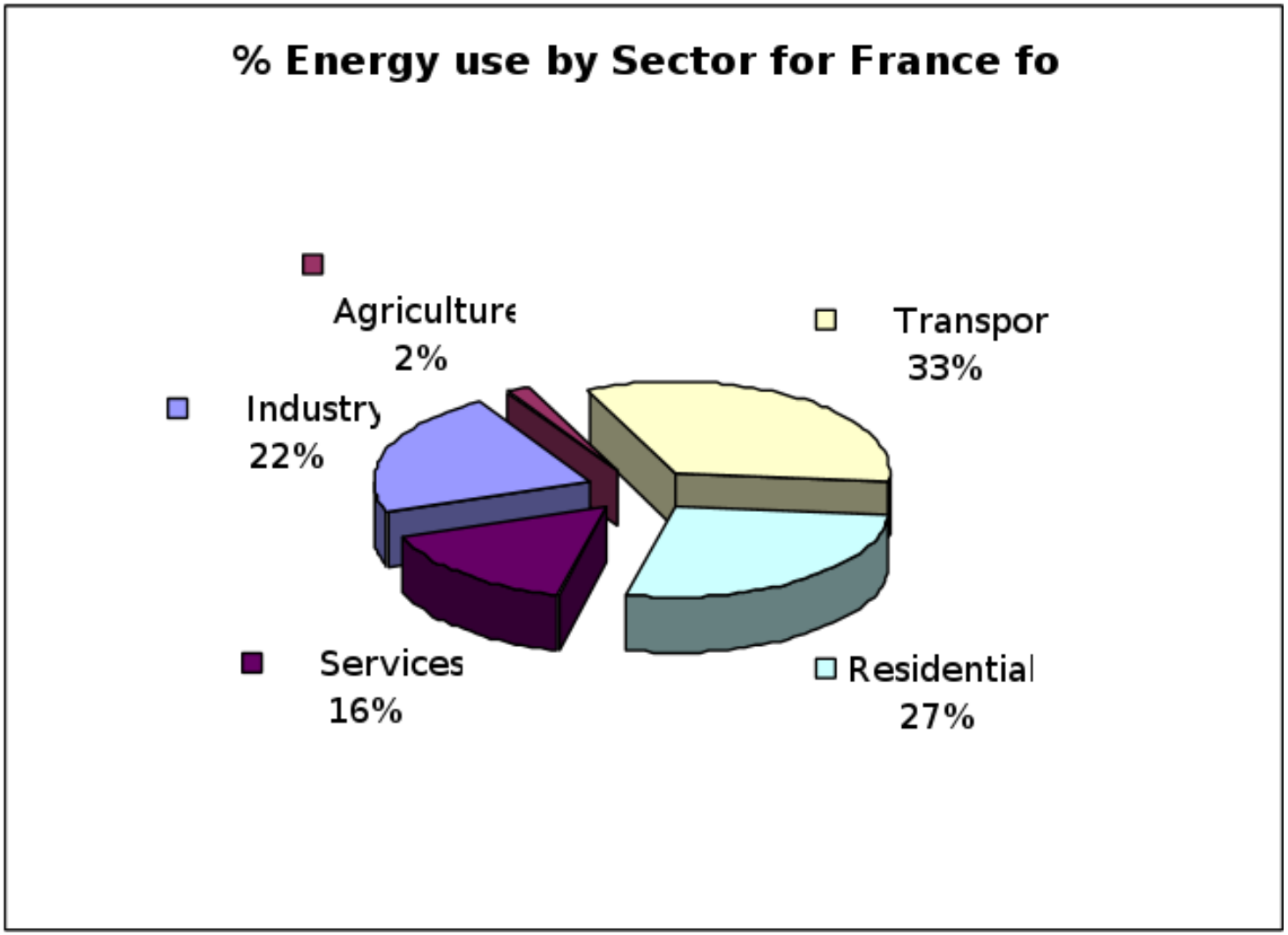
# Breakdown of Primary Energy Use

- Up to 40% of primary energy use within the EU occurs in buildings.
- Energy efficiency programmes therefore need to target this area.
- The following charts illustrate primary residential energy use as a percentage of total primary energy use for various countries.




Information sourced from the Statistical Pocketbook 2010 Excel workbook Part 2 Energy from the European Commission's Energy web site :

http://ec.europa.eu/energy/publications/statistics/statistics_en.htm

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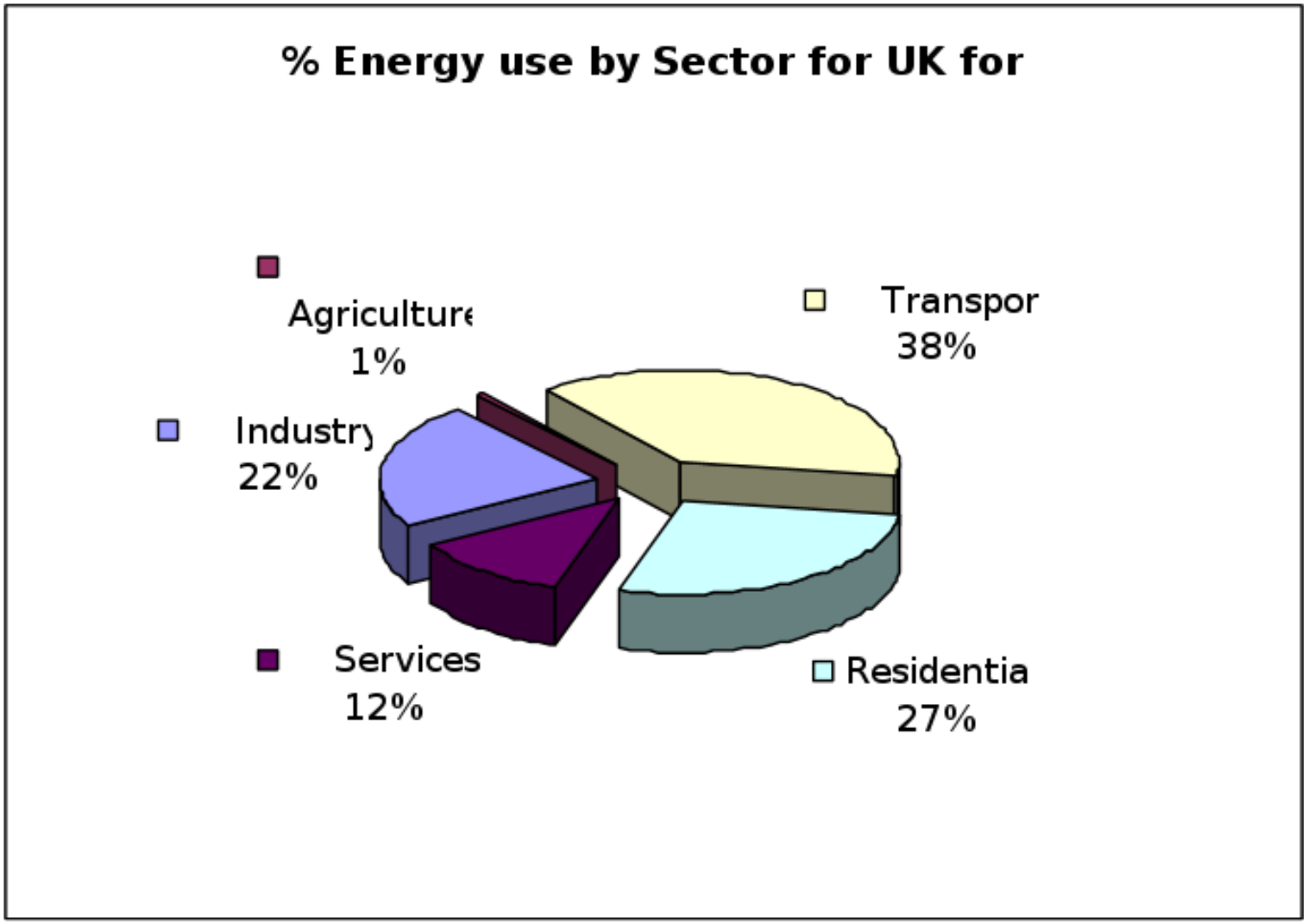


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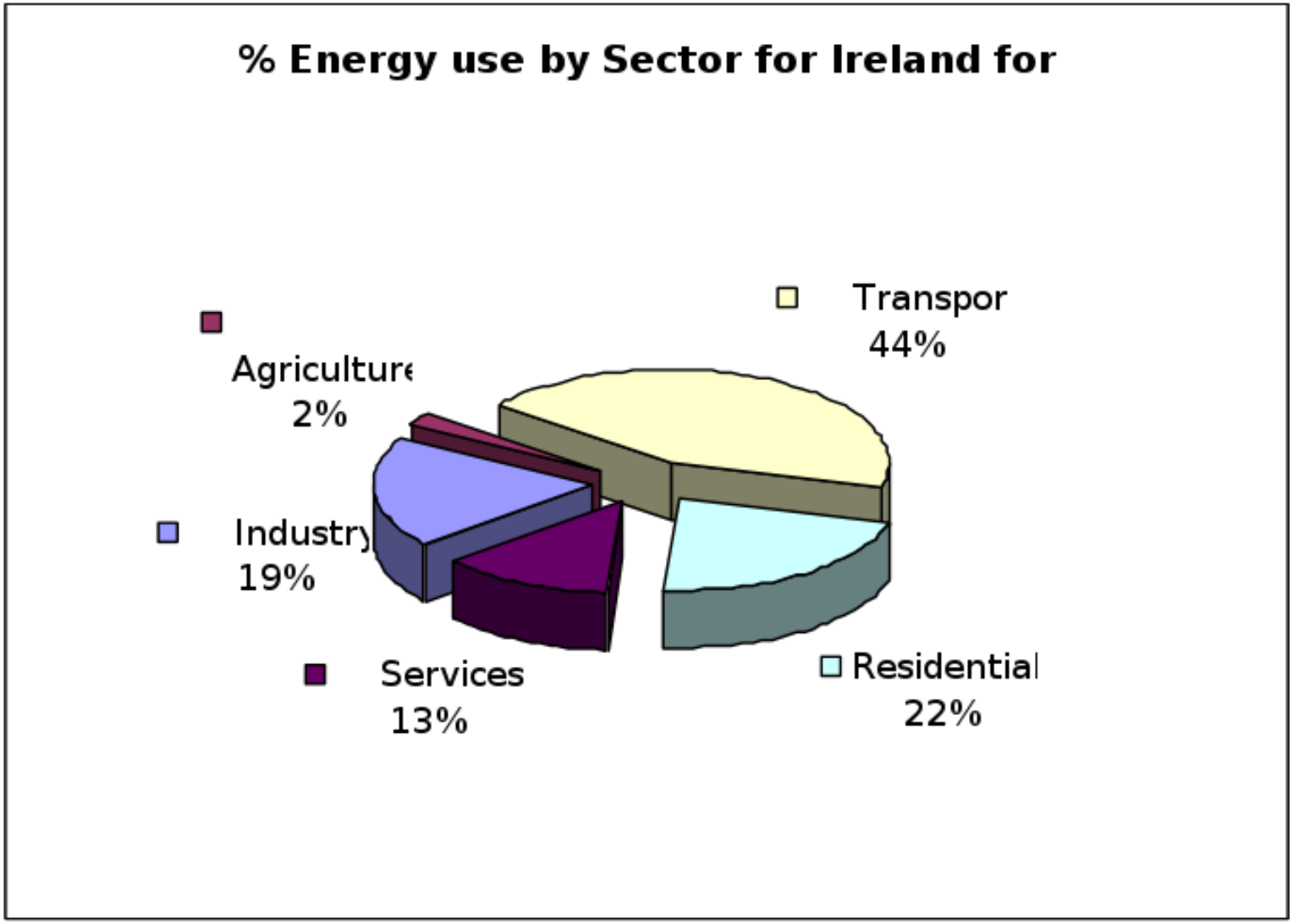


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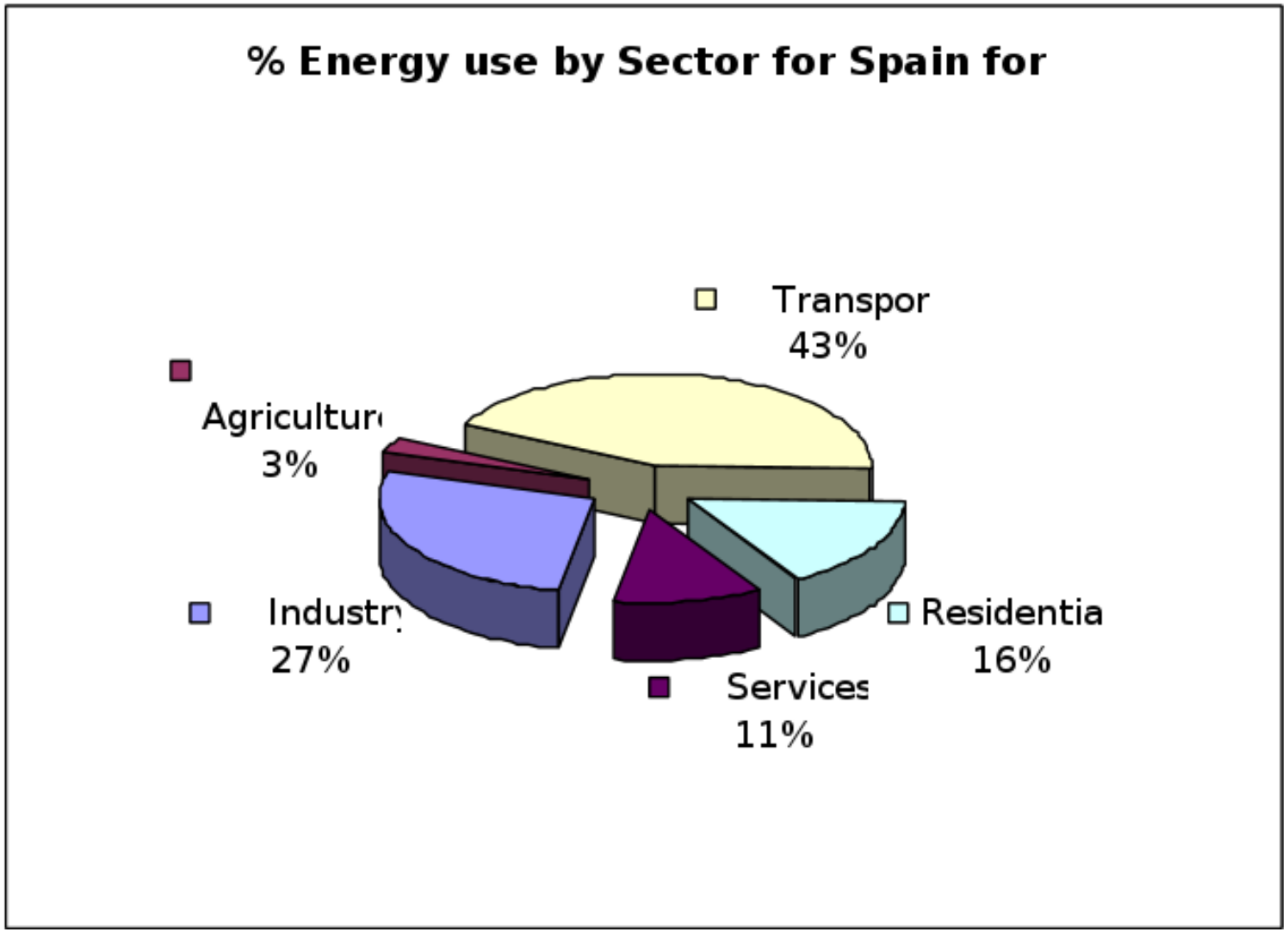


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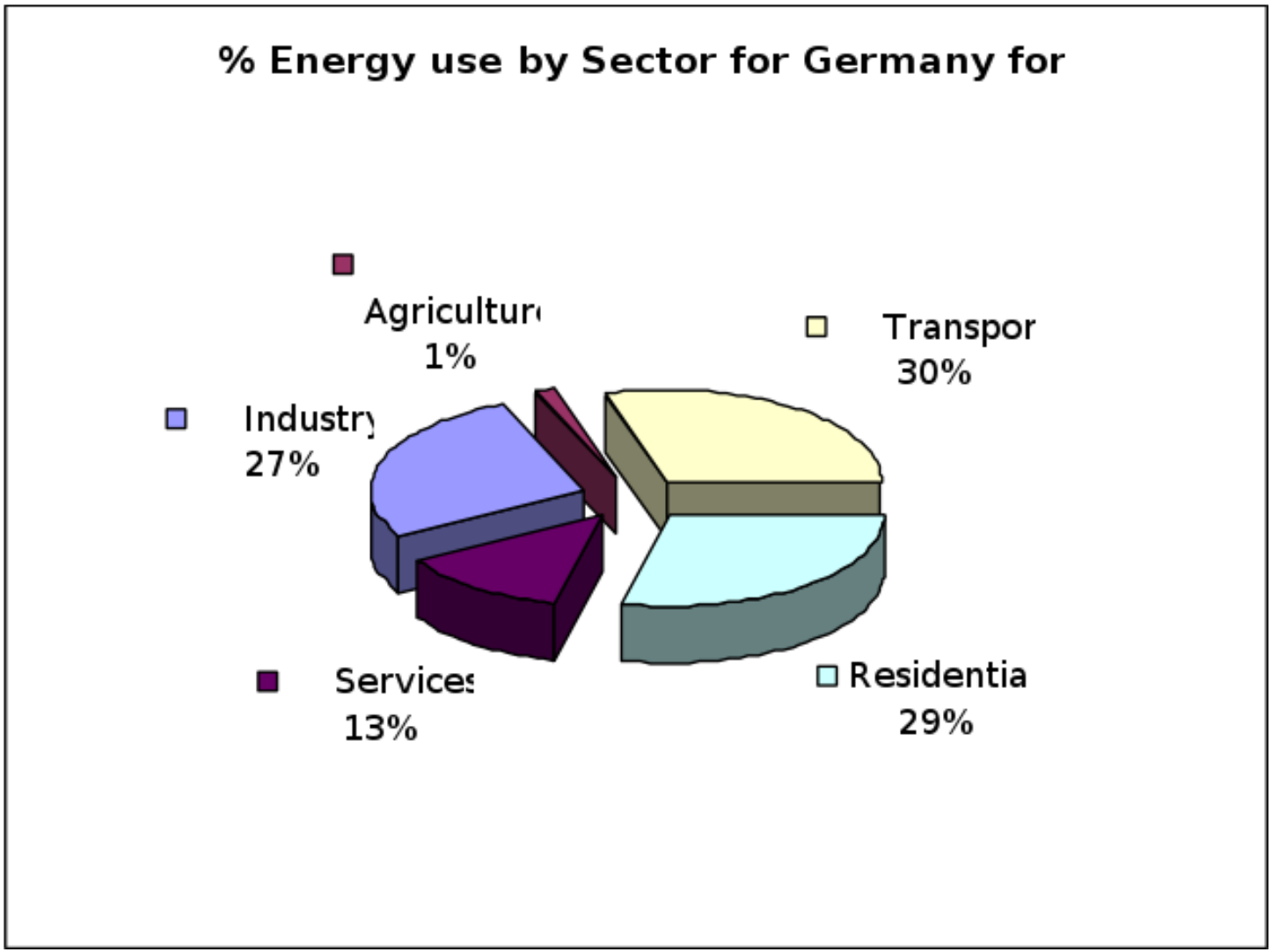


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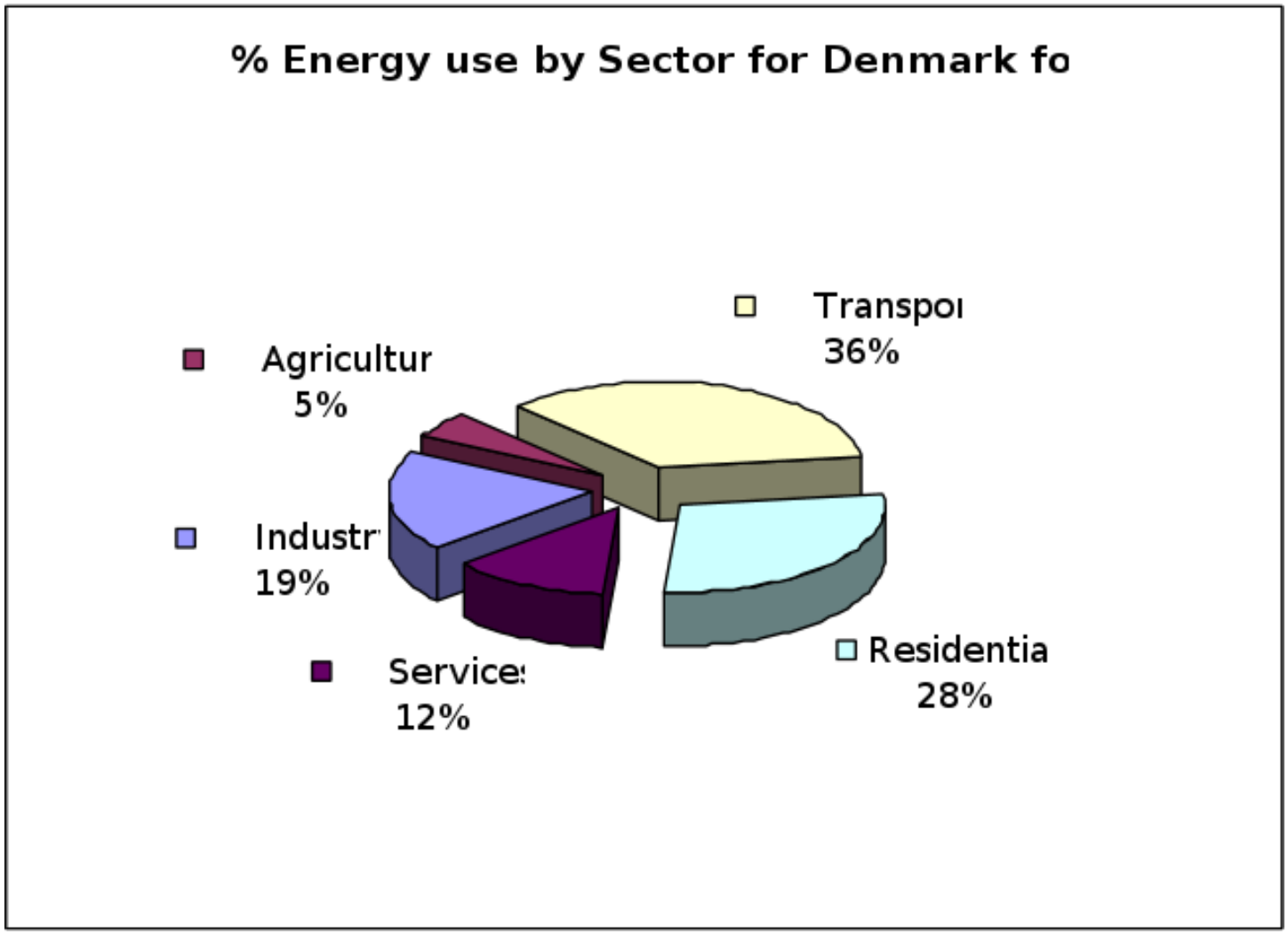


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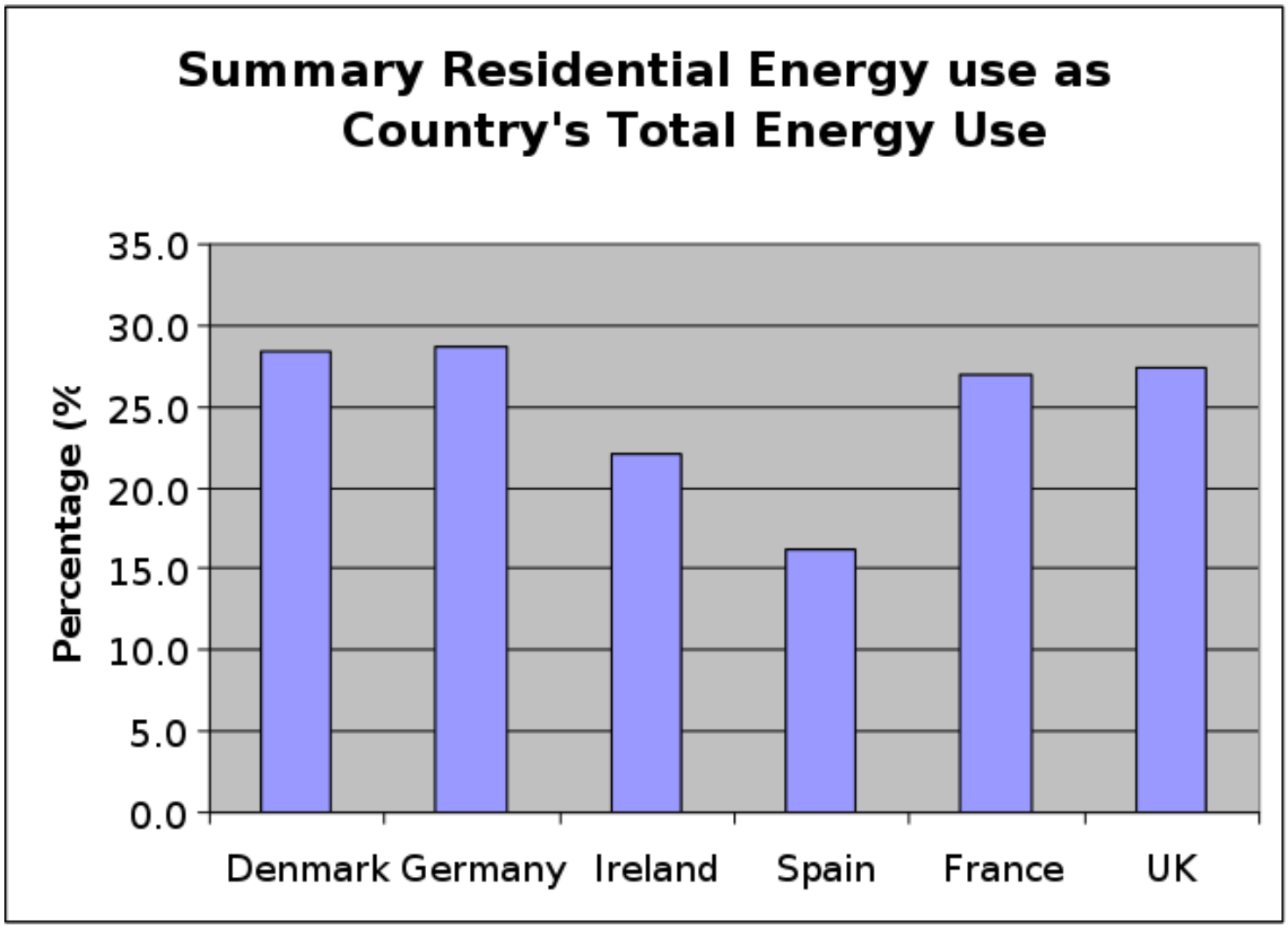


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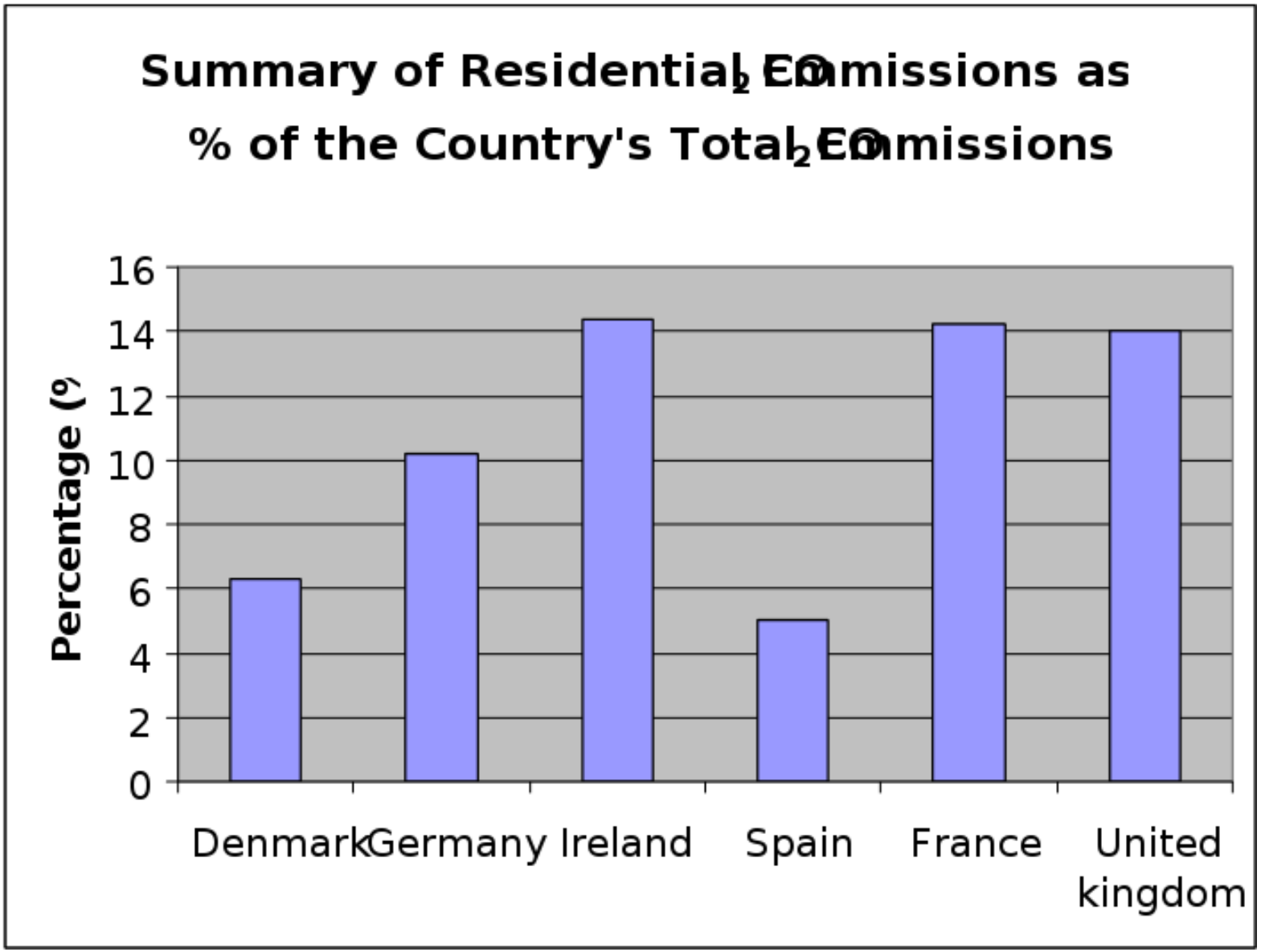


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# Summary

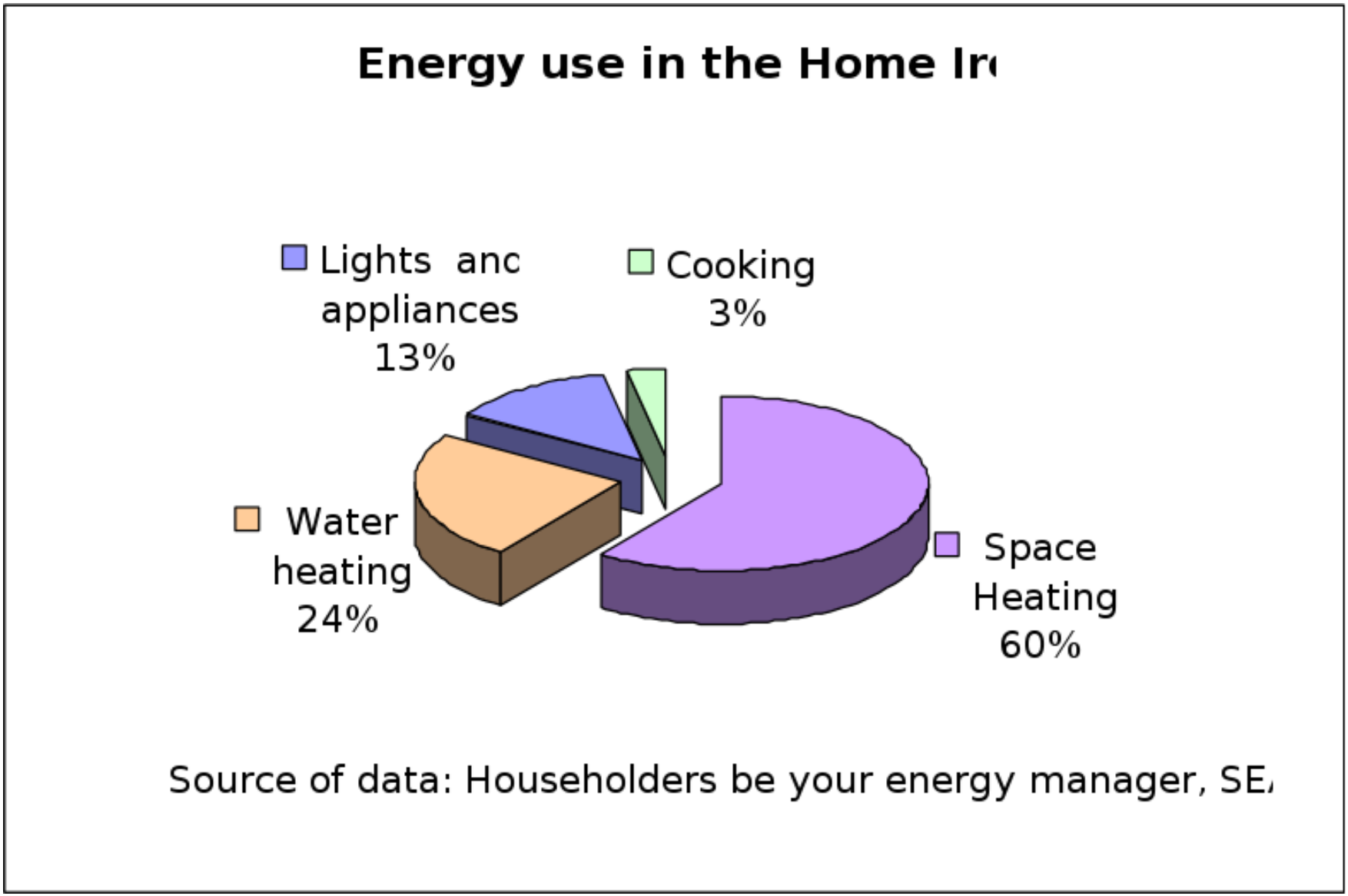
Residential primary energy use lies in the range 20% to 30% of a country's total primary energy use (notable exception is Spain)

Associated $CO_2$ emissions show a wide variation between countries due the variation in fuel mix used (Denmark has a high penetration of efficient district heating)

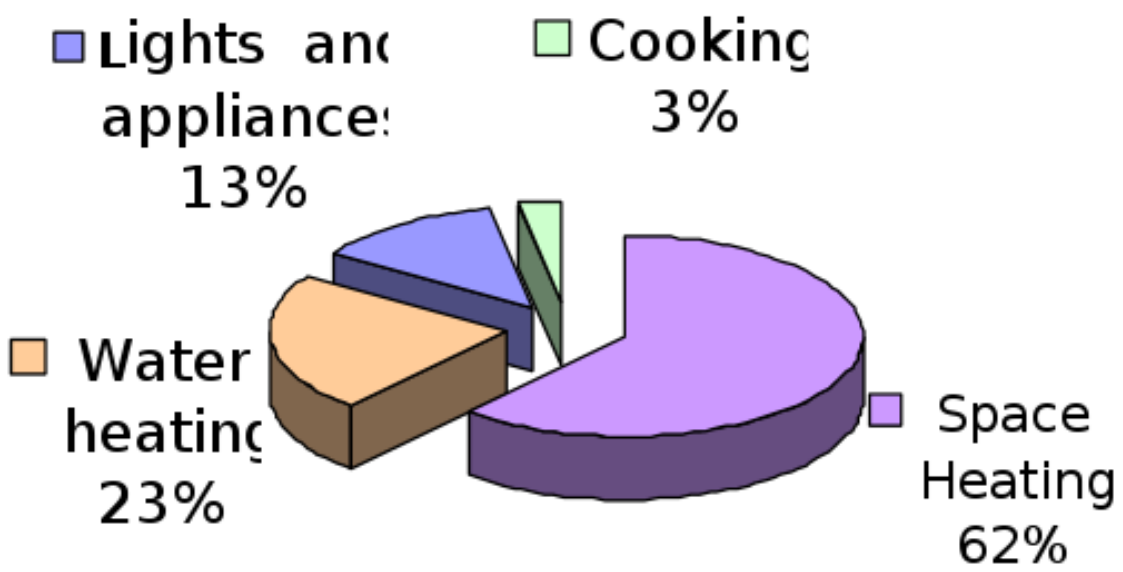
# Breakdown of Domestic Energy Use

- Statistical data exists for analysing domestic energy use under the following headings:
  - Space heating
  - Water heating
  - Lights and appliances
  - Cooking

    (not easily accessible for all countries)

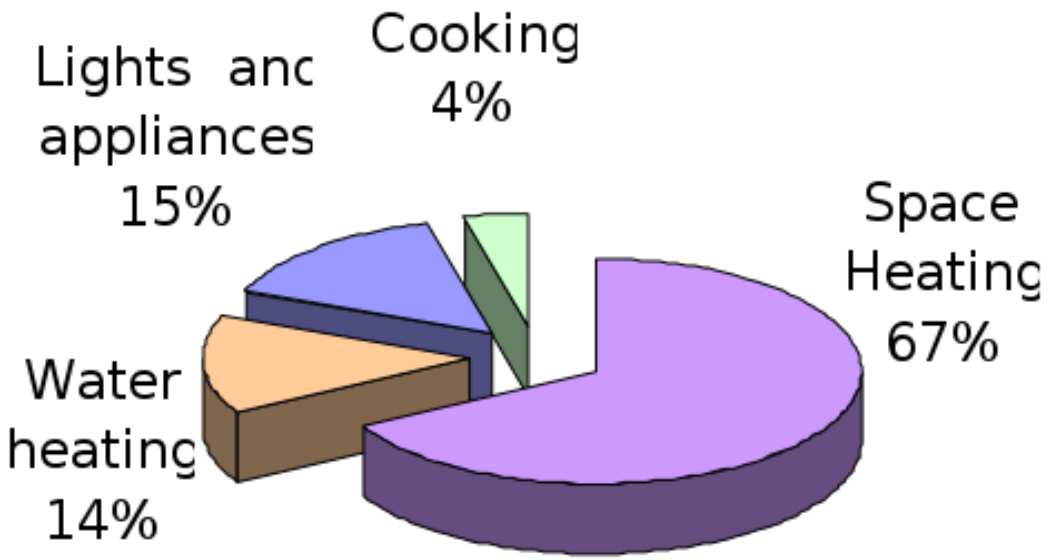

Energy use in the Home Ir
Lights anc appliances 13%
Cooking 3%
Water heating 24%
Space Heating 60%
Source of data: Householders be your energy manager, SE

# Energy Use in the Home UK




Source of data: www.statistics.gov.uk/Statbase

# Household Energy Use in the EU-27




Source of data: http://www.odyssee-indicators.org

# Summary

Residential primary energy use is dominated by space heating, followed by water heating, lights and appliances and finally cooking.

# Sources of information on statistics

- European Commissions website on Energy
  http://ec.europa.eu/energy/publications

- UK Office for National Statistics
  http://www.statistics.gov.uk

- Odyssee Energy Efficiency Indicators in Europe
  http://www.odyssee-indicators.org

# Energy Saving Potential

# Module 1.1.2

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# Module 1.1.2
# Energy Saving Potential

On completion of this module learners will be able to:

- Quantify the energy saving potential within the EU
- Identify actions undertaken to realise these savings

# Energy Saving Potential within the EU

There is a potential to save 20% of the energy used in the EU


***Saving 20% by 2020 Action Plan for Energy Efficiency*** published by the European Commission can be accessed at: http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/387

# Main findings of Action Plan for Energy Efficiency

- Europe continues to waste up 20% of its energy
- Increasing our energy bills raises our cost of living.
- A reduction of our energy consumption by 20% by 2020 is wholly achievable
- This could save us €100 billion a year
- If nothing is done energy consumption could still increase by almost 10% over the next 15 years

- Are buildings worth targeting for energy reduction strategies?

Yes : buildings alone use 40% of the energy consumed in the European Union

- Within the building sector are residential buildings worth targeting for energy reduction strategies?

Yes : there is a potential to save 27% of the energy consumed in the residential sector

# How much savings can be made? EU Energy Savings Potential

| Sector | Energy consumption (Mtoe) 2005 | Energy Consumption (Mtoe) 2020 (Business as usual) | Energy Saving Potential 2020 (Mtoe) | Full Energy Saving Potential 2020 (%) |
|---|---|---|---|---|
| Households (residential) | 280 | 338 | 91 | 27% |
| Commercial buildings (Tertiary) | 157 | 211 | 63 | 30% |
| Transport | 332 | 405 | 105 | 26% |
| Manufacturing Industry | 297 | 382 | 95 | 25% |

European Commission
Directorate-General for Energy and Transport

MEMO

October 2006

SAVING 20% BY 2020

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CIT Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

The potential to reduce residential energy use by 27% will vary from country to country and is highly dependant on factors such as:

- Construction standards
- Services installation (heating, cooling, hot water etc.)
- Mix of primary fuel
- Occupancy patterns
- User control/behaviour

# How do we realise these energy saving potentials?

The memo 06/387 “Saving 20% by 2020” lists 10 priority actions. Those applicable to the residential sector are:

- Appliance and equipment labelling and minimum performance requirements
- Building performance requirements and “passive houses”
- Spurring energy efficiency in the new Member States
- Raising energy efficiency awareness
- Energy efficiency in built-up areas

# Some of the actions taken to date:

- Directive on energy performance of buildings
- Directive on energy efficiency requirements for boilers, refrigerators and ballasts for fluorescent lighting
- Directives for labelling of electric ovens, air-conditioners and refrigerators and other appliances
- Directive on Eco-design requirements for energy using products
- Directive on energy end-use efficiency and energy services

# Country Specific Savings Ireland

Ireland's Energy Efficiency Action Plan quantifies potential savings that could be achieved in the residential, commercial and industrial sectors by 2020.

- The greatest potential exists in the residential sector
- In the residential sector significant savings can be made in the following areas in order of impact:

Space heating

Cooking/appliances

Lighting

Water heating

# How much savings can be made? Ireland's Energy Savings Potential

Potential to save 30% of the total domestic primary energy use in 2007 by 2020

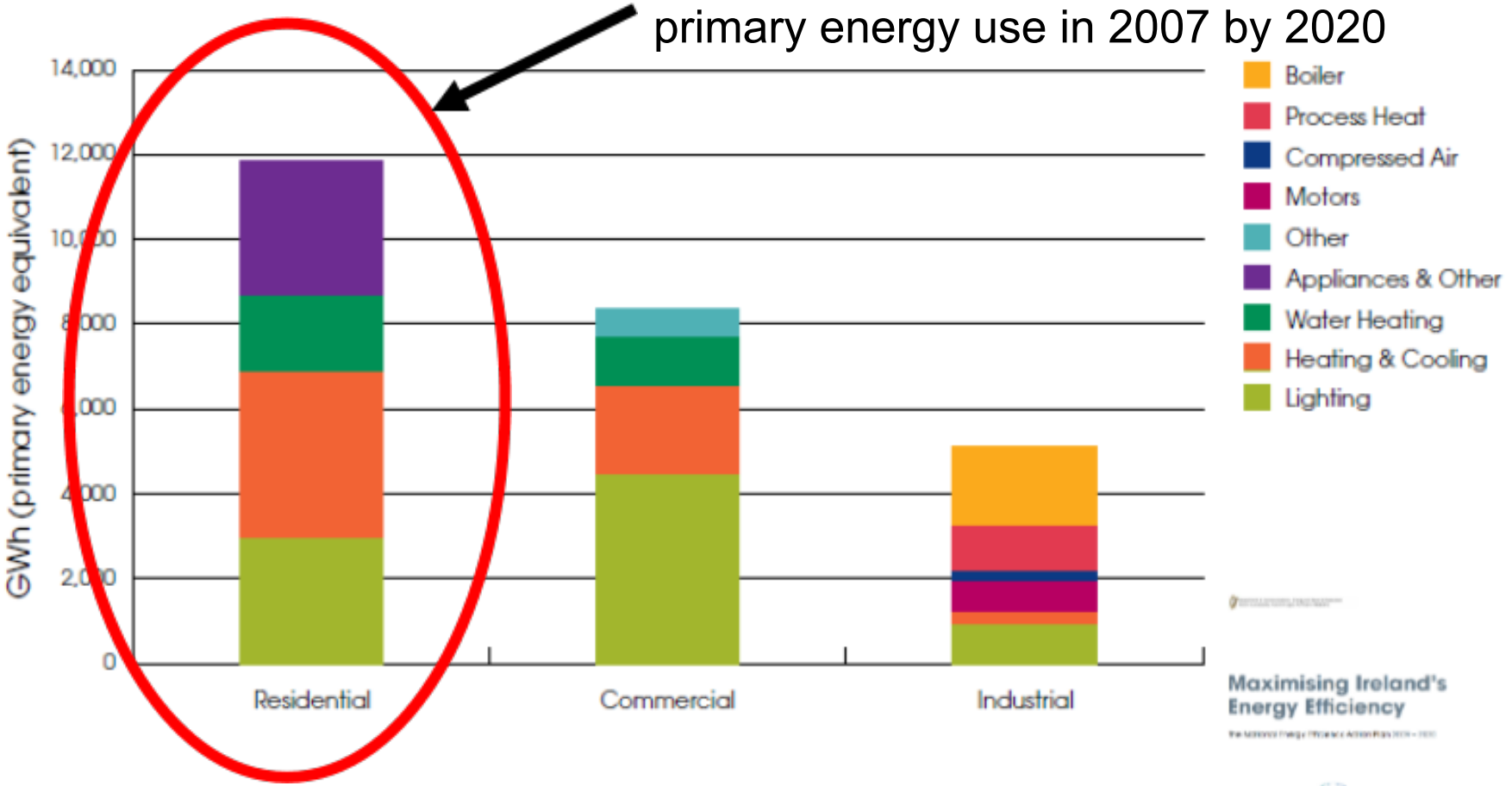
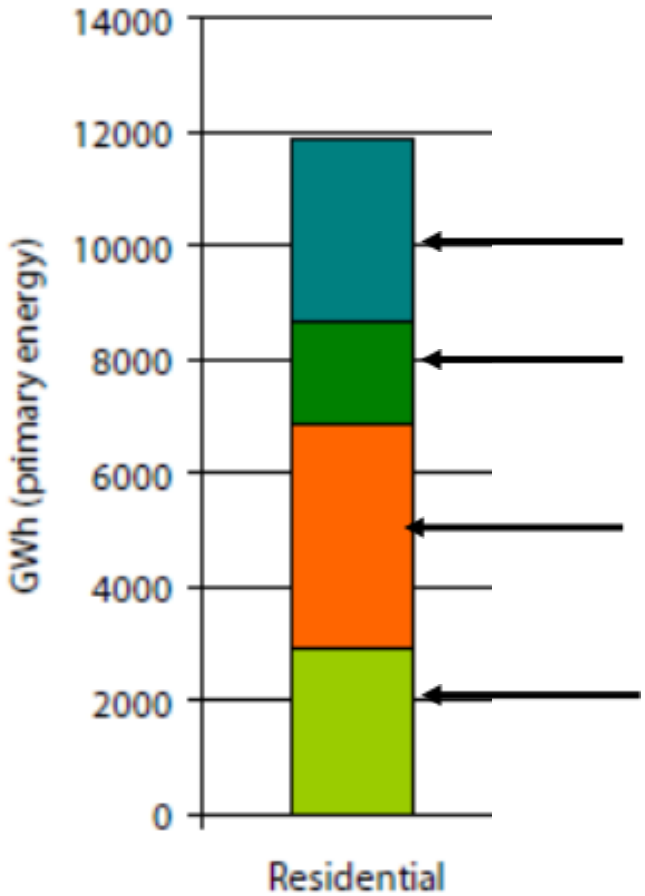



*Figure 9: Economic Efficiency Savings Potential by Sector and by Technology.*

# Potential savings by 2020 for the residential sector as proposed by Ireland's EEAP, showing the relative importance of space heating, water heating, appliances and lighting




Appliances 27% of the potential savings

Water heating 15% of the potential savings

Space heating 33% of the potential savings

Lighting 25% of the potential savings

# Summary

- There is the potential to reduce residential energy use by up to 27% by 2020
- Key areas to be addressed are space heating, water heating, lighting and appliances

# Module 1.2
# Legislation

## 1.2.1 EPBD2002/91/EC
## 1.2.2 Directive 2006/32/EC

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# 1.2.1 EPBD 2002/91/EC

On completion of this module learners will be able to :

- Explain the requirements of the main articles of the Energy Performance of Buildings Directive (EPBD) **EPBD2002/91/EC**
- Describe how the Energy Performance of Buildings Directive (EPBD) **EPBD2002/91/EC** has been implemented in their country

# Article 1 - Objective

The objective of this Directive is to promote the improvement of the energy performance of buildings within the Community, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness.

# How can this objective be achieved ?

The Directive stipulates the requirements for:

(a) the general framework for a methodology of calculation of the integrated energy performance of buildings

(b) the application of minimum requirements on the energy performance of new buildings

(c) the application of minimum requirements on the energy performance of large existing buildings that are subject to major renovation

(d) energy certification of buildings

# Article 3 - Adoption of a methodology

Member States shall apply a methodology, at national or regional level, of calculation of the energy performance of buildings on the basis of the general framework set out in the Annex

# Article 4 - Setting of Energy Performance Requirements

Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings are set, based on the methodology referred to in Article 3

(Certain categories of buildings may be excluded)

# Article 5 - New buildings

Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements referred to in Article 4.

For new buildings with a total useful floor area over 1000 $m^2$, Member States shall ensure that the technical, environmental and economic feasibility of alternative systems is considered and is taken into account before construction starts

# Article 6 - Existing buildings

Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1000 $m^2$ undergo major renovation, their energy performance is upgraded.

# Article 7 - Energy Performance Certificate

1. Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years.

# Article 7 - Energy Performance Certificate (cont.)

2. The energy performance certificate for buildings shall include reference values such as current legal standards and benchmarks l n order to make it possible for consumers to compare and assess the energy performance of the building.

The certificate shall be accompanied by recommendations for the cost-effective improvement of the energy performance.

# Article 7 - Energy Performance Certificate (cont.)

3. Member States shall take measures to ensure that for buildings with a total useful floor area over 1000 $m^2$ occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public

# Article 10 – Independent Experts

Member States shall ensure that the certification of buildings, the drafting of the accompanying recommendations and the inspection of boilers and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts, whether operating as sole traders or employed by public or private enterprise bodies.

# Article 15 – Transposition

Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive at the latest on 4 January 2006.

Member States may, because of lack of qualified and/or accredited experts, have an additional period of three years to apply fully the provisions of Article 7

# General framework for the calculation of energy performance of buildings (Article 3)

The methodology of calculation of energy performances of buildings shall include at least the following aspects:

- thermal characteristics of the building (shell and internal partitions, etc.), these characteristics may also include air-tightness
- heating installation and hot water supply, including their insulation characteristics;
- air-conditioning installation;
- ventilation;
- built-in lighting installation (mainly the non-residential sector)
- position and orientation of buildings, including outdoor climate;
- passive solar systems and solar protection;
- natural ventilation;
- indoor climatic conditions, including the designed indoor climate.

# What are the key points from the EPBD Directive ?

- Article 3 Adoption of a Methodology
- Article 4 Setting of energy performance requirements
- Article 5 New Buildings
- Article 6 Existing Buildings
- Article 7 Energy performance Certificate
- Article 10 Independent Experts

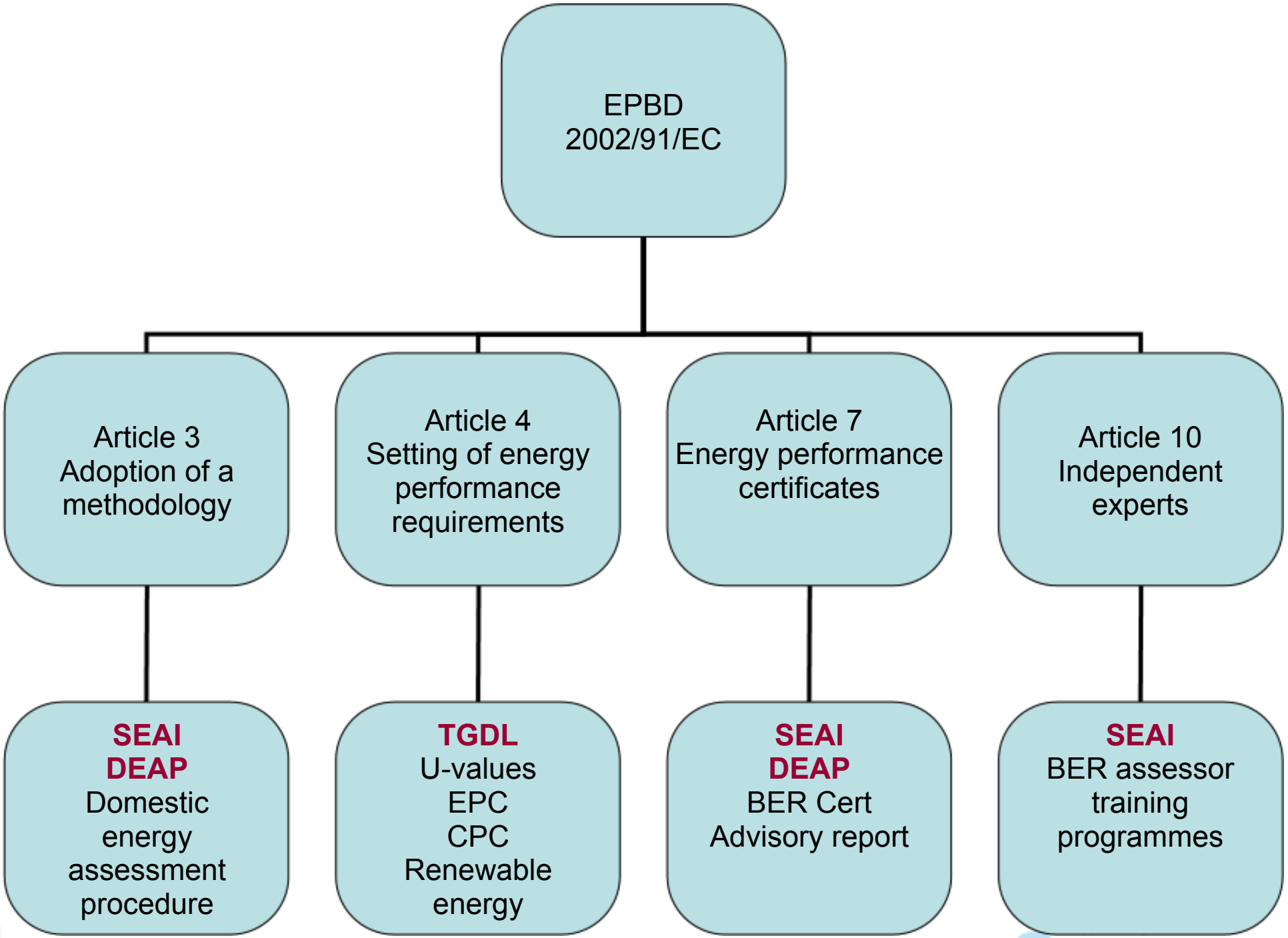
# Country Specific Implementation: Ireland

Primary piece of legislation SI 666

DEAP software is used to calculate the primary energy usage

DEAP checks compliance with some elements of TGDL

TGDL sets down minimum performance standards


EPBD
2002/91/EC
Article 3
Adoption of a methodology
Article 4
Setting of energy performance requirements
Article 7
Energy performance certificates
Article 10
Independent experts
SEAI
DEAP
Domestic energy assessment procedure
TGDL
U-values
EPC
CPC
Renewable energy
SEAI
DEAP
BER Cert
Advisory report
SEAI
BER assessor training programmes

# 1.2.2 2006/32/EC

# Energy end-use efficiency and energy services

# 1.2.2 2006/32/EC

On completion of this module learners will be able to :

- Explain the requirements of the main articles of the Energy End-Use Efficiency and Energy Services Directive
- Describe how the Energy End-Use Efficiency and Energy Services Directive has been implemented in their country

# Article 1

The purpose of the directive is to enhance the cost-effective improvement of energy end-use efficiency in the Member states

# Article 4

Member States shall adopt and aim to achieve an overall national indicative energy savings target of 9% for the ninth year of the application of this Directive

Member States shall establish an intermediate national indicative energy savings target for the third year of the application of this Directive

# Article 12 Energy Audits

Member States shall ensure the availability of efficient, high quality energy audit schemes which are designed to identify potential energy efficient measures.

Certification in accordance with Article 7 of Directive 2002/91/EC….shall be regarded as equivalent to an energy audit.

# Article 13 Metering an informative billing of energy consumption

Final customers are provided with competitively priced individual meters that accurately reflect actual energy consumption and provide information on actual time of use

Member states shall ensure that the following information is made available to final customers in clear and understandable terms

- Current price and energy consumption
- Comparison with the same period in the previous year preferably in graphical form
- Comparison with an averaged normalised or benchmark user in the same category

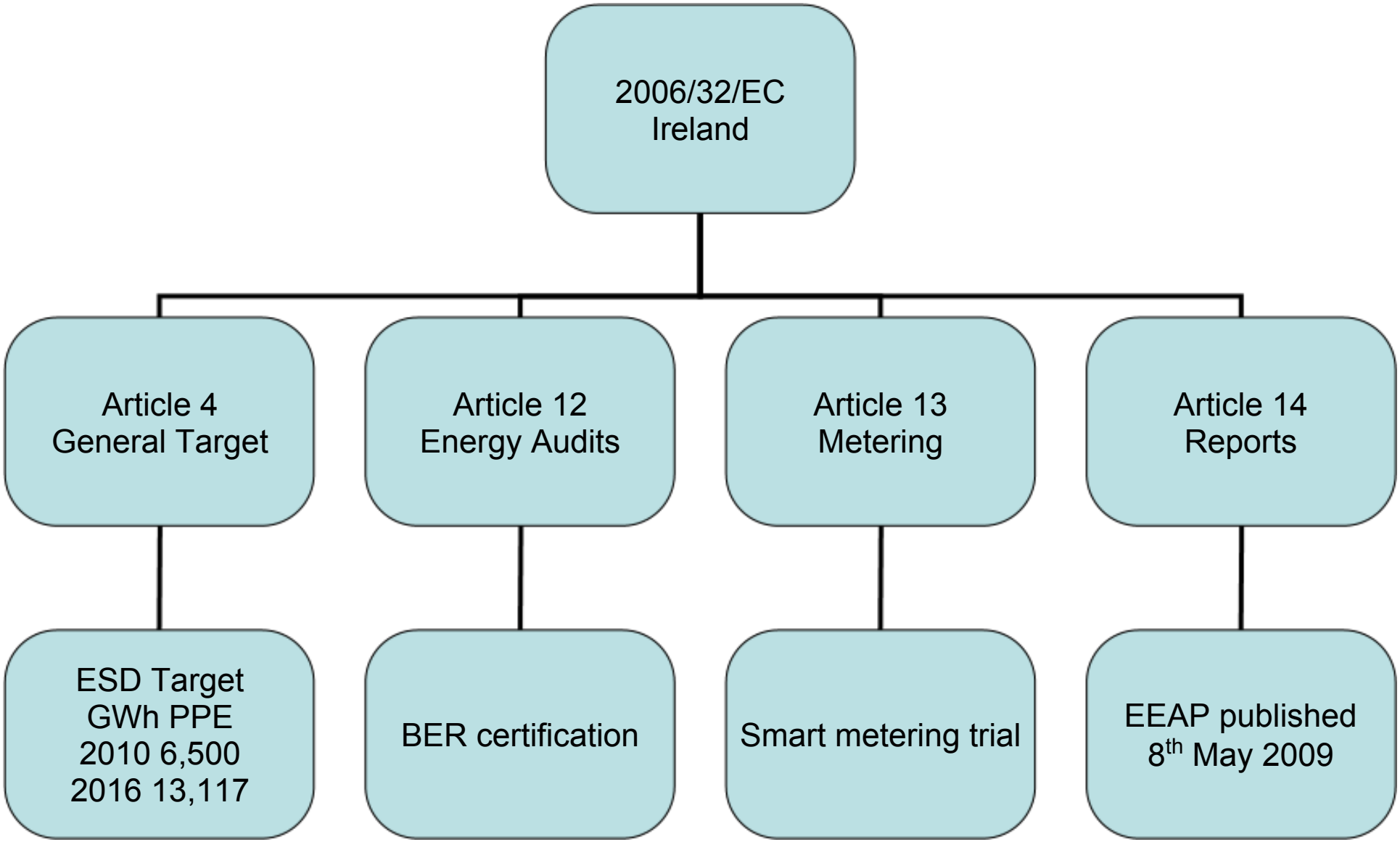
# Article 14

Member States shall submit to the commission an Energy Efficiency Action Plan (EEAP) not later than 30th June 2007

# Annex III Energy Efficiency Improvement Measures for the Domestic Sector

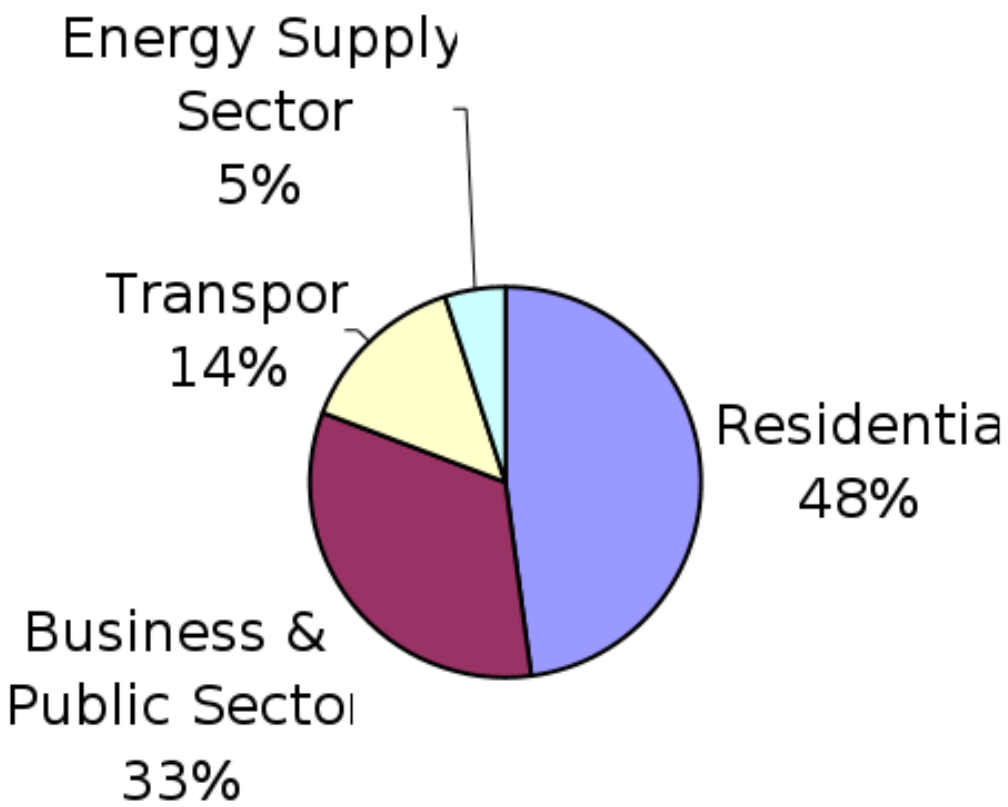
- Heating and cooling (e.g. heat pumps, efficient boilers, district heating/cooling)
- Insulation and ventilation (e.g. wall cavity and roof insulation, double/triple glazing, passive heating and cooling)
- Hot water (e.g. installation of new devices, efficient use of space heating, washing machines)
- Lighting (e.g. new efficient bulbs and ballast, digital control, motion detectors)
- Cooking and refrigeration (e.g. new efficient devices, heat recovery)
- Other equipment and appliances
- Domestic generation of renewable energy sources (e.g. solar thermal applications, domestic hot water, solar assisted space heating and cooling)

# Country Specific Implementation: Ireland

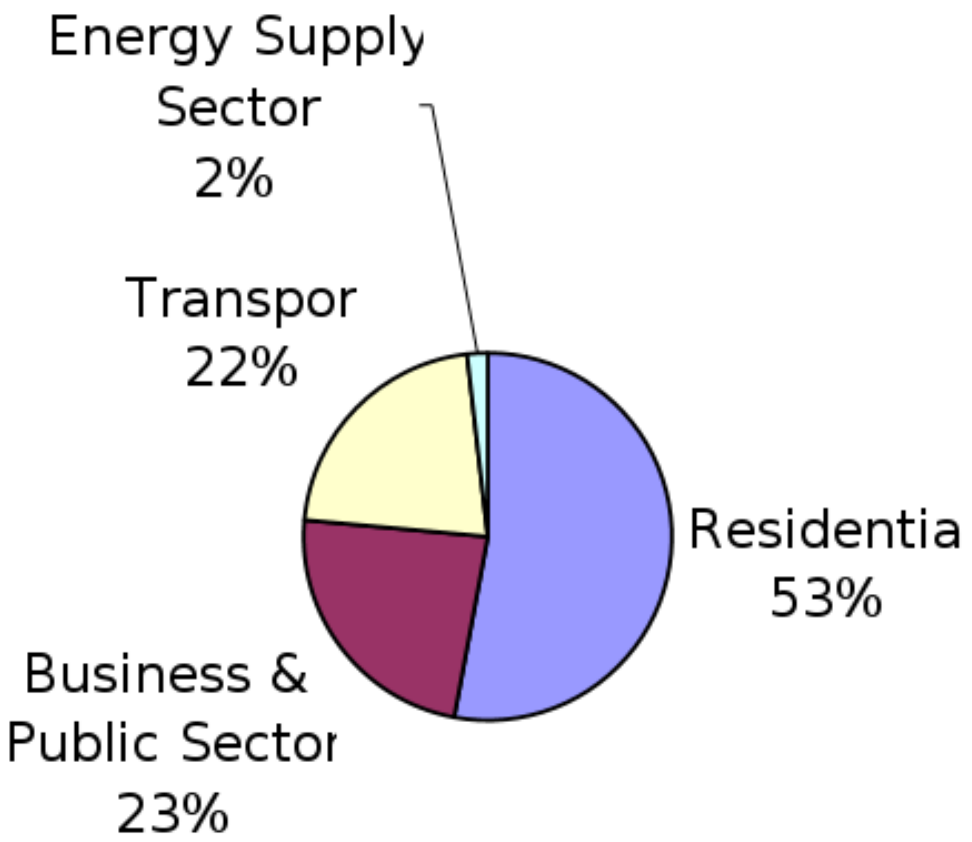


| EEAP Ireland Target Energy savings GWh PEE | | | |
|---|---|---|---|
| Sector | 2010 | 2016 | 2020 |
| **Residential** | **2605** | **7640** | **10355** |
| Business & Public Sector | 1790 | 3375 | 8340 |
| Transport | 775 | 3105 | 4670 |
| Energy Supply Sector | 275 | 300 | 365 |
| Total | 5454 | 14420 | 23730 |
| ESD Target | 6500 | 13117 | 31925 |
| Reference PE 2001-2005 | 145,741 | | |

# Ireland's Energy Saving targets fc



# Ireland's Energy saving targets f



| Target Reductions in Residential PEE | 2010 GWh | 2016 GWh |
|---|---|---|
| Building Regs 2002 | 1015 | 1015 |
| Building Regs 2008 | 130 | 1425 |
| Building Regs 2010 | 0 | 570 |
| Low carbon Homes 2013 | 0 | 130 |
| House of Tomorrow programme | 30 | 30 |
| Warmer Homes Scheme | 115 | 155 |
| Home energy Saving scheme | 450 | 600 |
| Smart metering | 0 | 650 |
| Greener homes | 265 | 265 |
| Ecodesign for Energy-Using Appliances (Lighting) | 200 | 1200 |
| Efficient Boiler Standard | 400 | 1600 |
| **Residential Total** | **2605** | **7640** |