

# Module 15

## Country Specific Legislation

## Module 15 Country Specific Legislation

- On completion of this module learners will be able to:
  - List the main pieces of legislation and standards which affect the energy performance of buildings in their country
  - Identify the main elements of the standards and legislation
  - Discuss how the main elements have been implemented and how compliance is checked

# Main legislative/technical documents

- 15.1 TGD L
- 15.2 TGD F
- 15.3 TGD J
- 15.4 SI 666
- 15.5 DEAP
- 15.6 Implementation

# Module 15.1

## TGDL 2007

### New Dwellings

# TGDL 2007

## Transitional Arrangements

TGD L 2007 applies to works to new dwellings, where the work commences or takes place, as the case may be, on or after 1 July 2008.

TGD L May 2006 ceases to have effect from 1 July 2008.

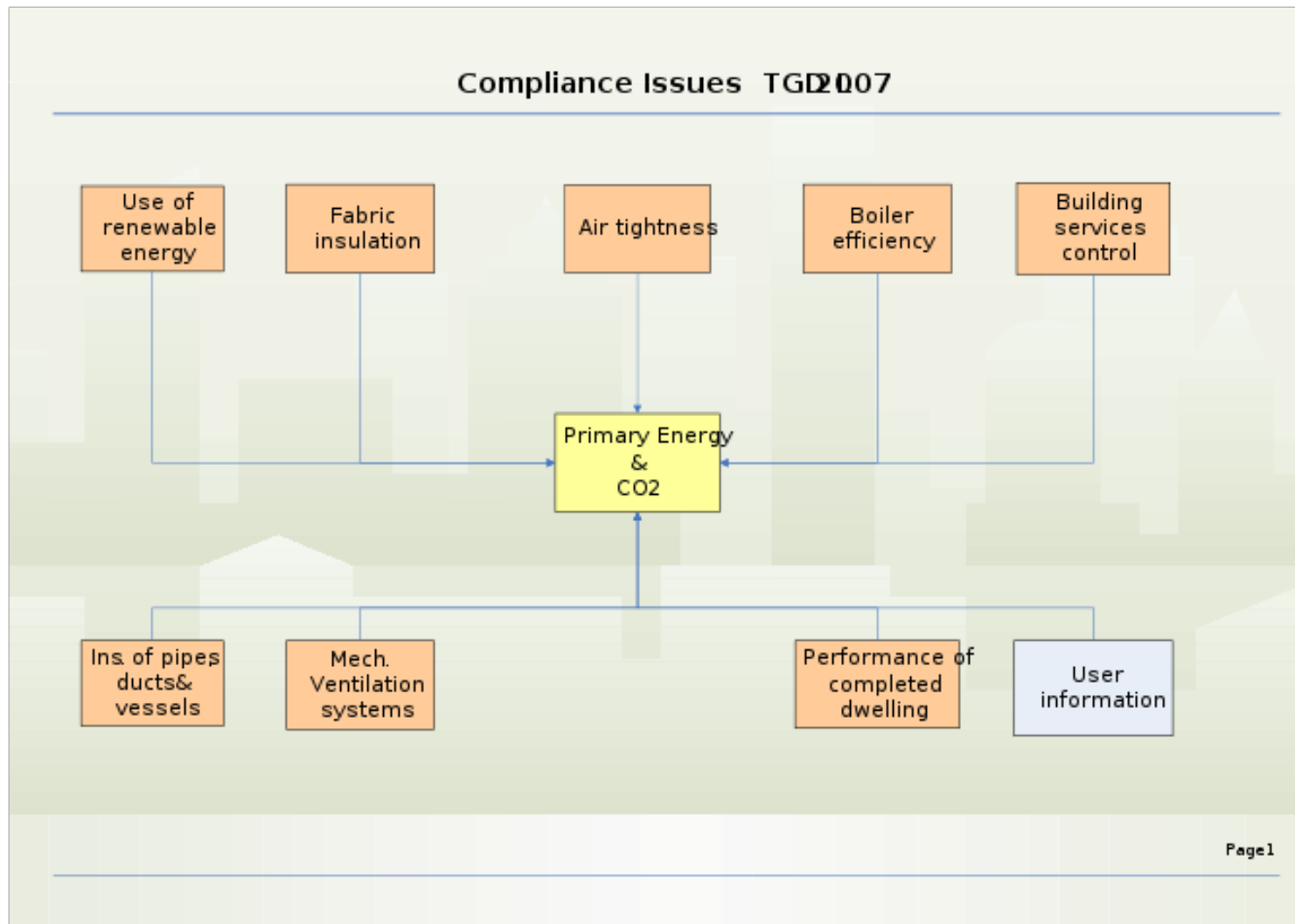
TGD L may continue to be used in the case of dwellings:

- where the work, material alteration or the change of use commences or takes place on or before 30 June 2008, or
- where planning approval or permission has been applied for on or before 30 June 2008, and substantial work has been completed by 1 July 2009. Substantial work has been completed” means that the structure of the external walls has been erected.

## Conservation of Fuel and Energy

- L1 A dwelling shall be designed and constructed so as to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the dwelling and the amount of CO<sub>2</sub> emissions associated with this energy use insofar as is reasonably practicable.
- L2 For new dwellings, the requirement of L1 shall be met by
- a. providing that the energy performance of the dwelling is such as to limit the calculated primary energy consumption and related CO<sub>2</sub> emissions insofar as is reasonably practicable, when both energy consumption and CO<sub>2</sub> emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by Sustainable Energy Ireland;
  - b. providing that, for new dwellings, a reasonable proportion of the energy consumption to meet the energy performance of a dwelling is provided by renewable energy sources;
  - c. limiting heat loss and, where appropriate, availing of heat gain through the fabric of the building;
  - d. providing and commissioning energy efficient space and water heating systems with efficient heat sources and effective controls;
  - e. providing that all oil and gas fired boilers shall meet a minimum seasonal net efficiency of 86%;
  - f. providing to the dwelling owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable
- L3 All oil and gas fired boilers installed as replacements in existing dwellings shall meet a minimum seasonal net efficiency of 86% where practicable.

# TGD 2007 Compliance Issues



# TGDL 2007

## Compliance Issues

- It is likely that one or more of the performance levels specified, for items coloured on the previous slide will need to be exceeded to achieve level specified for primary energy consumption and related CO<sub>2</sub>
- It is intended that the standards specified here will be tightened further in 2010.
- The aim is to achieve zero carbon emissions associated with the operation and use of dwellings, at the earliest date practicable.

# TGDL 2007

## 1.1 Limitation of Primary Energy Use & CO<sub>2</sub> Emissions

- PE Primary Energy Use
- CDER Carbon Dioxide Emission Rate
- CPC Carbon Performance Coefficient
- EPC Energy Performance Coefficient
- Subscripts
  - PD Proposed Dwelling
  - RD Reference Dwelling

$$EPC \leq \frac{PE_{PD}}{PE_{RD}} \leq 0.6 (MPEPC)$$

$$CPC \leq \frac{CDER_{PD}}{CDER_{RD}} \leq 0.69 (MPCPC)$$

TGDL 2007

## 1.2 Renewable Energy Technologies

10 kWh/m<sup>2</sup>/annum contributing to energy use for domestic hot water heating, space heating or cooling

OR

4 kWh/m<sup>2</sup>/annum of electrical energy

OR

A combination of these which would have an equivalent effect

Heat pumps: consider only energy produced in excess of 2.5 times the electrical energy used by the heat pump

CHP may be considered as a suitable alternative

# TGD L 2007

## 1.3 Building Fabric

- Fabric insulation levels
- U values for plane elements must not exceed area weighted average elemental U-value as per Table 1 column 2 page 17 subject to max individual element values in column 3
- Area Weighted Average Elemental U-value for windows, doors and rooflights varies as a percentage of floor area – see table 2 page 18

# TGD L 2007

## 1.3 Building Fabric

Maximum Elemental U-value (W/m <sup>2</sup> K)		
Element	Area Weighted Average Elemental U-value	Average elemental u-value – individual element
Roof		0.30
Pitched Insulation at ceiling	0.16	
Pitched Insulation at ceiling Flat	0.20	
	0.22	
Walls	0.27	0.60
Ground floor	0.25	0.60
External doors, windows & rooflights	2.00	3.00

# TGD L 2007

## 1.3 Building Fabric

Column 1 Fabric Elements	Column 2 Area weighted Average Elemental U- Value (U <sub>m</sub> )	Column 3 Average Elemental U-value – individual element or section of element
Roofs		
Pitched roof - Insulation at ceiling - Insulation on slope	0.16 0.20	0.3
Flat roof	0.22	
Walls	0.27	0.6
Ground Floors <sup>3</sup>	0.25	0.6
Other Exposed Floors <sup>3</sup>	0.25	0.6
External doors, windows and rooflights	2.00 <sup>4</sup>	3.0
<b>NOTES</b>		
1. The U-value includes the effect of unheated voids or other spaces		
2. For alternative method of showing compliance see Paragraph 1.3.2.3		
3. For insulation of ground floors and exposed floors incorporating underfloor heating, see Paragraph 1.3.2.2		
4. Windows, doors and rooflights should have maximum U-value of 2.0 W/m <sup>2</sup> K and maximum opening area of 25% of floor area. However areas and U-values may be varied as set out in <a href="#">Table 2</a>		

Average U-value of windows, doors and rooflights (U <sub>ope</sub> ) (W/m <sup>2</sup> K)	Maximum combined area of external doors, windows and rooflights (A <sub>ope</sub> ), expressed as % of floor area (A <sub>f</sub> )
1.0	59.2
1.2	46.5
1.4	38.3
1.6	32.5
1.7	30.2
1.8	28.3
1.9	26.5
2.0	25.0
2.1	22.4
2.2	22.4
2.3	21.3
2.4	20.3
2.6	18.6
<b>NOTE :</b> Intermediate values of "combined areas" or of "U-values" may be estimated by interpolation in the above Table. Alternatively the following expression may be used to calculate the appropriate value:  $A_{ope}/A_f = 0.4325/(U_{ope} - 0.27)$  This expression may also be used to calculate appropriate values outside the range covered by the Table.	

# TGD L 2007

## 1.3 Building Fabric

### 1.3 Thermal Bridging

- Performance levels as set out in Appendix D
- Standard construction details

“Limiting Thermal Bridging and Air Infiltration Acceptable Construction Details”

[www.communities.gov.uk](http://www.communities.gov.uk)

Thermal bridging factor of 0.15

Default value can be reduced if appropriate calculations are shown

# TGDL 2007

## 1.4 Building Services

- Heating appliance efficiency
  - boiler seasonal efficiency not less than 86%
- Space heating and hot water controls
  - automatic control of space heating based on room temperature
  - automatic control of stored hot water on the basis of hot water temperature
  - separate and independent time control of space heating and hot water
  - boiler interlock
  - zoning if floor area is greater than 100m<sup>2</sup>

# TGDL 2007

## 1.4 Building Services

- Insulation of hot water storage vessels, pipes & ducts
- Hot water cylinders BS 1566 Part 1 2002 Appendix B
- Pipework BS 5422 2001
- HWS, vent pipe, primary flow and returns to be insulated for at least 1m from point of connection to cylinder.

TGDL 2007

## 1.4 Building Services MVHR system performance

Minimum performance levels for continuously operated ventilation systems	
SFP for continuous supply	0.8 $Wl^{-1}s^{-1}$
SFP for continuous extract	0.8 $Wl^{-1}s^{-1}$
SFP for balanced supply & extract	2.0 $Wl^{-1}s^{-1}$
Efficiency of heat exchanger where fitted	60%

# TGDL 2007

## 1.5 Construction Quality & Commissioning of Services

### Air Permeability Pressure Test

Number of Units	Number of Tests
4 or less	1
>4 and $\leq 40$	2
>40 and $\leq 100$	At least 5% of the dwelling type
>100	At least 2% for dwellings in excess of the first 100 units (higher rates apply for retest)

TGDL 2007

## 1.5 Construction Quality & Commissioning of Services

- Commissioning
  
- Heating & hot water systems to be commissioned at completion
  
- Procedure “Heating and Domestic Hot Water Systems for Dwellings – Achieving compliance with Part L”

TGDL 2007

1.6 User Information

## User information

- Information to be provided to building owner:
  - Details of installed services
  - Services maintenance requirements
  - Operating instructions

# Module 15.2

## TGDF 2009

### New Dwellings

TGD F Natural ventilation requirements for air permeability > 5 m<sup>3</sup>/m<sup>2</sup>/h

Room or space	General Ventilation	Extract Ventilation	Purge Ventilation
	Area of background ventilator (mm <sup>2</sup> )	Fan extract rate (l/s)	Window opening size
Habitable room or space	5000	-	1/20 <sup>th</sup> of room floor area
Kitchen	2500	60 l/s 30 l/s if next to cooker	Window opening section
Utility Room	2500	30 l/s	Window opening section
Bathroom	2500	15 l/s	Window opening section
Sanitary Accommodation	2500	6 l/s	Window opening section

# TGD F Whole house mechanical ventilation with heat recovery

Supply	Extract		Purge (Openable window area)
	Habitable room	Extract Rate (l/s)	1/20 <sup>th</sup> of room floor area
5 l/s plus 4l/s per person	Kitchen	13	Window opening section
<b>OR</b>	Utility	8	Window opening section
0.3 l/s per m <sup>2</sup> internal floor area	Bathroom	8	Window opening section
If air permeability is greater than 5 m <sup>3</sup> /h/m <sup>2</sup> subtract 0.04V (l/s)	Sanitary Accommodation	6	Window opening section

# Module 15.3

## TGD J

# Heat producing appliances

Air supply.	J1	A heat producing appliance shall be so installed that there is an adequate supply of air to it for combustion and for the efficient working of any flue pipe or chimney.
Discharge of products of combustion.	J2	A heat producing appliance shall have adequate provision for the discharge of the products of combustion to the outside air.

<i>Table 1</i> <b>Air Supply to Appliances</b>	
Solid fuel burning open appliance	<p>A ventilation opening (or openings) with a total free area of at least 50% of the appliance throat opening area (of which at least 6500 mm<sup>2</sup> is permanent ventilation) shall be provided.</p> <p>For description and dimensions of "throat", see BS 8303: Part 1:1994).</p>
Other solid fuel appliance	<p>A permanent air entry or opening with a total free area of at least 550 mm<sup>2</sup> per kW of rated output above 5 kW shall be provided but in no case less than 6500 mm<sup>2</sup>.</p> <p>Where a flue draught stabiliser is used the total free area should be increased by 300 mm<sup>2</sup> for each kW of rated output.</p>

# Module 15.4

## SI 666

- **S.I. No. 666 of 2006**
- Part 1 Preliminary & General
- Part 2 Alternative Energy Systems
- Part 3 Building Energy Rating
- Part 4 Administration of BER System
- Part 5 Enforcement

# Part 1 Preliminary & General

## Definition of terms

### ● **BER Certificates**

- “BER certificate” means a certificate in a prescribed form on the basis of a BER assessment, which is held and may be viewed in electronic form on the BER register, and may be reproduced and issued in printed form by or on behalf of the issuing authority, (First Schedule)
- “provisional BER certificate” is a certificate in a prescribed form respecting a proposed new building which is held and may be viewed in electronic form on the BER register on the basis of a BER assessment of the plans and specifications for the building prior to its construction being completed, and may be reproduced and issued by or on behalf of the issuing authority in printed form; (Second Schedule)

- **“advisory report”** means a report held and which may be viewed in electronic form on the BER register, to accompany a BER certificate or provisional BER certificate, on the basis of a BER assessment of a building and in a form approved by the issuing authority with the prior approval of the Minister, which contains recommendations on how the energy performance of the building may be improved in a cost-effective manner, and which may be reproduced and issued in printed form by or on behalf of the issuing authority;
- **“BER record”** means, as the case may be, the current and any earlier BER certificate, including any provisional BER certificate where applicable, any advisory report, any BER data file and any related data or documents, pertaining to a building;

## Part 2 Alternative Energy Systems

- This Part of the Regulations shall apply to the design of any large building for which a planning application is made, or a planning notice is published, on or after 1 January 2007.

● **“large building”** means a building with a total useful floor area in excess of 1,000m<sup>2</sup>;

- (a) decentralised energy supply systems based on renewable energy
- (b) combined heat and power systems
- (c) district or block heating or cooling, if available
- (d) heat pumps

- Part 3 Building Energy Rating
  - **Provisional BER**
    - Based on the plans and must be available to purchasers off the plans
  - **BER**
    - Based on actual construction must be produced prior to completion of sale

- **Classes of Buildings**

- (1) A person who commissions the construction of a building ..... shall, **before such building is occupied for the first time**, secure a BER certificate .

- (2) A person who offers for sale or letting

- (a) ‘new building’

- (b) on or after 1 January 2009, a building that is in existence on or before 1 January 2009,

## ● 9.1 Production of BER certificate

- A building control authority or an authorised officer thereof may demand the production of a printed copy of the BER certificate
- The building owner must submit within 28 days a printed copy of the BER certificate to the authority

# Building Energy Rating (BER)

BER for the building detailed below is:

Name of House,  
Street Name One, Street Name Two,  
Town name One, Town Name Two,  
County name One, County name Two.

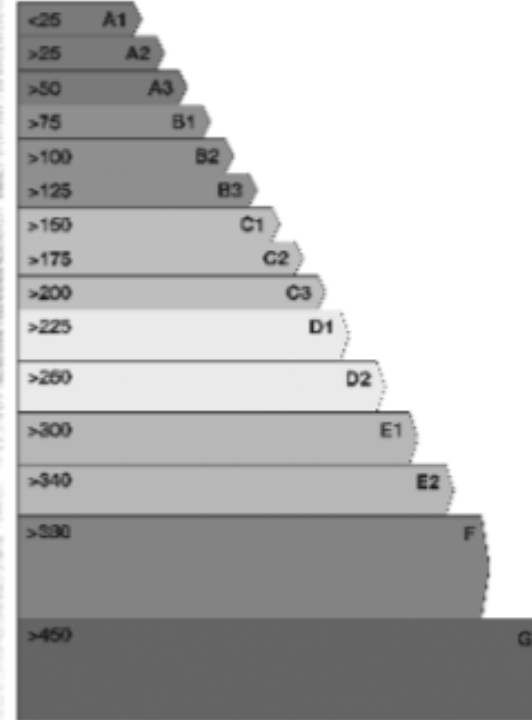
BER Number: XXXXXXXXXX  
Date of Issue: Day Month Year  
Valid Until: Day Month Year  
BER Assessor No.: XXXX  
Assessor Company No.: XXXX

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

'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

**Building Energy Rating**  
kWh/m<sup>2</sup>/yr

**MOST EFFICIENT**



**LEAST EFFICIENT**

**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 indicated above. A future BER assigned to this dwelling may be different, as a result of changes to the building or to the assessment software.

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

**BEST**  
0

**WORST**  
>120

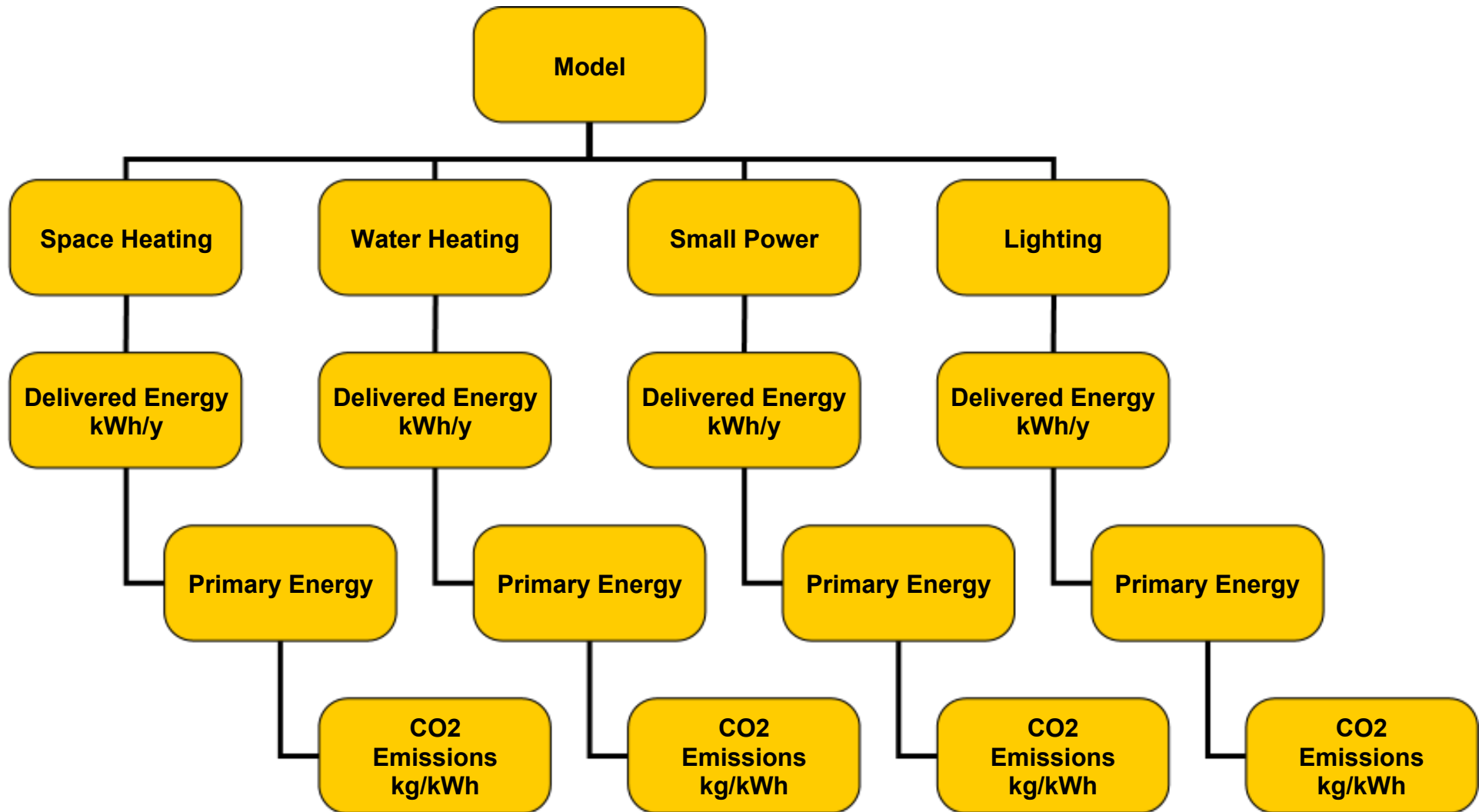
The less CO<sub>2</sub> produced, the less the dwelling contributes to global warming.

# Module 15.5

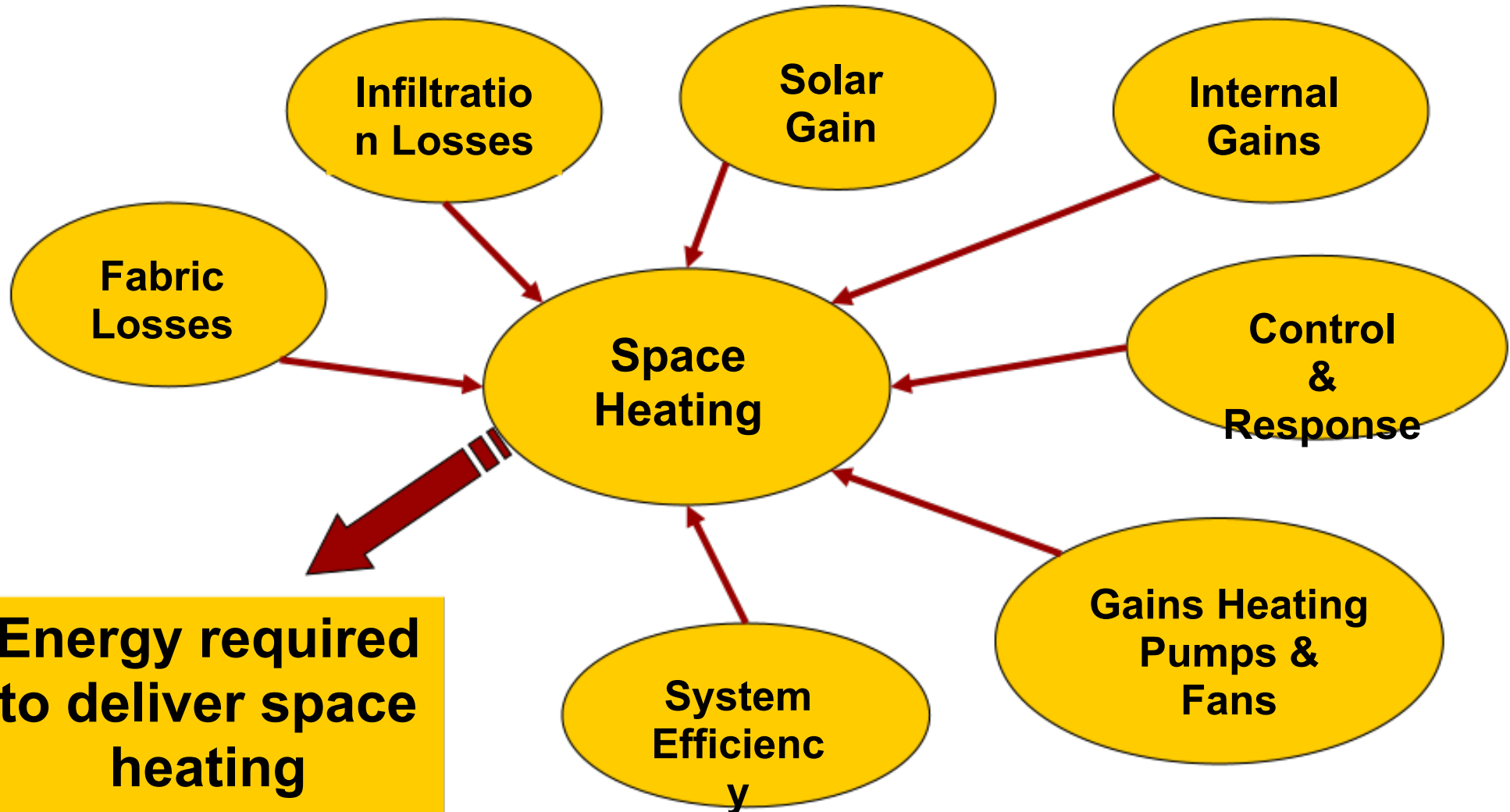
## DEAP

(Domestic Energy assessment Procedure)

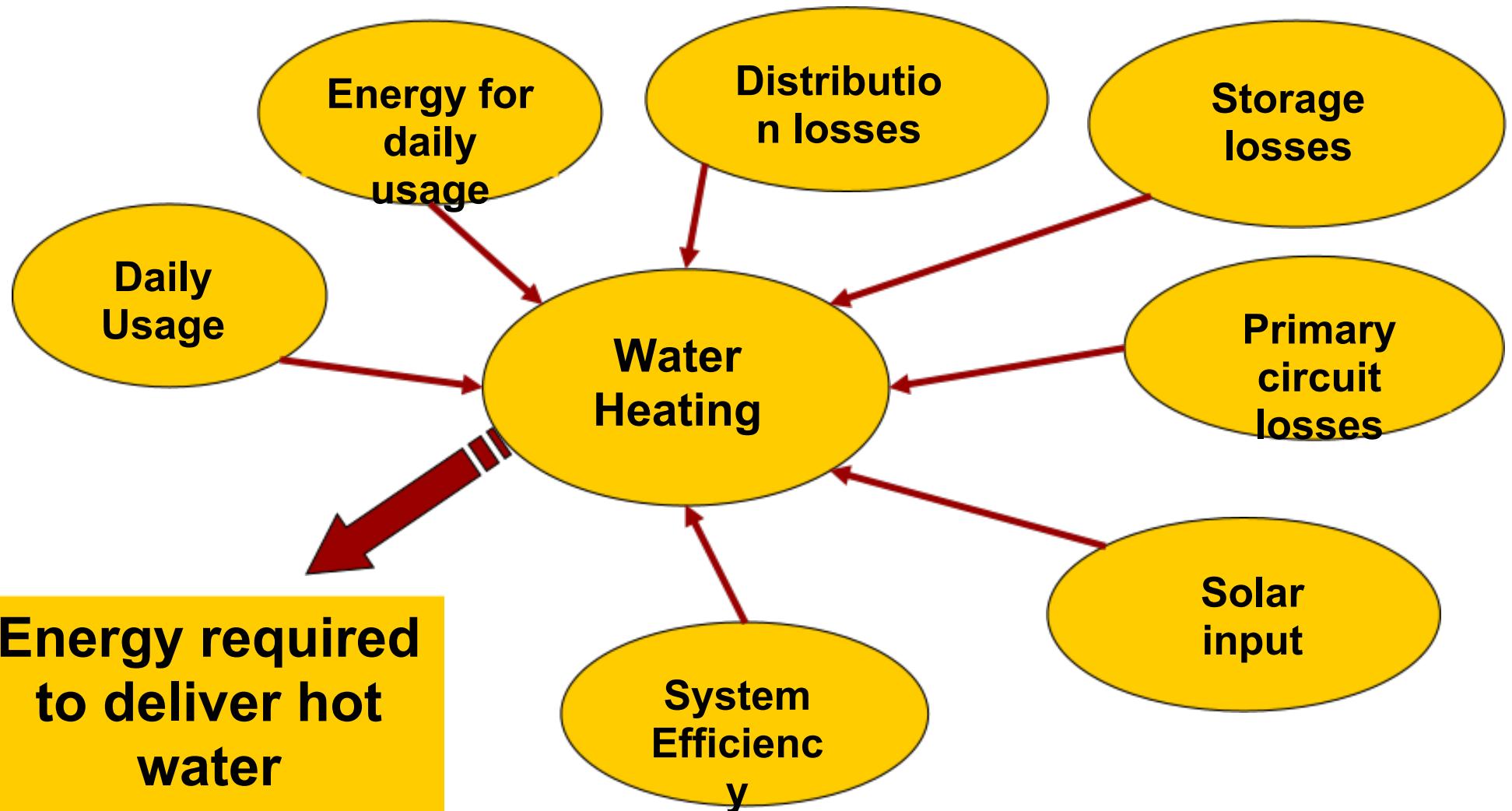
# Model Description



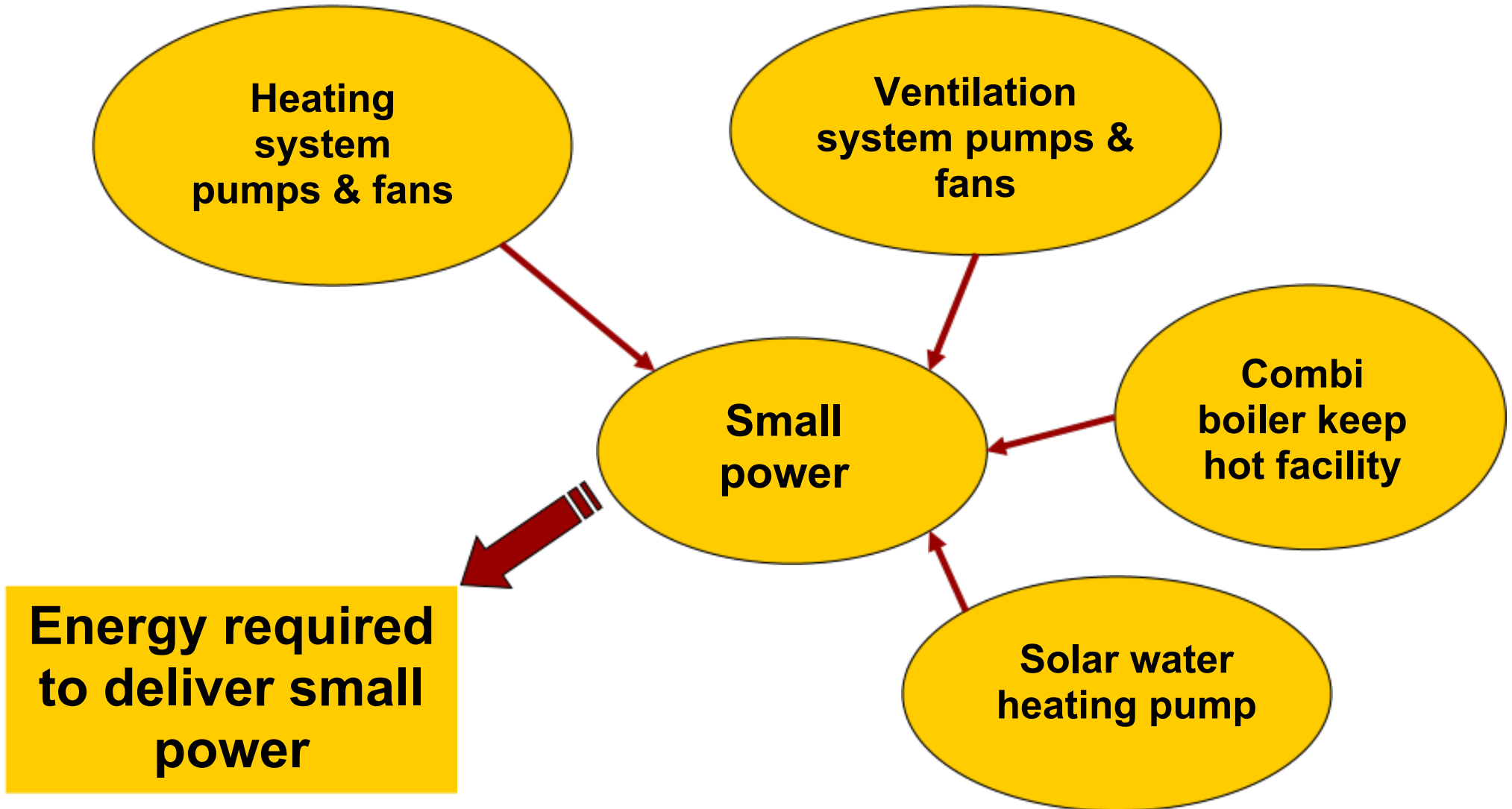
# Model Description



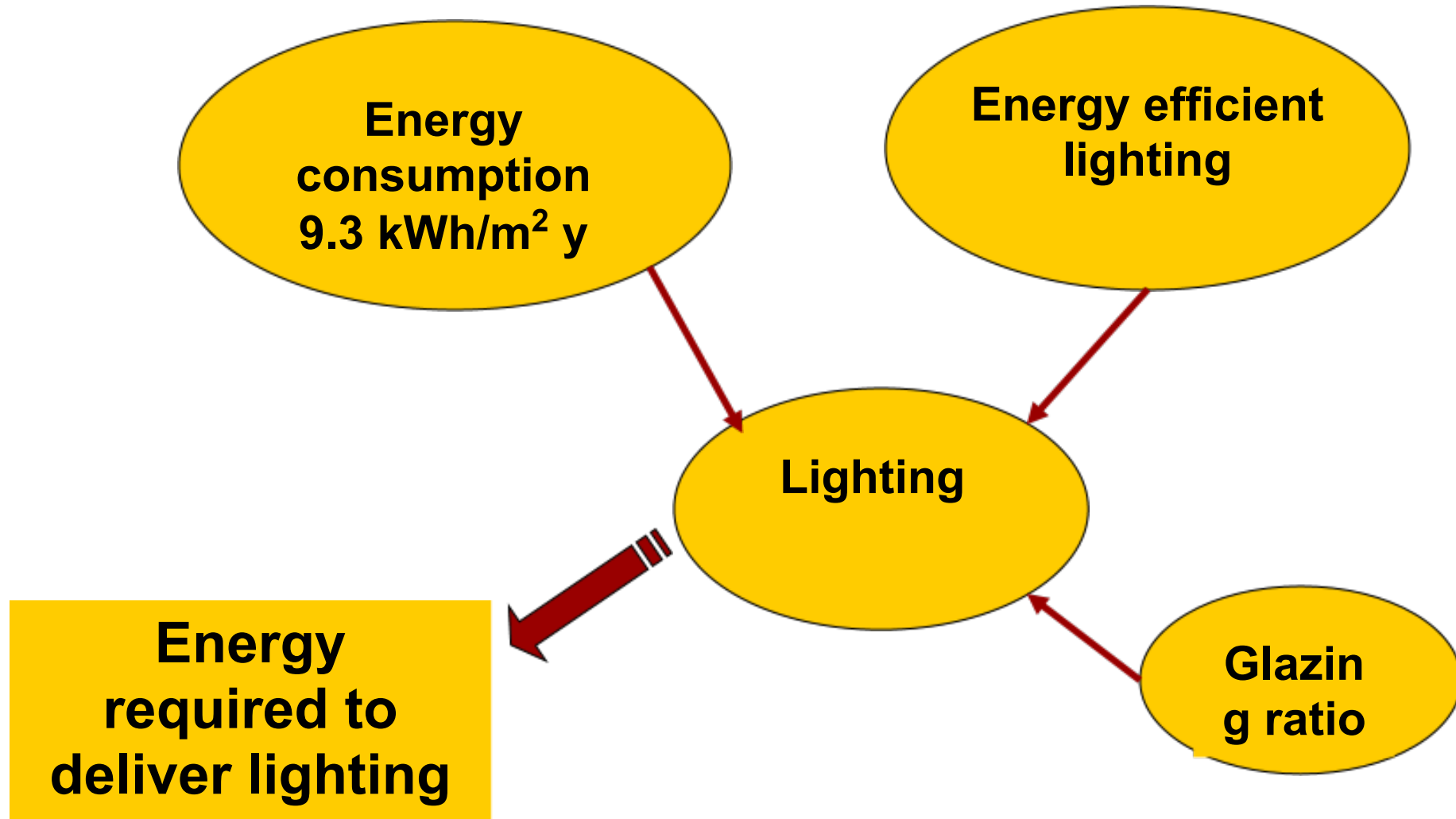
# Model Description



# Model Description



# Model Description



# Model Description

## ● Model Assumptions

- Occupancy levels based on floor area
- Heating season spans October to May inclusive
- Heating schedule:
  - Weekdays: 07.00 to 09.00 and 17.00 to 23.00
  - Weekends: 07.00 to 09.00 and 17.00 to 23.00
- Internal Temperatures:

Living area: 21°C

# Model Description

## ● **Model Assumptions**

- External Air Temperatures
  - Monthly averages from MET Eireann data
- Solar Gain
  - Monthly averages from MET Eireann data
- Hot water energy demand based on occupancy
- Lighting levels based on floor area

# Model Description

- **Model Assumptions**

- The air infiltration rate can be assessed either from an air leakage pressure test (section 2.3)
- or
  - in the absence of a pressure test, using the “structural air tightness” section of the DEAP ventilation algorithm built into the worksheet

# BER Assessor Training

## Unit 1- Model Description

- **Model Assumptions**
- Internal gains from appliances, cooking and from the occupants of the dwelling (metabolic gains) are based on the total floor area of the dwelling.

- **Delivered energy**, in kWh/year: This corresponds to the energy consumption that would normally appear on the energy bills of the dwelling for the assumed standardised occupancy and end-uses considered.
- **Primary energy**, in kWh/year: This includes delivered energy, plus an allowance for the energy “overhead” incurred in extracting, processing and transporting a fuel or other energy carrier to the dwelling. For example, in the case of electricity it takes account of generation efficiency at power stations.
- **Carbon dioxide emissions**, in kg CO<sub>2</sub> per year: Emissions are calculated on the basis of primary energy consumption, e.g. emissions at power stations associated with the dwelling’s electricity use are

- The calculated primary energy consumption of the proposed dwelling is divided by that of a reference dwelling, the result being the energy performance coefficient (EPC) of the proposed dwelling. To demonstrate that an acceptable Primary Energy consumption rate has been achieved, the calculated EPC of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC) which is 0.6
- Similarly the carbon performance coefficient (CPC) must be less than the maximum permitted carbon performance coefficient (MPCPC) which is 0.69

Results

- Start
- Property and assessor details
- Dimensions
- Ventilation
- Building elements
- Water heating
- Lighting and internal gains
- Net space heat demand
- Dist. system losses and gains
- Energy requirements
- Summer internal temperature
- Results

Results Building Regulation Part L 2008 Conformance

Conformity with maximum avg U-Value requirements

Average elemental U-Values [W/m<sup>2</sup>K]

Pitched roof insulated on slope	0.000	✓
Pitched roof insulated on ceiling	0.160	✓
Flat roof	0.000	✓
Floors with no underfloor heat	0.250	✓
Floors with underfloor heat	0.000	✓
Walls	0.270	✓
Percentage of opening areas [%]	10	✓
Average u-value of openings	1.800	✓

Conformity with maximum U-Value requirements

Maximum elemental U-Values [W/m<sup>2</sup>K]

Roofs	0.160	✓
Walls	0.270	✓
Floors	0.250	✓
External doors/windows/rooflights	1.800	✓

Conformity with renewable energy technologies requirement - individual schemes

	Total contribution kWh/y	Part L renewable contribution kWh/m <sup>2</sup> y
Solar water heating system	1267.03	8.45
Heat pump as main space heating system	0	0
Heat pump as secondary space heating system	0	0
Heat pump as main water heating system	0	0
Wood/Biomass heater as main space heating system	6948.8	46.33
Wood/Biomass heater as secondary heating system	0	0
Wood/Biomass heater as main water heating system	2319.19	15.46
Not Entered	0	0
Not Entered	0	0
Not Entered	0	0
Total thermal	10535.02	70.23
Total electrical	0	0
Total thermal equivalent	10535.02	70.23
Does CHP meet renewables requirement for TGD L 2008	No	✓

Name:

- Start
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Results

Floors with no underfloor heat	0.250	✓
Floors with underfloor heat	0.000	✓
Walls	0.270	✓
Percentage of opening areas [%]	10	✓
Average u-value of openings	1.800	✓

External doors/windows/rooflights 1.800 ✓

Conformity with renewable energy technologies requirement - individual schemes

	Total contribution kWh/y	Part L renewable contribution kWh/m <sup>2</sup> y
Solar water heating system	1267.03	8.45
Heat pump as main space heating system	0	0
Heat pump as secondary space heating system	0	0
Heat pump as main water heating system	0	0
Wood/Biomass heater as main space heating system	6948.8	46.33
Wood/Biomass heater as secondary heating system	0	0
Wood/Biomass heater as main water heating system	2319.19	15.46
Not Entered	0	0
Not Entered	0	0
Not Entered	0	0
Total thermal	10535.02	70.23
Total electrical	0	0
Total thermal equivalent	10535.02	70.23
Does CHP meet renewables requirement for TGD L 2008	No	✓

Conformity with primary energy use and CO2 emissions limitation requirement

	Performance coefficient		
CPC	0.186	MPCPC	0.69 ✓
EPC	0.79	MPEPC	0.6 ✗

Name:

## Menu

- [Import calculation data](#)
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- [Save](#)
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- [Find existing record](#)
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- [MPRN Address Search](#)

## More Options

- [Clear all fields](#)
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### Results

Energy Rating: **B1**  
[kWh/m<sup>2</sup>/yr]  
 Energy Value: **80.45**  
[kgCO<sub>2</sub>/m<sup>2</sup>/yr]  
 CO<sub>2</sub> Emissions Indicator: **19.16**

DEAP Version: 3.0.0  
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- Start
- Property and assessor details
- Dimensions
- Ventilation
- Building elements
- Water heating
- Lighting and internal gains
- Net space heat demand
- Dist. system losses and gains
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- Summer internal temperature
- Results

Name:

### Results

Floors with no underfloor heat	0.250	✓	External doors windows/rootlights	1.800	✓
Floors with underfloor heat	0.000	✓			
Walls	0.270	✓			
Percentage of opening areas [%]	10	✓			
Average u-value of openings	1.800	✓			

### Conformity with renewable energy technologies requirement - individual schemes

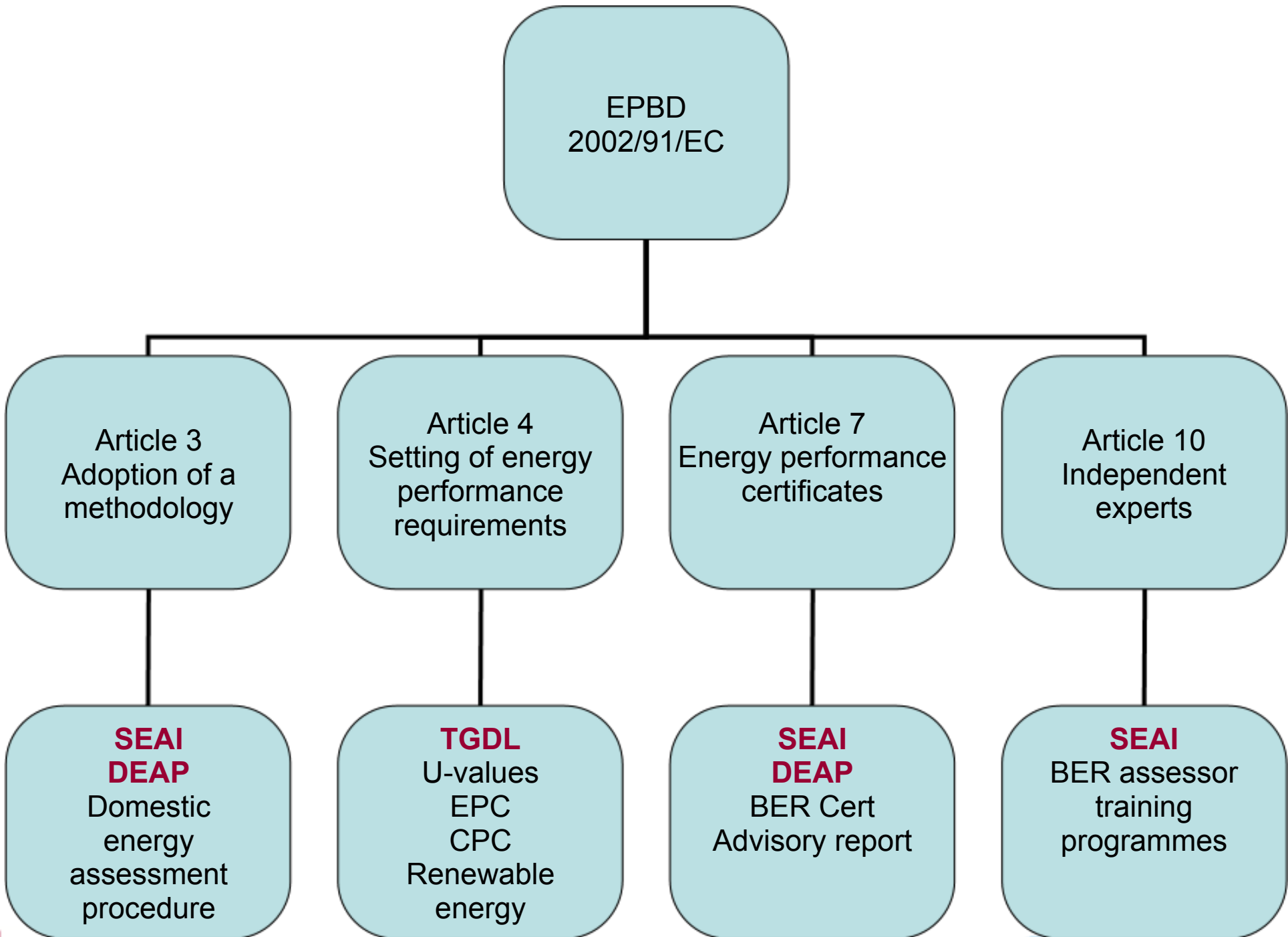
	Total contribution kWh/y	Part L renewable contribution kWh/m <sup>2</sup> y
Solar water heating system	1267.03	8.45
Heat pump as main space heating system	1520.05	10.13
Heat pump as secondary space heating system	0	0
Heat pump as main water heating system	0	0
Wood/Biomass heater as main space heating system	0	0
Wood/Biomass heater as secondary heating system	0	0
Wood/Biomass heater as main water heating system	0	0
Not Entered	0	0
Not Entered	0	0
Not Entered	0	0
Total thermal	2787.08	18.58
Total electrical	0	0
Total thermal equivalent	2787.08	18.58
Does CHP meet renewables requirement for TGD L 2008	No	✓

### Conformity with primary energy use and CO<sub>2</sub> emissions limitation requirement

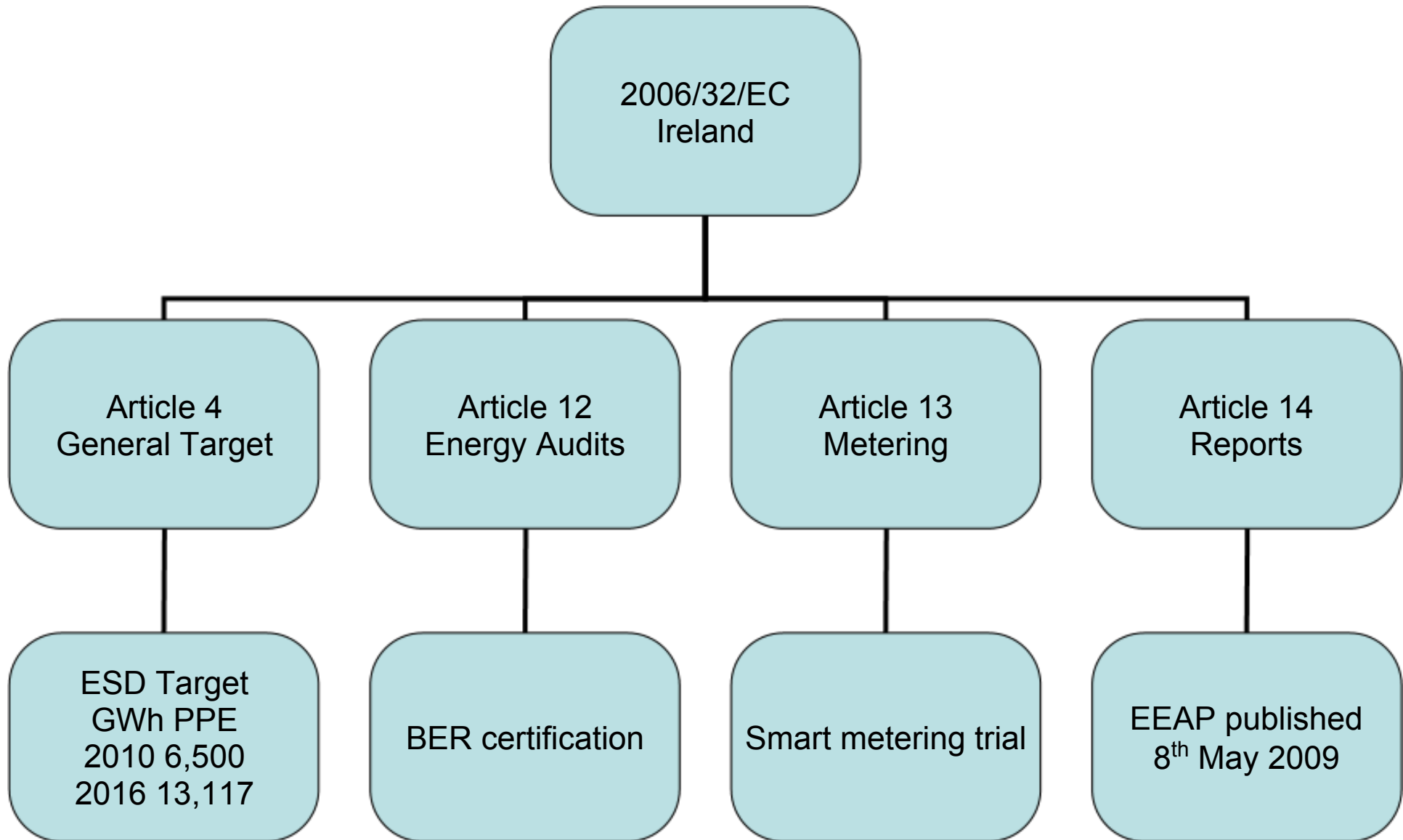
Performance coefficient	
CPC	0.591
MPCPC	0.69
EPC	0.531
MPEPC	0.6

# Module 15.6

## Implementation

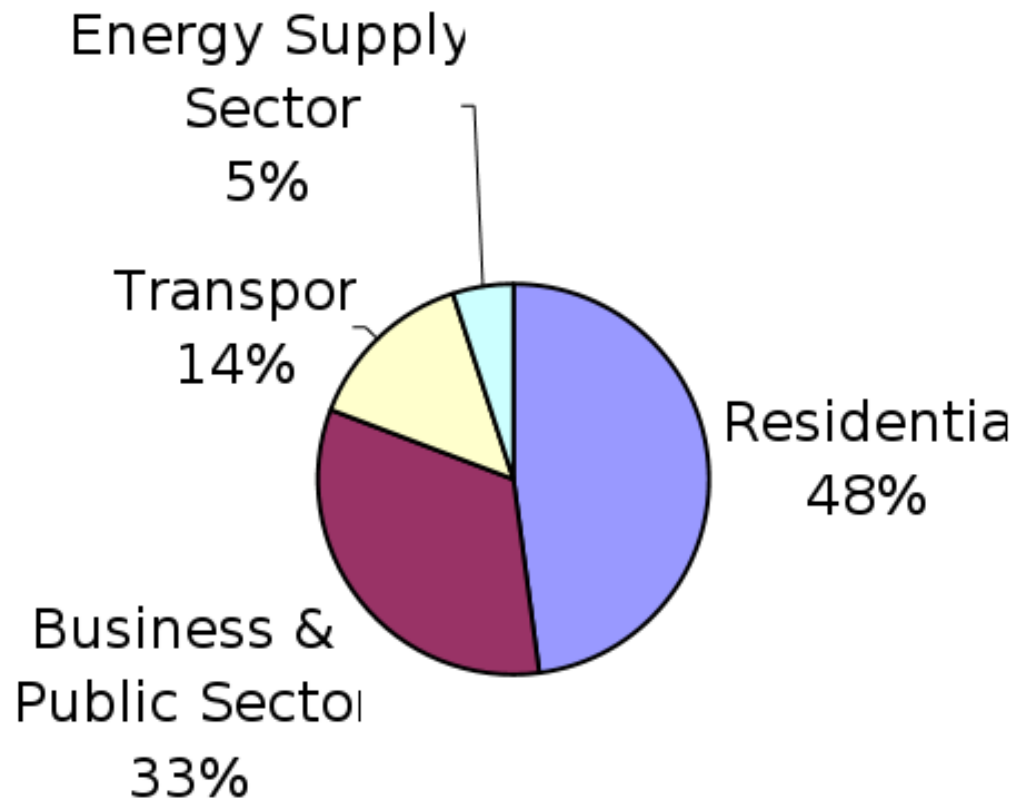


# Implementation of Directive in Ireland

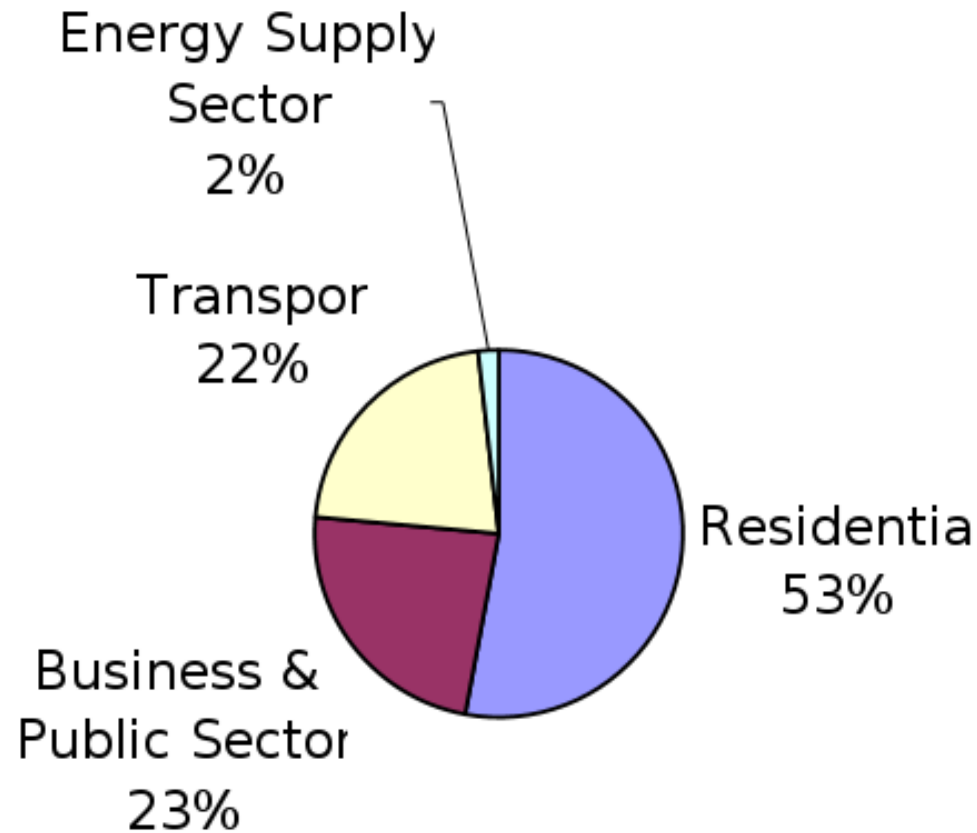


EEAP Ireland Target Energy savings GWh PEE			
Sector	2010	2016	2020
<b>Residential</b>	<b>2605</b>	<b>7640</b>	<b>10355</b>
Business & Public Sector	1790	3375	8340
Transport	775	3105	4670
Energy Supply Sector	275	300	365
Total	5454	14420	23730
<b>ESD Target</b>	<b>6500</b>	<b>13117</b>	<b>31925</b>
Reference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

# Ireland's Energy Saving targets for



## Ireland's Energy saving targets for



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
<b>Residential Total</b>	<b>2605</b>	<b>7640</b>