

What the L?



The New Irish Building Regulations Part L:

The Impact on City Centre Developments

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ENERGY CORK COMMUNITY BREAKFAST BRIEFING 26TH OCT 2017

The New Irish Building Regulations Part L:

Overview

1

**Introduction to
new regulations**

2

**Compliance
simulation**

3

**Changes between
Part L 2008 &
2017**

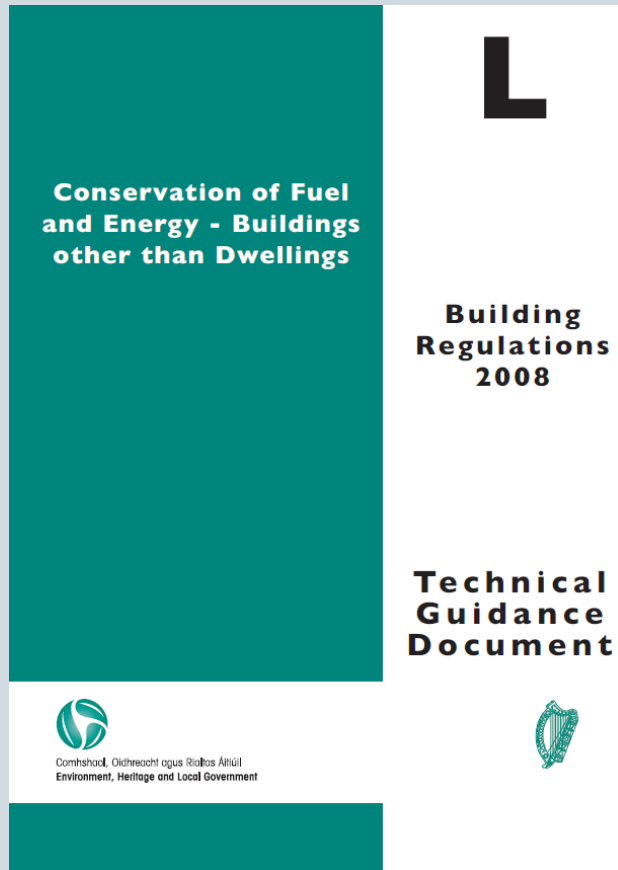
4

Example building

5

Conclusions

Introduction



EPBD defines NZEB as “...a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby”.

New Regulations

Interim NZEB Performance Specification for new buildings owned and occupied by Public Authorities

Introduction

The following is set out a performance specification for new buildings owned and occupied by Public Authorities after 31st Dec 2018. It is intended that this specification will form the Nearly Zero Energy Buildings requirement in the interim period until the new 2017 Part L for Buildings other than Dwellings takes effect.

The definition of Nearly Zero Energy Buildings as defined in Directive 2010/31/EU on the energy performance of buildings (recast) as:

"nearly zero-energy building" means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;

Application

Public Authorities should use this performance specification in the design of all new buildings from the 1st January 2017. It is intended that applying this standard from this date will enable all new buildings owned and occupied by Public Authorities after the 31st Dec 2018 to be Nearly Zero Energy Buildings. The application of the performance parameters specified in Table 1 will achieve a performance that is in the order of 50% to 60% better than current requirements.

This specification and any updates will be available to download from the SEAI website. Any supporting guidelines or support tools for this specification will be made available there.

Energy from Renewable Sources

The definition of "nearly zero energy building" requires that *"the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;"*

In order to achieve this, a target of 20% Renewables Energy Ratio (RER) has been set as the NZEB energy from renewable sources onsite or nearby target. The draft software tool provided by SEAI will be provided to support the calculation of the RER.

It is recognised that in certain confined situations it may not be possible to achieve the full 20% RER. In these situations Public Sector Authorities should provide the optimum proportion of energy from renewable energy sources that is practically possible.

In all cases the overall energy performance of the building should be equivalent to the performance of the building as if the 20% RER had been achieved.

Overheating

Public Authorities should work with their design teams to define a satisfactory criteria for the internal environment and carry out the necessary assessments to ensure

Department of Housing, Planning, Community and Local Government Date: 22-12-2016 Rev. 0

- Issued 23rd Dec 2016,
- To be used from **1st Jan 2017**
- Applicable until Part L 2017 applies

Conservation of Fuel and Energy - Buildings other than Dwellings

Building Regulations 2017

Technical Guidance Document




An Roinn Tithíochta, Pleanála, Pobail agus Rialtais Áitiúil
Department of Housing, Planning, Community and Local Government



- Draft regulations currently under review
- Applicable to works that take place on or after 1st Jan 2019
- Transitional agreement: allows the use of Part L 2008 for projects where planning approval has been applied for on or before **31st December 2018** and substantial work has been completed by **1st January 2020**

Supporting Documentation

Interim NZEB Performance Specification Calculation Methodology V1.0 Q1 2017



Interim NZEB Performance Specification Calculation Methodology

Q1 2017

Contents:

- 1 Introduction 2
- 2 Reference Building 3
 - 2.1 Project Database 3
 - 2.2 Geometry 3
 - 2.3 HVAC Systems 5
 - 2.4 HWS Systems 8
 - 2.5 Zones 8
 - 2.6 Renewables 10
- 3 Actual Building 11
- 4 Interim NZEB Performance Specification Tool 11
 - 4.1 Reference Building 11
 - 4.2 Actual Building 13
 - 4.2.1 Photovoltaics 15
 - 4.2.2 Wind Turbine 15
 - 4.2.3 Solar Panel 16
 - 4.2.4 Biomass 17
 - 4.2.5 Combined Heat and Power 17
 - 4.2.6 Heat Pump 18
 - 4.2.7 Actual Building Energy and Renewable 19
 - 4.3 Results 20

1

EPC_CPC_Interim-NZEB-Specification-Tool.xlsx - Excel

File Home Insert Draw Page Layout Formulas Data Review View BLUEBEAM Tell me what you want to do


Clipboard Font Alignment Number Conditional Formatting Styles Cells

B6

Interim NZEB Specification Tool

VERSION 1

Publication Date: Q1 2017



Colour Key

- User Input, only editable cells
- Constant
- Calculated Value

1. General information						
Public Body:						
Building Address:						
2. Assessor Details						
Assessor Name:						
Assessor Number:						
3. Reference Building Data						
	Actual Energy Use:	Guidance Note:	Fuel:	Primary Energy:	CO2 Emissions:	
Heating Energy	25.3096	Values are taken from the actual energy use for the manually created Reference Building	Mains Gas	27.84	5.14	
Cooling Energy	20.0171		Electricity	43.84	9.47	
Auxiliary Energy	11.5074		Electricity	25.20	5.44	
Lighting Energy	45.4944		Electricity	99.63	21.52	
Hot Water Energy	4.22082		Mains Gas	4.64	0.86	
			Reference Building without Renewable			

BER

No changes to BER rating procedure



Virtual Environment v6.1.1 (SBEM v3.5.b.1)

Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is: **A3**

The Building Energy Rating (BER) is an indicator of the energy performance of this building. It covers energy use for space heating and cooling, water heating, ventilation and lighting, calculated on the basis of standard operating patterns. It is accompanied by a CO₂ emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO₂ emissions, relative to what would apply for a similar building generally satisfying the Building Regulations 2006. Well rated properties are the most energy efficient and will tend to have the lowest energy bills.

BER Number: voidvoidvoid **Date of Issue:** 26 May 2016
Building Type: Office **Valid Until:** 25 May 2018
Useful Floor Area (m²): 17949 **BER Assessor No.:** 123456
Main Heating Fuel: Natural Gas **Assessor Company No.:** 1234
Building Environment: Air Conditioning **Assessor Scheme:** Not accredited

Building Energy Rating (Indicator)	Carbon Dioxide (CO ₂) Emissions Indicator
< 0.17 A1	BEST 0
≥ 0.17 A2	
≥ 0.34 A3	
≥ 0.50 B1	
≥ 0.67 B2	
≥ 0.84 B3	
≥ 1.00 C1	
≥ 1.17 C2	
≥ 1.34 C3	
≥ 1.50 D1	
≥ 1.75 D2	
≥ 2.00 E1	
≥ 2.25 E2	
≥ 2.50 F	
≥ 3.00 G	WORST >3.0

Calculated annual CO₂ emissions: 35 kgCO₂/m²/yr
0.49

IMPORTANT: This provisional BER is calculated on the basis of pre-construction plans and specifications provided to the BER assessor, and using the version of the assessment software quoted above. The BER assigned to this building on completion may be different, in the event of changes to those plans or specifications, or to the assessment software.

Part L 2017

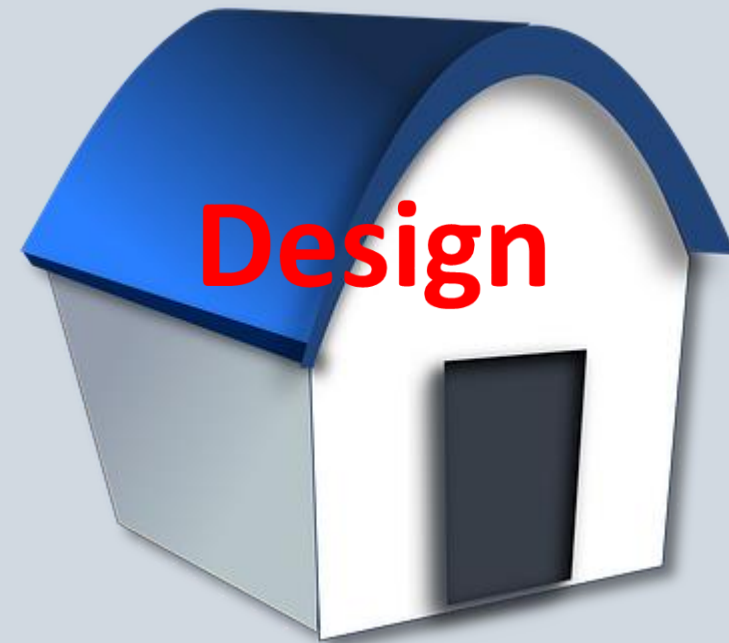
1. EPC & CPC
2. Renewable contribution

Simulation Procedure

Reference Building



Actual Building Building



Simulation Procedure

$$EPC = \frac{\text{Primary Energy}_{\text{Actual Building}}}{\text{Primary Energy}_{\text{Reference Building}}}$$

$$CPC = \frac{\text{CO}_2 \text{ Emmissions}_{\text{Actual Building}}}{\text{CO}_2 \text{ Emmissions}_{\text{Reference Building}}}$$



EPC and CPC defines level of renewables

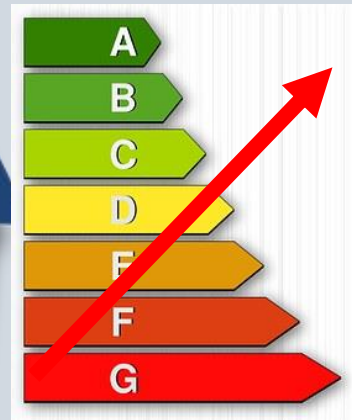
New Requirements

	For compliance	Renewables
Energy Performance Coefficient (EPC)	EPC 1.0	EPC > 0.9 & CPC > 1.04 20%
Carbon Performance Coefficient (CPC)	CPC 1.15	EPC </= 0.9 & CPC </= 1.04 10%

Changes from Part L 2008

Reference Building

Actual Building Actual Building



Reference Building

Table 1 Interim Reference Building Specification for Public Authority Non-residential Buildings

Element	Side lit or unlit (where HVAC specification is heating only)	Side lit or unlit (where HVAC specification includes cooling)	Top lit
Roof U Value (W/(m ² ·K))	0.15	0.15	0.15
Wall U Value (W/(m ² ·K))	0.15	0.15	0.15
Floor U Value (W/(m ² ·K))	0.15	0.15	0.15
Thermal Bridging			
Window U Value (W/(m ² ·K))	0.15	0.15	0.15
Side lit : Exposed facade: windows with area that is either: 1.5m high x full facade OR 40% of exposed facade			
Top Lit::12% of exposed facade be made up of roof-light			
G-Value (%)	40	40	40
Light Transmittance (%)	71	71	71
Air Permeability (m ³ /(m ² ·h))	5	5	5
Gross internal area less than 250 m ²			
Air Permeability (m ³ /(m ² ·h))	5	5	5
Gross internal area greater than 250 m ²			
Lighting luminaire (lm/circuit watt)	65	65	65
Occupancy Control	Yes	Yes	Yes
Daylight Control	Yes	Yes	Yes

Improved building fabric specification

Advanced lighting and services specification

20% PV

50-60% increase of overall efficiency

Maintenance Factor	0.8	0.8	0.8
Heating efficiency (heating and hot water)%	91	91	91
Central Ventilation SFP (W/(l/s))	1.8	1.8	1.8
Terminal unit SFP	0.3	0.3	0.3
Cooling (air-conditioned) (SEER/SSEER)	N/A	4.5/3.6	4.5/3.6
			2.7
			Yes
			Yes

Renewable Energy Ratio (RER)
% (provided by photovoltaics with at 30 degrees and a south west or south east orientation)

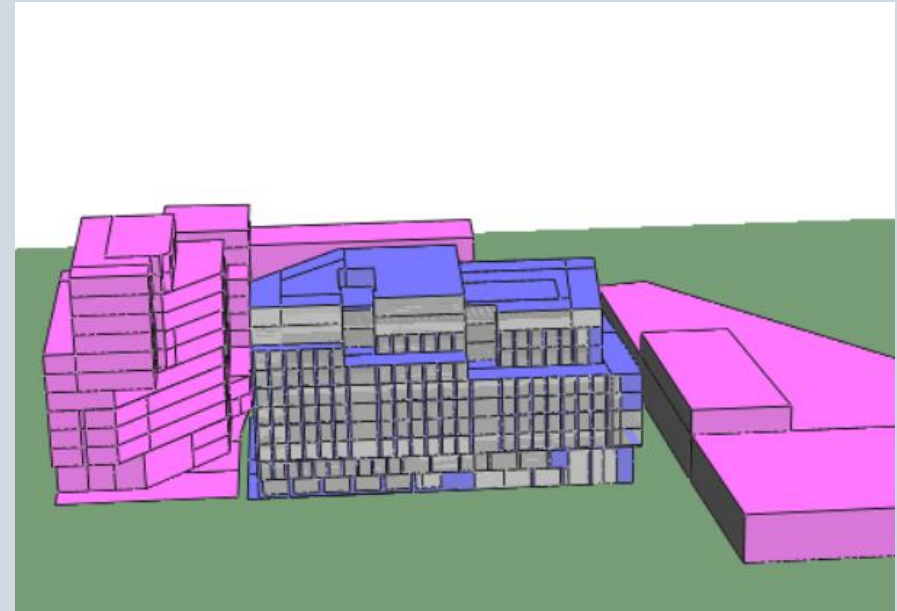
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units and fans,

where: $E_{P_{tot}}$ is the total primary energy including renewable energy and $E_{P_{ren}}$ is the renewable primary energy. [kWh/m²a].

Example Office Building

- 16,000m²
- Dublin city centre
- Owned and occupied by public authority
- Meets and exceeds Part L – 2008
- BER A3 Rating
- Mechanical and Lighting systems:
 - 4-pipe Fan-coil-unit system
 - Gas fired boilers
 - Water cooled chillers
 - Low SFP
 - AHU Heat Recovery
 - Low lighting power density



EPC & CPC

	Part L - 2008	Part L - 2017		
EPC	0.36	0.82	<1.0	<0.9
CPC	0.36	0.83	<1.15	<1.04

**No changes required to
meet EPC & CPC**



Next Step

1. EPC & CPC



2. Renewable contribution



Renewable Energy Ratio (RER)

- Photovoltaic
- Solar Panel – Thermal
- Wind Energy
- CHP
- Biogas CHP
- Biomass Boiler
- Heat Pumps

Photovoltaic

PV Array Type	PV Area [m²]	PV Efficiency	Primary Energy [kWh/ m²/ year]	RER	Meets RER 20%?	Meets RER 10%?
Monocrystalline Silicone	3,200	15%	12.94	21%	Yes	Yes
Monocrystalline Silicone	1,600	15%	6.47	10%	No	Yes
Polychrystalline Silicone	4,000	12%	12.94	21%	Yes	Yes
Amorphous Silicone	4,000	6%	6.47	11%	No	Yes
Other thin films	4,000	8%	8.63	14%	No	Yes



Solar Thermal

- 2% RER
- Small hot water load



Wind Energy

Assumptions:

- 30m hub height
- 60kW rated power
- 22m horizontal axis
- 4% RER (large scale)

Feasibility:

- Only roof mounted feasible
- Hard to integrate to city centre developments



CHP

- Full heating & hot water load 8% RER
- Constant load only provided by hot water
- Hot water load 1% RER



Biogas CHP

- 38% RER
- Storage and delivery issues for city centre locations



Biomass Boiler

- 18% RER
- Issues around frequent delivery and large storage areas
- Air quality issues with the use of wood pellets

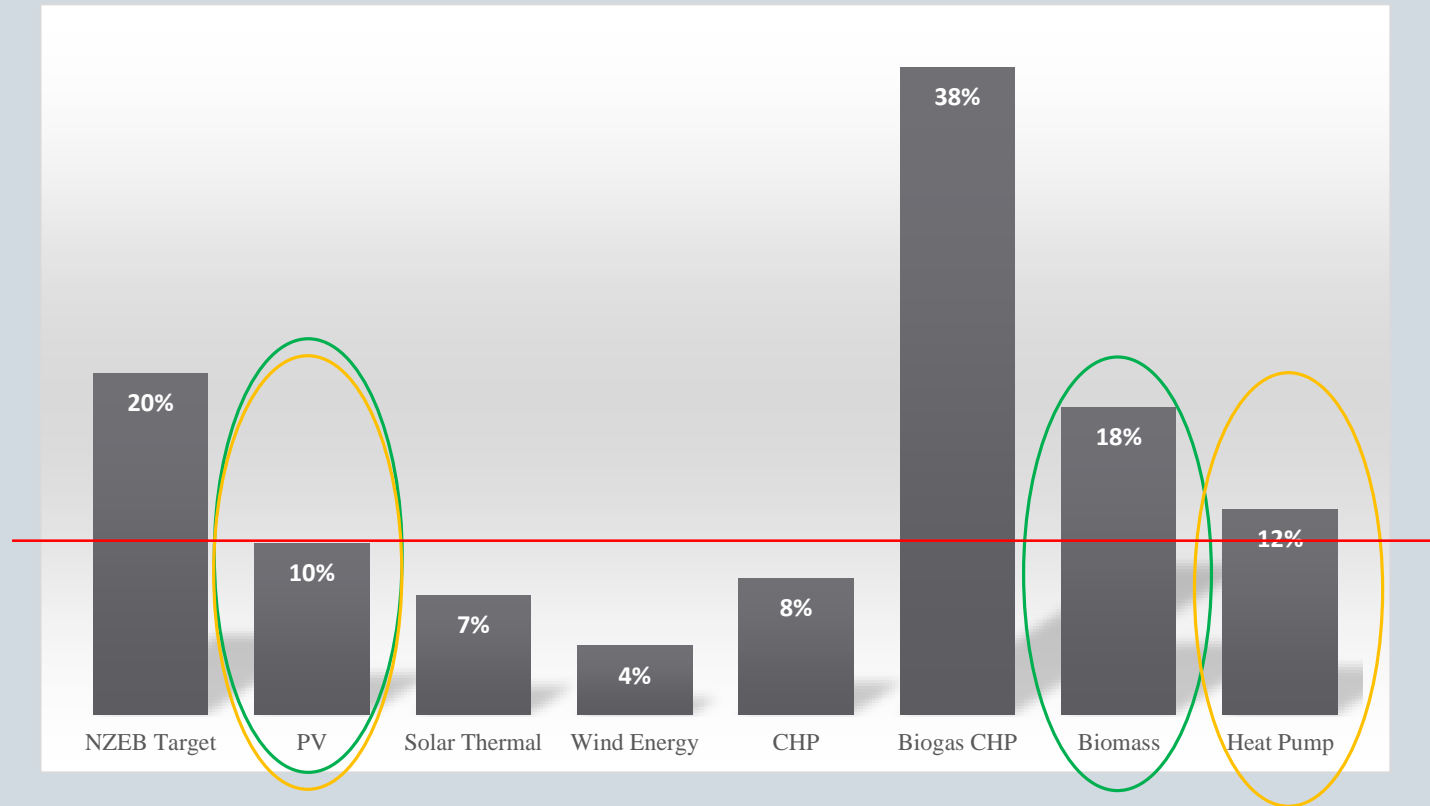


Heat Pumps

- 12% RER
- Most feasible option for city centre location
- Low design temperatures
- Poor performance low external temperatures
- Use of refrigerant



Renewable Energy Ratio Results



Public Consultation

- No embodied energy
- Primary energy factor based on 2015 data
- SBEM not suited for complex buildings, call for dynamic simulation
- 10% option might not be acceptable under EPBD
- Concerns of oversizing CHPs, PV overshadowing
- No maintenance requirements



Conclusions

- EPC and CPC can be met with a building designed to BER A3
- Renewable Energy Contribution will be challenging for city centre projects
- Push for high efficiency buildings to reduce renewable energy requirements
- The typical Dublin office solution not viable

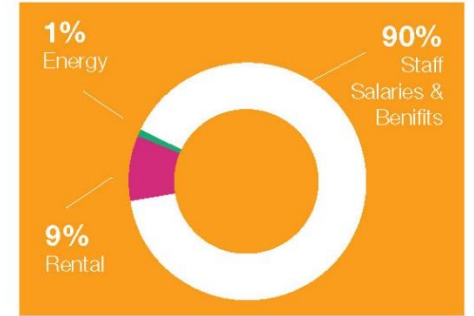


Arup Cork onealbertquay | WELL Features

Thank you

Q&A

Health And Wellbeing Consultancy at Arup
[Click here](#)



WELL identifies 100 performance metrics, design strategies, and policies that can be implemented in buildings.



WELL is based on a thorough review of the existing research into the effects of spaces on individuals.



WELL is the first standard of its kind that focuses solely on the health and wellbeing (H&WB) of building occupants.

” – *Designing and operating facilities for the betterment of the occupants*

ARUP