Part L Review
New Domestic Buildings 2014

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11th-13th February 2014

What I will be talking about

Llywodraeth Cymru
Welsh Government

- Introduction
- Background
- Key changes to Part L1A 2014
  - meeting the five new-build compliance steps
  - Inclusion of regulation 25C
  - New format
- Worked Examples
- Summary

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Introduction

- AECOM led the technical support to WG on the Part L 2014 review from our office in Cardiff
- AECOM is a world-wide design engineering consultancy with around 3,600 employees in the UK
- This includes a 60-strong Sustainability group who undertook the technical and cost analysis, and stakeholder engagement throughout the process
- Davis Langdon, now part of AECOM , provided costing information
- Additional specialist support was provided by:

Background

- In 2012 Welsh Government consulted upon a 40% reduction to greenhouse gas emissions compared to 2010 levels.
- Elemental recipe approach - fabric first + renewable energy generation
- Considered consultation responses and have taken a balanced approach delivering an 8% reduction in emissions compared to 2010 levels
- This is an interim step to delivering zero carbon (and nearly zero energy) buildings by 2021 as set out in EU law.

New-build 2010: The five compliance steps

1. **Achieving the TER -** Dwelling Emission Rate (DER) ≤ Target Emission Rate (TER)
2. **Limits on design flexibility –** fabric standards and system efficiencies
3. **Limiting the effects of solar gains in summer**
4. **Building performance consistent with DER** - Quality of construction & commissioning
5. **Provisions for energy efficient operation of the dwelling** - Providing information / O&M instructions

New-build 2010: The five compliance steps

1. **Achieving the TER -** Dwelling Emission Rate (DER) ≤ Target Emission Rate (TER)
2. **Limits on design flexibility –** fabric standards and system efficiencies
3. **Limiting overheating due to solar and other gains**
4. **Building performance consistent with DER** - Quality of construction & commissioning
5. **Provisions for energy efficient operation of the dwelling** - Providing information / O&M instructions

Criterion 1 changes: Calculating the TER

- Traditionally, Part L1A has targeted a percentage improvement compared to a historic 2002 performance standard that is consistent across all dwelling types
- However, the challenge in reducing CO_2 can vary significantly by building type

Part L 2006	20% improvement over 2002
Part L 2010	25% improvement over 2006 (40% improvement over 2002)

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Criterion 1 changes: Calculating the TER

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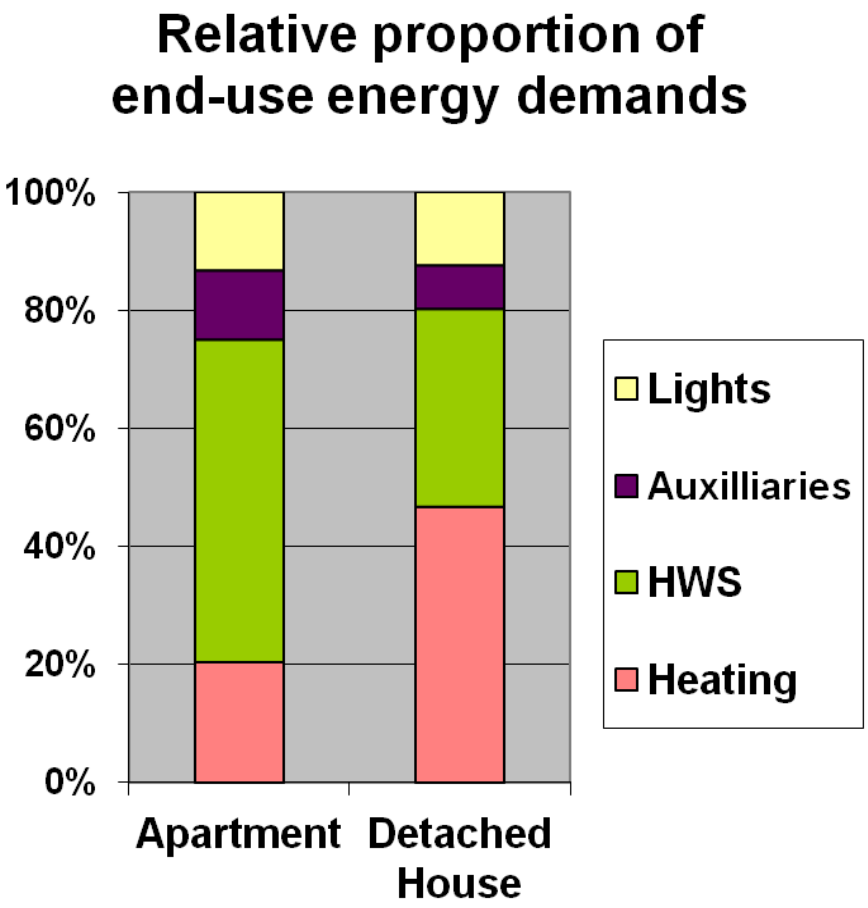

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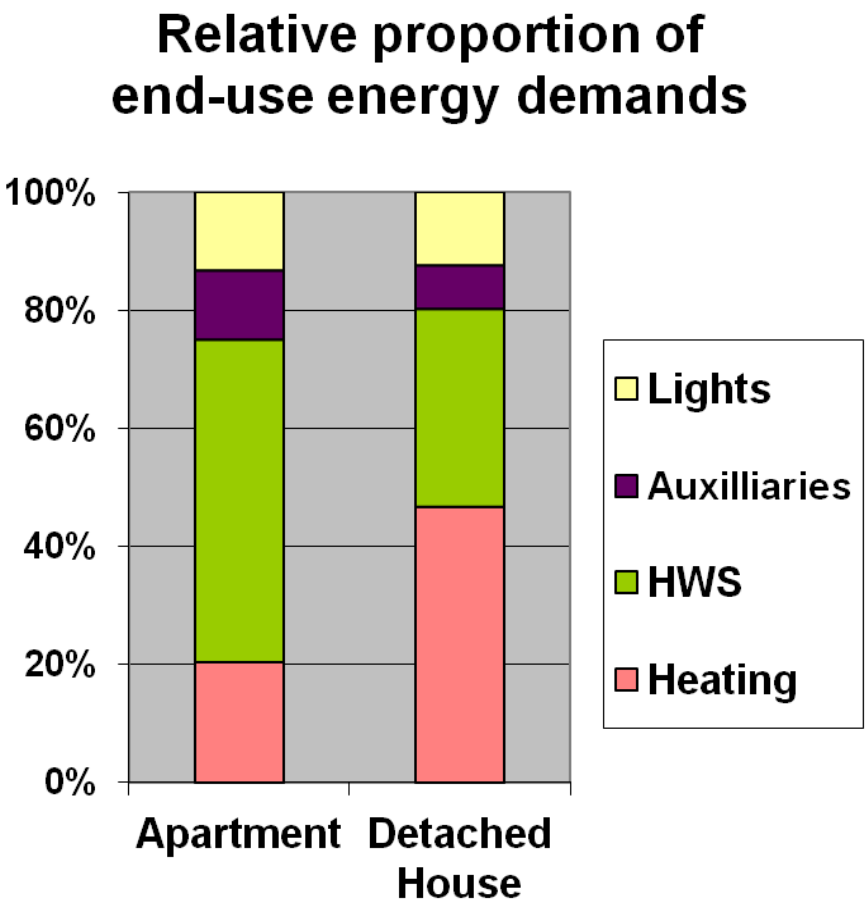
Criterion 1 changes: Calculating the TER

- Traditionally, Part L1A has targeted a percentage improvement compared to a historic 2002 performance standard that is consistent across all dwelling types
- However, the challenge in reducing CO_2 can vary significantly by building type
- As proposed in the consultation, Part L 2014 introduces **one elemental set of specifications for all dwelling types** to which no additional improvement factor is applied.



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Criterion 1 changes: Calculating the TER

– The ‘**elemental recipe**’ is based on a set fabric and service specification applied to **a gas heated dwelling**.

  - The recipe is typically a compliant solution (meets Criteria 1 and 2)
  - More commonly, the recipe will provide a **reasonable starting point** for a developer to select their own best solution.

– Provided the dwelling satisfies the limits on design flexibility as set out in Criterion 2, the designer has flexibility to achieve the TER utilising fabric and services measures and integrating of low and zero carbon technologies.

– The impact is a **8%** uplift in the TER on 2010 levels across the build mix, comparable to the uplift provided by TAN 22.

Table B1: Elemental Recipe Specification

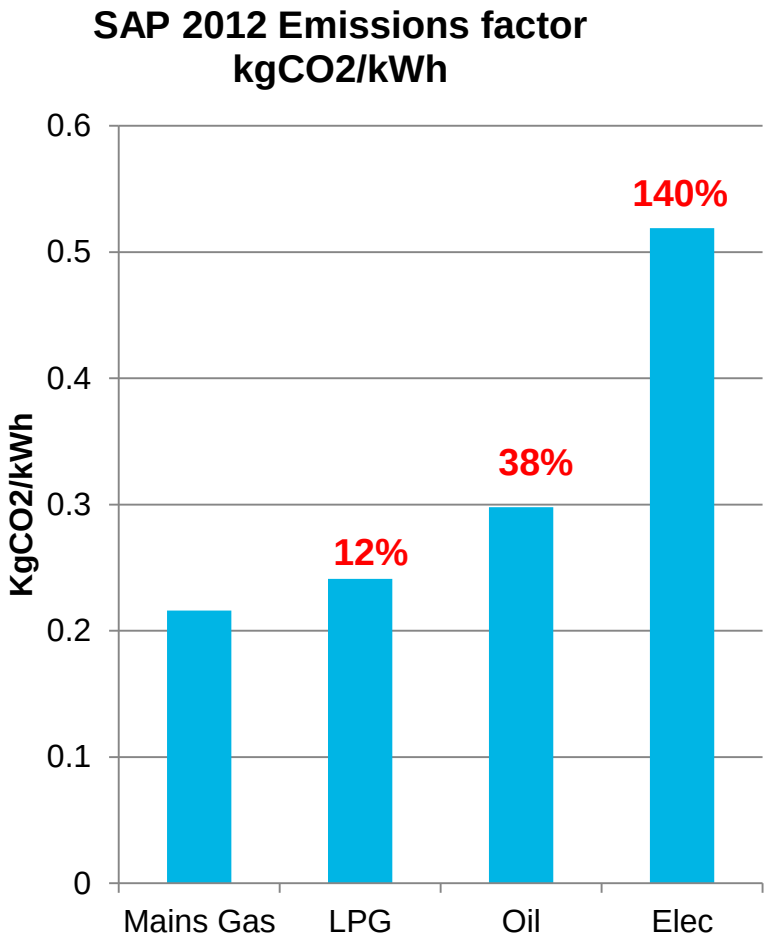
Element or System	Elemental Recipe Values
Opening areas (windows and doors)	Same as actual dwelling up to a maximum proportion of 25% of total floor area
External Walls (W/m²K)	**0.18**
Party Walls (W/m²K)	**0.0**
Floor (W/m²K)	**0.13**
Roof (W/m²K)	**0.13**
Windows, roof windows, glazed rooflights and glazed doors	**1.4**
	g-value = **0.63**
Opaque doors (W/m²K)	**1.0**
Semi glazed doors (W/m²K)	**1.2**
Air tightness ($m^3/h.m^2$ at 50Pa)	**5.0**
Linear thermal transmittance	**Standardised Psi values** – SAP Appendix R, Except y=0.05 W/m²K if the default y=0.15 W/m²K is used in the actual building
Ventilation type	Natural (with extract fans)
Air conditioning	None

Table B1: Elemental Recipe Specification

Element or System	Elemental Recipe Values
Fuel Type	**Gas**
Heating System	Boiler with radiators
	89.5% efficient (SEDBUK 2009)
Controls	Time and temperature zone control Weather compensation
Hot water storage system (if specified)	Stored hot water from boiler
	Thermostat controlled, Separate time control for space and water heating
HWC loss factor (if specified)	Declared loss factor equal or better than $0.85 \times (0.2 + 0.051\ V^{2/3})$ kWh/day
Secondary Space Heating	None
Low Energy Lighting	100% Low Energy Lighting

Criterion 1 changes: Fuel factor

- Fuel factors have been traditionally used for fuels that are more carbon intensive than gas.
- A fuel factor relaxes the TER for homes heated by fuels such as LPG, Oil and electricity.
- So particularly helpful for
  - Off-gas grid homes
  - Electrically heated apartments
- With a fuel factor, the TER is eased to reduce cost but still requires some additional measures, compared to gas homes, to reduce emissions.



% uplift in carbon intensity of fuel compared to mains gas

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Criterion 1 changes: Fuel factor

– Response from consultation was supportive of the use of Fuel factors citing the additional burden on off gas grid homes if no fuel factors used

– Hence, **fuel factors retained at current levels but rebased**
  - to align with new TER methodology
  - to align with revised DECC carbon emission factors

Criteria 2 changes: Mandatory Elemental backstops

- Energy efficiency elemental backstops have been **significantly tightened**
- For Part L 2014 fabric backstops are **mandatory**
- So potential to relax fabric when introducing LZCs is more limited.
- For **reasonable provision** back stops for **building services** refer to the Domestic Building Services Compliance Guide

Limiting Fabric Parameters			
		2010	2014
Roof	$W/m^2.K$	0.20	**0.15**
External Wall	$W/m^2.K$	0.30	**0.21**
Floor	$W/m^2.K$	0.25	**0.18**
Party Wall	$W/m^2.K$	0.20	**0.20**
Windows, doors, curtain walling	$W/m^2.K$	2.0	**1.60**
Air permeability	$m^3/hr.m^{-2}$ @50Pa	10	**10**

Criterion 3: Limiting overheating due to solar and other gains

- Change in title stresses that it is **not just solar gains** that need to be controlled during the summer period
- It highlights the need to insulate circulation pipes for domestic hot water
- For example: feedback is that in apartment blocks, poorly insulated pipes in communal areas can contribute to overheating
- This guidance is already in the Domestic Building Services Compliance Guide

Criteria 4 changes: Quality of construction & commissioning

- Removal of the separate quality assured accredited construction detail approach for thermal bridging introduced in Part L 2010

Criterion 5 changes: Provision of information for energy efficient operation of the building

- Provides more details of what this information should contain
- Content:
  - **Explanation** of essential design principles and key features
  - **Floor plans** to show main heating and ventilation components
  - **Explanation** of how to operate, control and maintain building services and LZCs
  - **Signposts** to other key information that should be provided including appliance manuals, EPC recommendation report

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Regulation 25A - Consideration of high-efficiency alternative systems for new buildings

- Part L 2014 consolidates the amendments made in Dec 2012 which require the feasibility of high efficiency alternative systems to be taken into account before construction commences.
- High Efficiency systems include:
  - decentralised energy supply based on energy from renewable sources;
  - cogeneration;
  - district or block heating or cooling
  - heat pumps.
  - And others where suitable

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Regulation 25A - Consideration of high-efficiency alternative systems for new buildings

- Before work starts, need to notify Building Control that the analysis has been undertaken, is documented and is available for verification purposes.
- CO_2 emission rate calculation software may offer this functionality to the builder.

- *Note: The Building Regulations are technology neutral and do not mandate the installation of high efficiency alternative systems or other low and zero carbon systems.*

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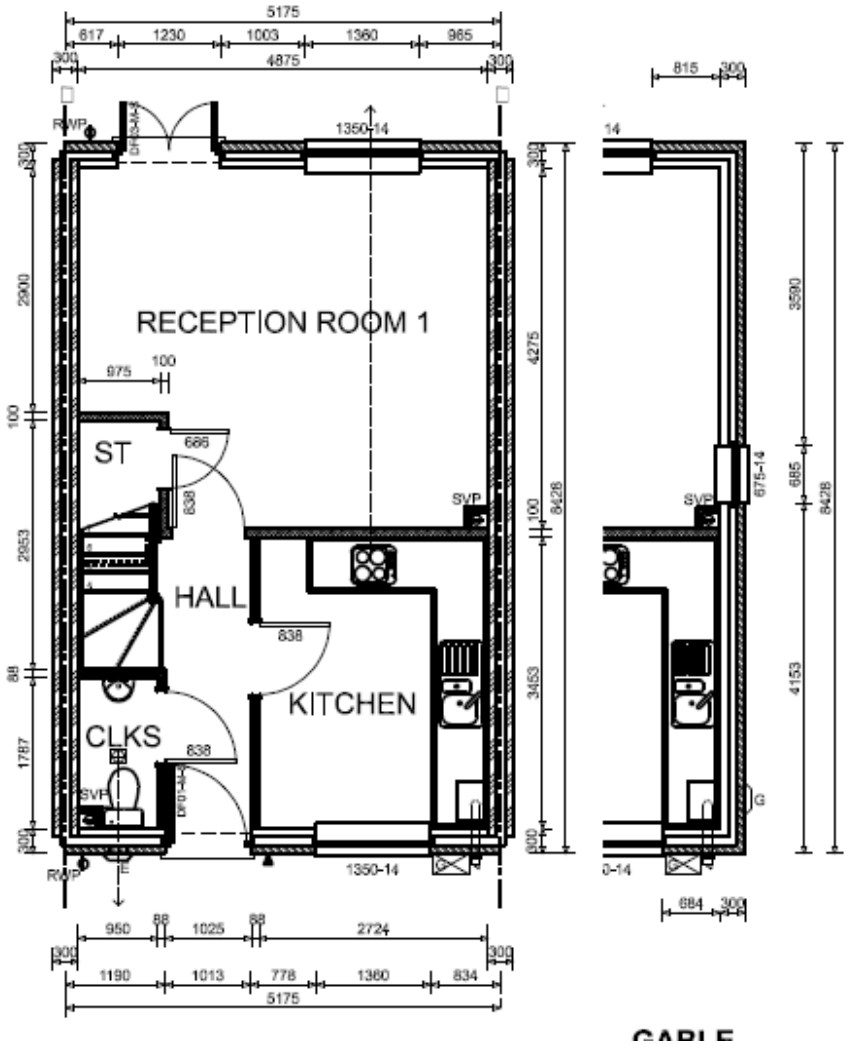
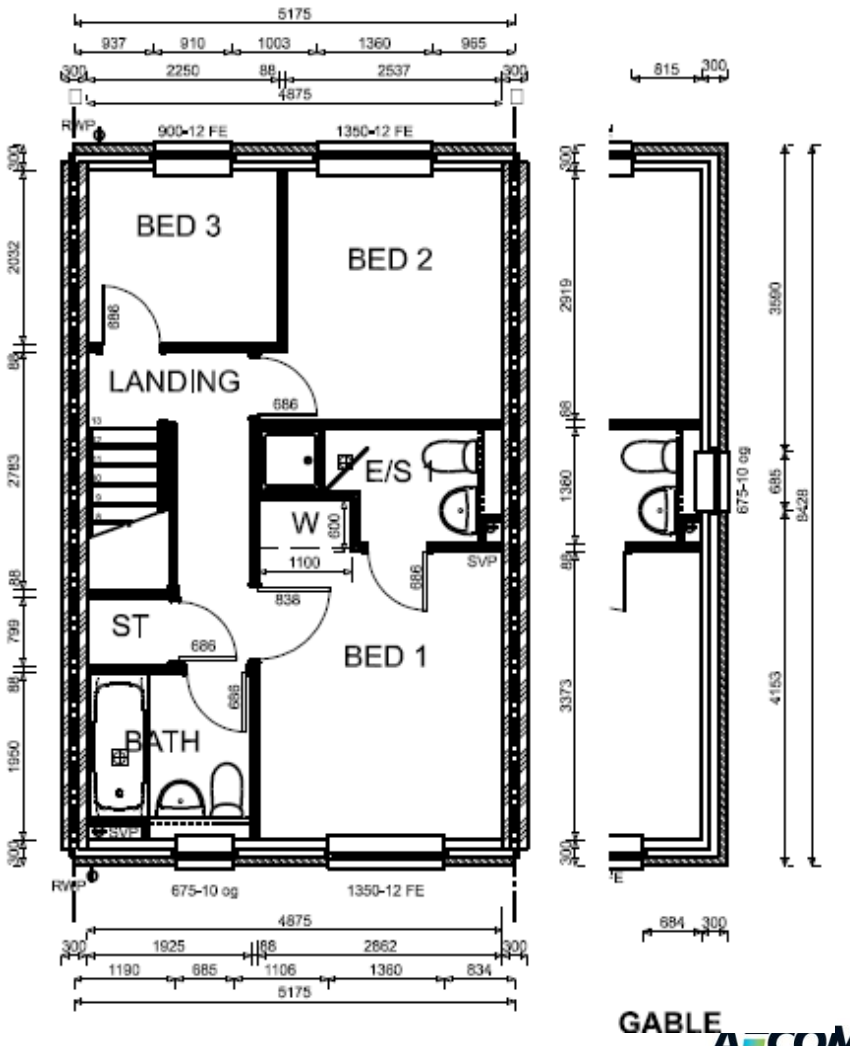
Part L 2014 – New Format

- Reformatted with single column – easier to read on PCs, tablets and other mobile devices
- Simpler ‘Plain English’ approach
- Flow chart to help navigation
- Restructured to prioritise key information

Example routes to meet the TER– End Terrace 76m²



GROUND FLOOR



FIRST FLOOR

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Example routes to meet the TER – End Terrace 76m² – Relaxed fabric and Triple Glazing

	Appendix R	
	Elemental Recipe	
Ext. Walls (W/m²K)	0.18	
Party Walls (W/m²K)	0	
Floor (W/m²K)	0.13	
Roof (W/m²K)	0.13	
Windows (W/m²K)	1.4 (g=0.63)	
Door (W/m²K)	1	
Air tightness (m³/hr.m²)	5	
Gas boiler	89.5% (SEDBUK)	
Services		
TER ($kgCO_2/m^2.yr$)	18.76	
DER ($kgCO_2/m^2.yr$)	**18.76**	

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Example routes to meet the TER – End Terrace 76m² – Relaxed fabric and Triple Glazing

	Appendix R	End Terrace
	Elemental Recipe	Relaxed fabric + Triple Glazing
Ext. Walls (W/m²K)	0.18	**0.21**
Party Walls (W/m²K)	0	0
Floor (W/m²K)	0.13	**0.18**
Roof (W/m²K)	0.13	0.13
Windows (W/m²K)	1.4 (g=0.63)	**0.9** (g=0.57)
Door (W/m²K)	1	**1.4**
Air tightness (m³/hr.m²)	5	**7**
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)
Services		-
TER ($kgCO_2/m^2.yr$)	18.76	18.76
DER ($kgCO_2/m^2.yr$)	**18.76**	**18.75**

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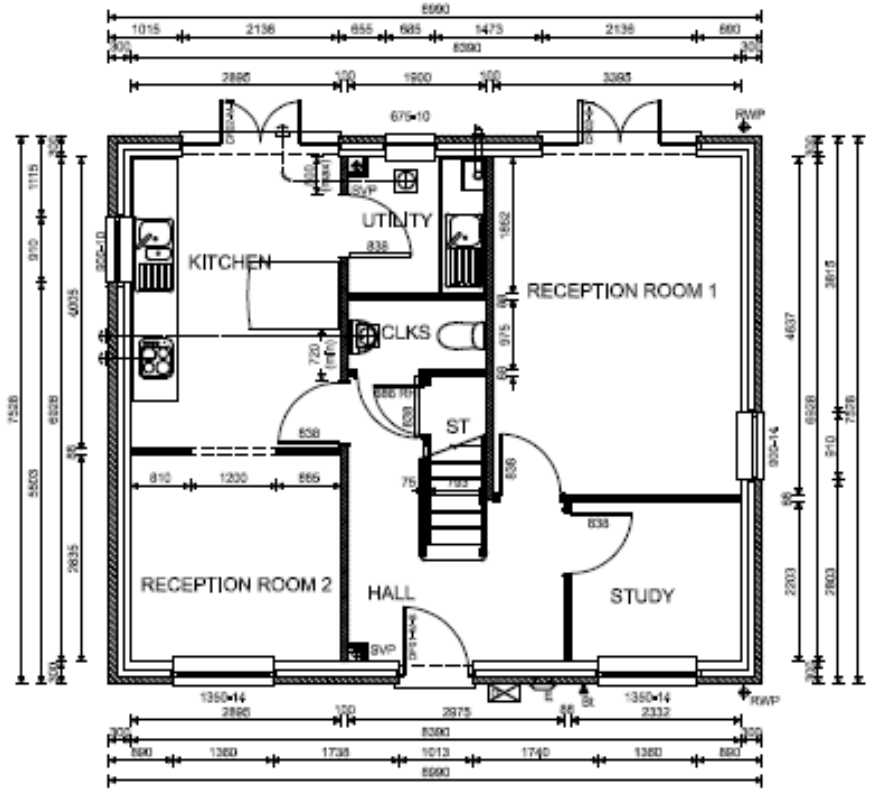
Example routes to meet the TER– Detached House 118m²



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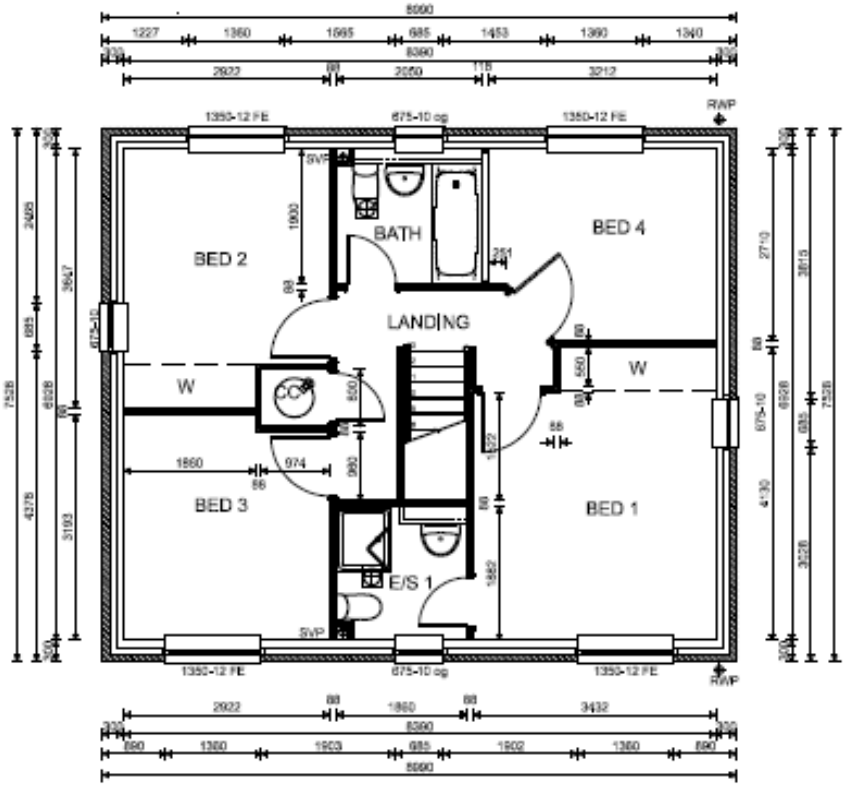

FIRST FLOOR

Example routes to meet the TER–
Detached House 118m² - Varying U values

	Appendix R		
	Elemental Recipe		
Ext. Walls (W/m²K)	0.18		
Party Walls (W/m²K)	0		
Floor (W/m²K)	0.13		
Roof (W/m²K)	0.13		
Windows (W/m²K)	1.4		
Door (W/m²K)	1		
Air tightness (m³/hr.m²)	5		
Thermal Bridging	App R		
Gas boiler	89.5% (SEDBUK)		
TER ($kgCO_2/m^2.yr$)	17.07		
DER ($kgCO_2/m^2.yr$)	**17.07**		

Example routes to meet the TER–
Detached House 118m² - Varying U values

	Appendix R	Detached	
	Elemental Recipe	Relaxed Fabric	
Ext. Walls (W/m²K)	0.18	**0.21**	
Party Walls (W/m²K)	0	0	
Floor (W/m²K)	0.13	**0.18**	
Roof (W/m²K)	0.13	**0.15**	
Windows (W/m²K)	1.4	**1.6**	
Door (W/m²K)	1	**1.4**	
Air tightness (m³/hr.m²)	5	**7**	
Thermal Bridging	App R	App R	
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	
TER ($kgCO_2/m^2.yr$)	17.07	17.07	
DER ($kgCO_2/m^2.yr$)	**17.07**	**18.95**	

Example routes to meet the TER–
Detached House 118m² - Varying U values

	Appendix R	Detached	Detached
	Elemental Recipe	Relaxed Fabric	Less Relaxed Fabric + Triple glazing
Ext. Walls (W/m²K)	0.18	**0.21**	0.21
Party Walls (W/m²K)	0	0	0
Floor (W/m²K)	0.13	**0.18**	0.18
Roof (W/m²K)	0.13	**0.15**	0.15
Windows (W/m²K)	1.4	**1.6**	**0.9**
Door (W/m²K)	1	**1.4**	**1**
Air tightness (m³/hr.m²)	5	**7**	**6**
Thermal Bridging	App R	App R	App R
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	89.5% (SEDBUK)
TER ($kgCO_2/m^2.yr$)	17.07	17.07	17.07
DER ($kgCO_2/m^2.yr$)	**17.07**	**18.95**	**17.05**

Example routes to meet the TER–
Detached House 118m² - Backstop U values + PV

	Appendix R	Detached	
	Elemental Recipe	Relaxed Fabric + Y=0.15	
Ext. Walls (W/m²K)	0.18	**0.21**	
Party Walls (W/m²K)	0	**0**	
Floor (W/m²K)	0.13	**0.18**	
Roof (W/m²K)	0.13	**0.15**	
Windows (W/m²K)	1.4	**1.6**	
Door (W/m²K)	1	**1.4**	
Air tightness (m³/hr.m²)	5	**7**	
Thermal Bridging	App R	**Y = 0.15**	
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	
Services			
TER ($kgCO_2/m^2.yr$)	17.07	**17.21**	
DER ($kgCO_2/m^2.yr$)	**17.07**	**21.65**	

Example routes to meet the TER–
Detached House 118m² - Backstop U values + PV

	Appendix R	Detached	Detached
	Elemental Recipe	Relaxed Fabric + Y=0.15	Backstop Fabric, Y= 0.15 + PV
Ext. Walls (W/m²K)	0.18	**0.21**	0.21
Party Walls (W/m²K)	0	**0**	0
Floor (W/m²K)	0.13	**0.18**	0.18
Roof (W/m²K)	0.13	**0.15**	0.15
Windows (W/m²K)	1.4	**1.6**	1.6
Door (W/m²K)	1	**1.4**	1.4
Air tightness (m³/hr.m²)	5	**7**	7
Thermal Bridging	App R	**Y = 0.15**	Y = 0.15
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	89.5% (SEDBUK)
Services			**1.23kWp PV**
TER ($kgCO_2/m^2.yr$)	17.07	**17.21**	**17.21**
DER ($kgCO_2/m^2.yr$)	**17.07**	**21.65**	**17.2**

Summary

- Part L 2014 to deliver 8% CO_2 savings across the new homes build mix relative to Part L 2010.
- A new elemental specification for new dwellings has been introduced for the purpose of target setting.
- The limiting fabric values in Criterion 2 are now mandatory
- Amendments requiring the consideration of the feasibility of high efficiency alternative systems are included
- The guidance for insulation of circulation pipes within communal spaces is given greater prominence
- The Approved Document is in a new style format

Thank You

Any Questions?

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