

Residential Heating

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# The Future Homes Standard; Proposed changes to Part L - Heat Pumps as a Solution

In association with



Presented by

Rhys Jacob & Sunny Vashisht

## This webinar will cover...

- Energy efficiency in the news
- A decarbonising grid
- What is the Future Homes Standard (FHS)
- Resultant proposed changes to Part L1A of the regulations
- Q&A



**The Future  
Homes Standard;**  
Proposed changes  
to Part L

## After this webinar you should have...

- Awareness as to why change is required
- Understanding how a decarbonised grid will affect change
- Knowledge of the forthcoming Future Homes Standard
- Appreciation as to how this might affect building regulations
- Confidence in this topic and how **ME** can support you



**The Future  
Homes Standard;**  
Proposed changes  
to Part L

## Poll Question

- What is your job role?
  - End-User/Purchaser
  - Installer/Contractor
  - Architect/Specifier/Developer
  - Facilities Manager/Service Engineer
  - Other

## Energy Efficiency in the News



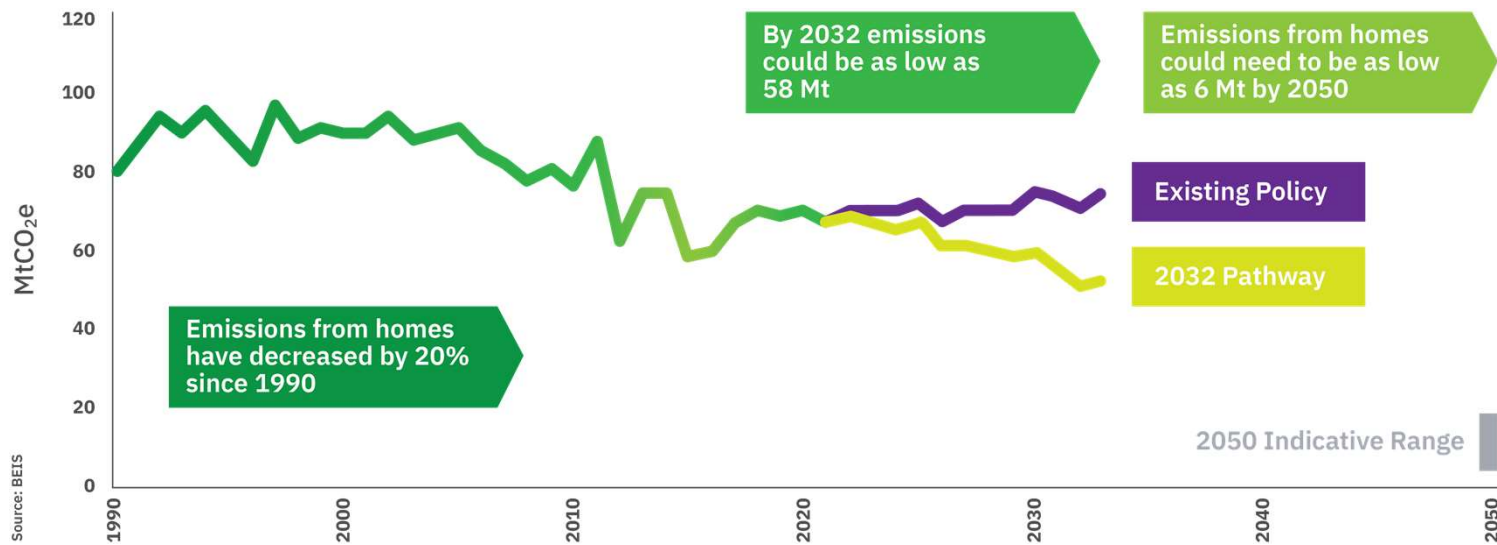
**BREAKING NEWS**

**Climate change** ...6 million people join the wave of global protests.....

Source: Telegraph • Getty images

## 2032 Pathway

**Figure 20:** Actual and projected emissions in homes, taking into account the clean growth pathway, 1990-2050.



## Clean Growth Strategy

Just some of the headlines

- **Published in Oct-17 by the Government (BEIS<sup>1</sup>)**
- **Mission to lead way to a low carbon future for UK**
- **Review of Building Regulations for energy efficiency**
- **Private Rented homes to be EPC<sup>2</sup> band 'C' by 2030<sup>3</sup>**
- **Between 6 to 9 million properties to be insulated**



<sup>1</sup>BEIS: Department for Business, Energy & Industrial Strategy / <sup>2</sup>Energy Performance Certificate / <sup>3</sup>UK

## Clean Growth Strategy

More of the headlines

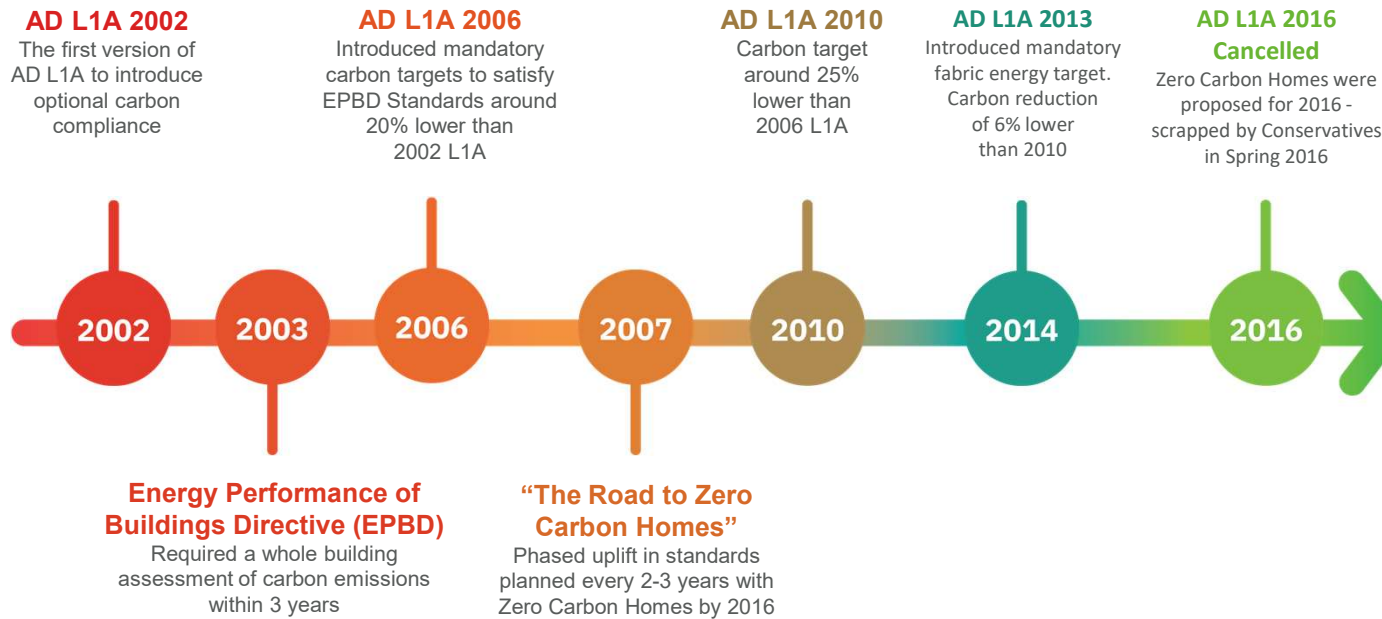
- As many homes as possible EPC band 'C' by 2035
- Similar goals in commercial buildings
- Businesses to be 20% more energy efficient by 2030
- Recognition that we are on a trajectory to 'increase' our carbon emissions if we do nothing!



<sup>1</sup>BEIS: Department for Business, Energy & Industrial Strategy / <sup>2</sup>Energy Performance Certificate / <sup>3</sup>UK



## History of AD L1A



## Poll Question

- How much have emissions from new homes decreased since 1990?
  - 15%
  - 20%
  - 30%
  - 40%
  - Other
  
- Answer: **20%**: Significant progress is still required to deliver zero emissions!

# A De-carbonising Grid



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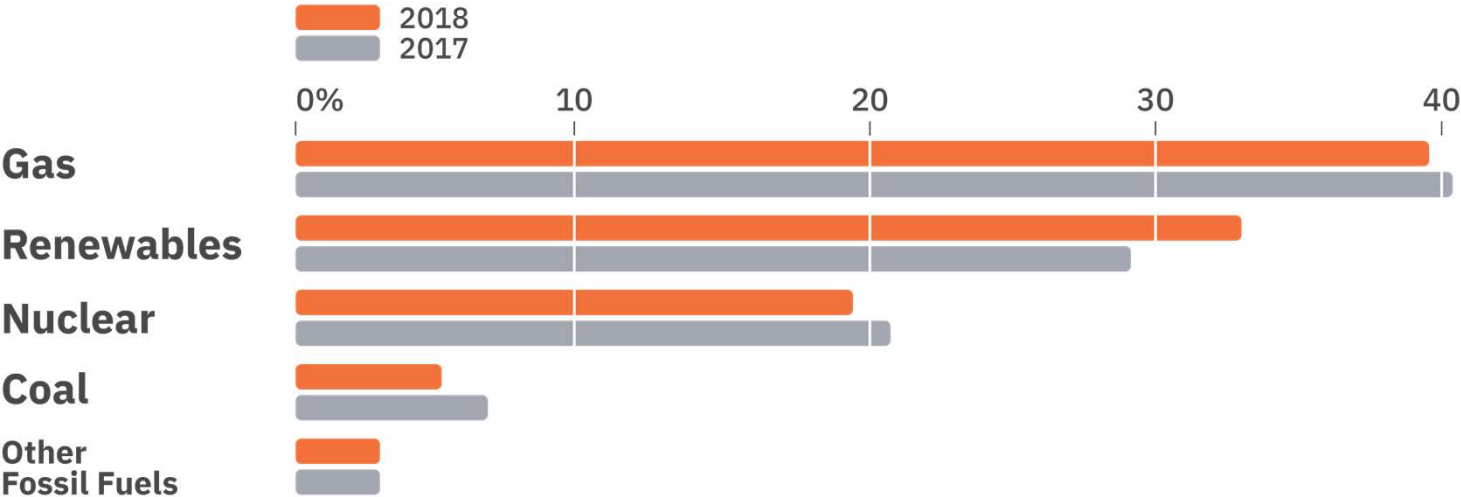
## The decarbonising grid

2018 statistics...

- Electricity grid has changed rapidly since the existing Part L was developed
- 53% of the UK's electricity was generated from low carbon sources
- Renewables (solar, wind, tidal) contributed to 33% of this generation
- During 2020, 65% of electricity is estimated to be from a low carbon source

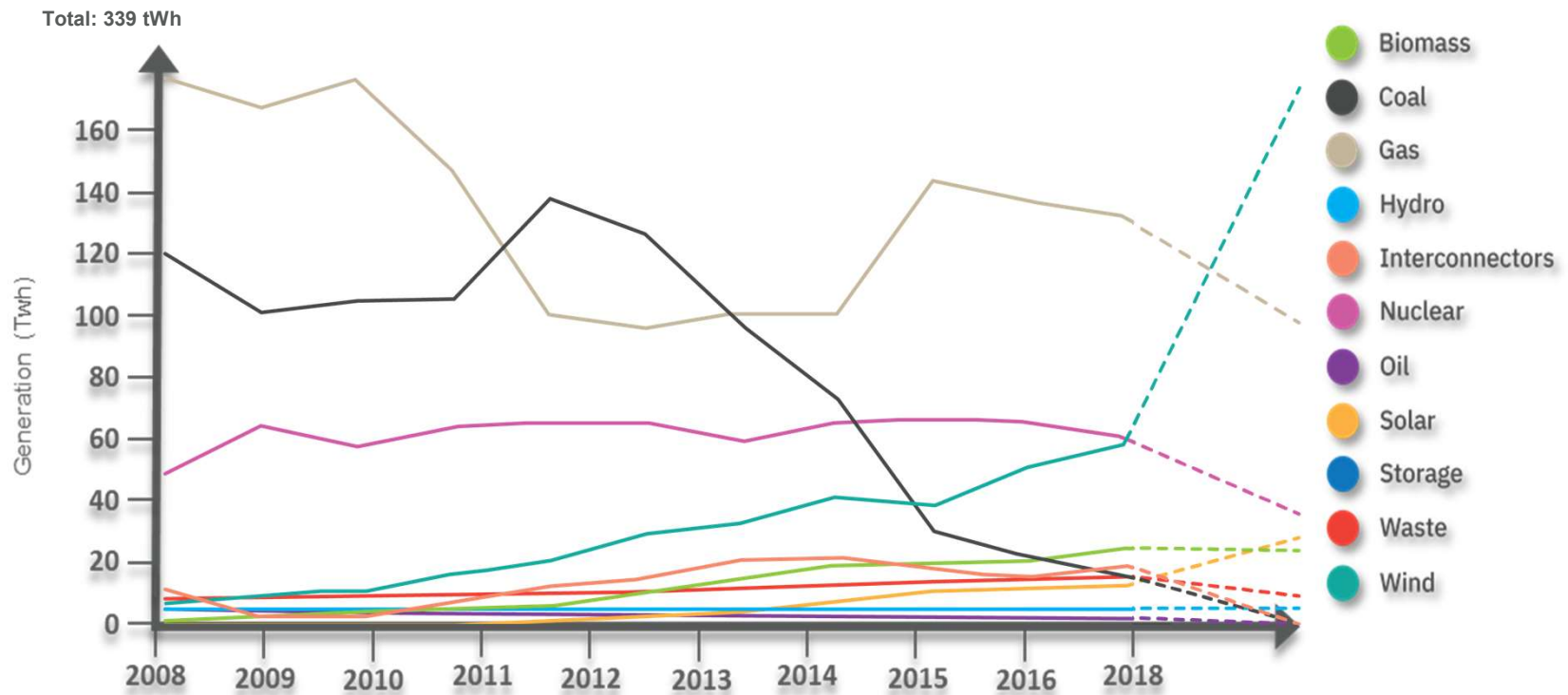


# UK Electricity Supply 2017-2018



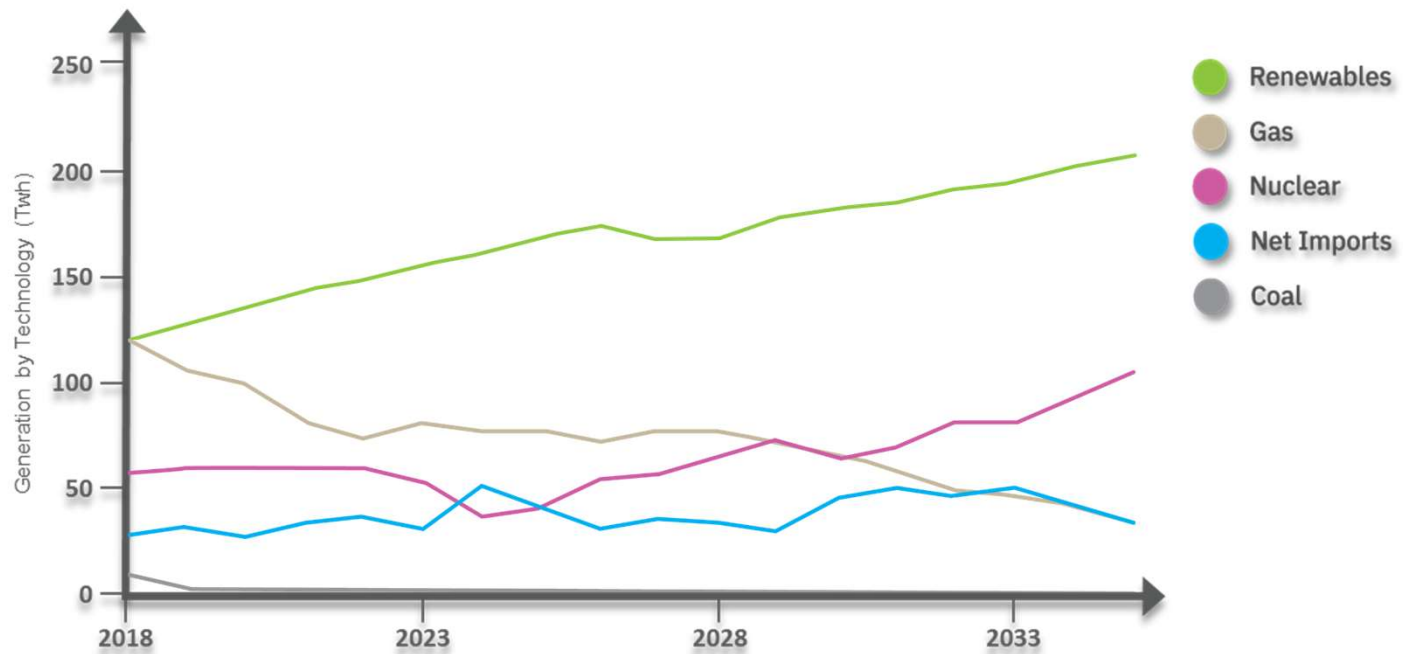
Source: Energy and Emissions Projections 2018 (BEIS)

# UK Electricity Supply Projections



Source: Energy and Emissions Projections 2018 (BEIS)

## UK Electricity Supply Projections



Source: Energy and Emissions Projections 2018 (BEIS)

## Poll Question

- Which technology's electrical generation has increased the most in the past 10 years?
  - Nuclear
  - Solar
  - Wind
  - Hydro
  - Other
  
- Answer: **Wind**: Significantly surpassing any other 'new' energy source



## What is the 'Future Homes Standard'?



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## The Future Homes Standard (FHS)

A roadmap for energy efficiency standards

- **2019 spring statement introduced the FHS to the public**
- **By 2025 homes are to be future proofed with low carbon heating and world leading levels of energy efficiency**
- **A new home built to Future Homes Standard expected to be 75-80% lower CO2 than current regulations**
- **In order to start progress to this goal, it is proposed an uplift to Part L will be delivered in 2020**

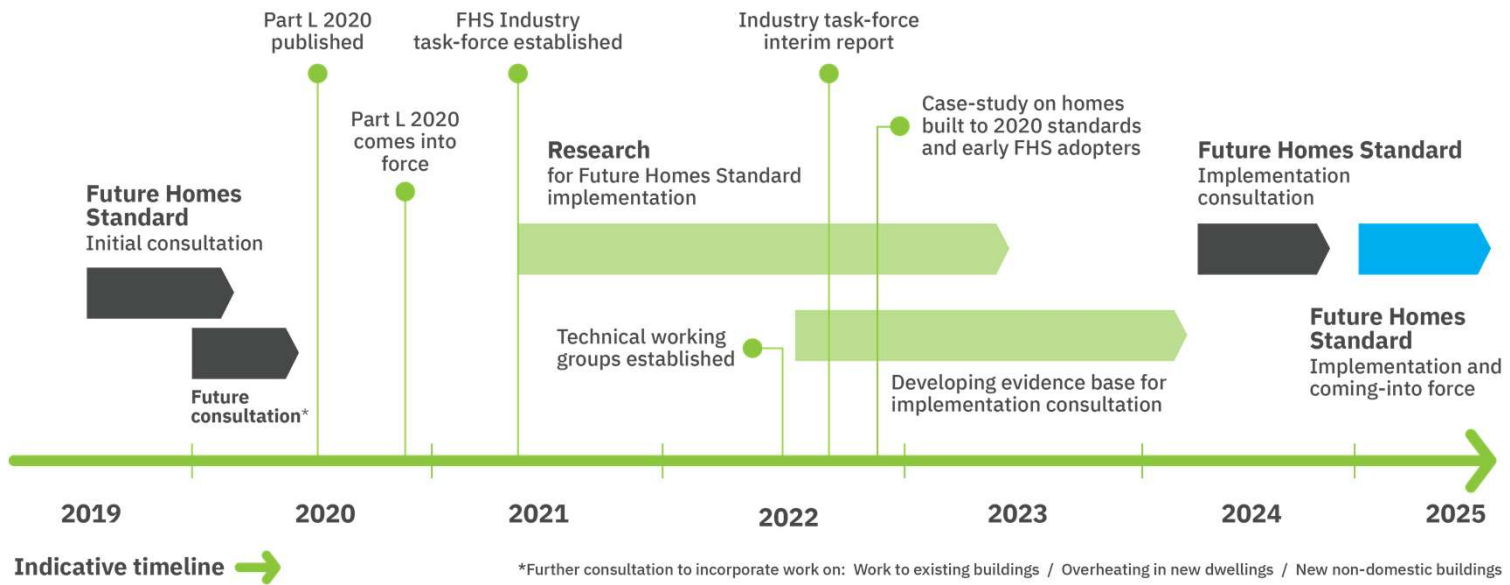
# 80%

Reduction in  
CO2



# Future Home Standard - timeline

## Roadmap to the Future Homes Standard



## The rest of the UK?

Potentially a roadmap for the UK only...

- **Wales** - consultation released 19th December 2019, closes 12th March. Similar to Future Homes Standard but greater uplifts of energy efficiency standards
- **Scotland** - Government recently announced a consultation will be issued in 2020 with change in 2021
- **Northern Ireland** - level of change partially depends on Brexit, but expected 2020/2021



## Scottish building standards

Sustainable governance of energy efficiency

- **Sections 6 (Energy) & 7 (Sustainability) of the Scottish Building Standards govern the use of energy and carbon emissions**
- **Section 7 has four tiers available (compared to 2010 standards):**
  - **Bronze:** CO<sub>2</sub> saving of 21.4% for domestic buildings and 43% for non-domestic buildings (vs.2010)
  - **Silver:** the same CO<sub>2</sub> requirement as Bronze with the additional requirement that homes must use no more than 40 kWh/m<sup>2</sup> for space heating per year
  - **Gold:** a reduction in CO<sub>2</sub> emissions of 42.8% for domestic buildings and 64.3% for non-domestic buildings compared to Scottish 2010 buildings standards. Homes must use no more than 30 kWh/m<sup>2</sup> for space heating per year
  - **Platinum:** a reduction in CO<sub>2</sub> emissions of 100% compared to 2010 standards

## Poll Question

- When is the Future Homes Standard due to be implemented?
  - 2022
  - 2023
  - 2024
  - 2025
  - Other
  
- Answer: **2025**: Following several updated iterations of the building regulations

## Proposed changes to Part L1A



## Compliance metrics

Proposed changes to the Standard Assessment Procedure (SAP)

- **In the consultation four compliance metrics are proposed:**
  - **Primary Energy (new)**
  - **Carbon emissions (retained)**
  - **Householder affordability rating (new)**
  - **Min. standards for fabric and services (retained)**
- **Aiming for a balanced approach of energy use, CO2 emissions & cost**





## What is Primary Energy?

Relating to the original source of the energy being used

- An expression of how 'efficiently' a dwelling is meeting it's heating, ventilation and lighting requirements
- Each fuel used has a factor - key factors include:
  - Planting of biofuel sources
  - Extraction of fuels
  - Transformation of fuels
  - Generation method
  - Transmission and distribution losses



## Why Primary Energy?

An important new criteria that compliments the weakness of current SAP criteria

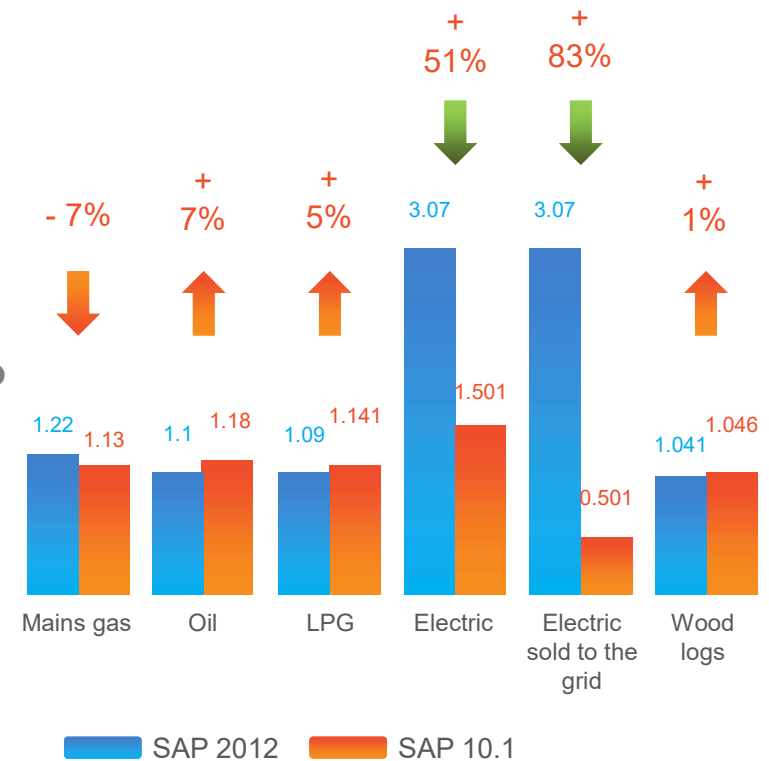
- **Energy Performance of Buildings Directive requires “nearly zero energy buildings” from 2021**
- **As the electricity grid is being decarbonised, using carbon as a measure of energy efficiency for a dwelling is less relevant**
- **Primary Energy is a good indicator of how much of a ‘drain’ a dwelling is on the nations energy infrastructure**



## Primary Energy Factors (PEF)

Comparison of different fuel sources

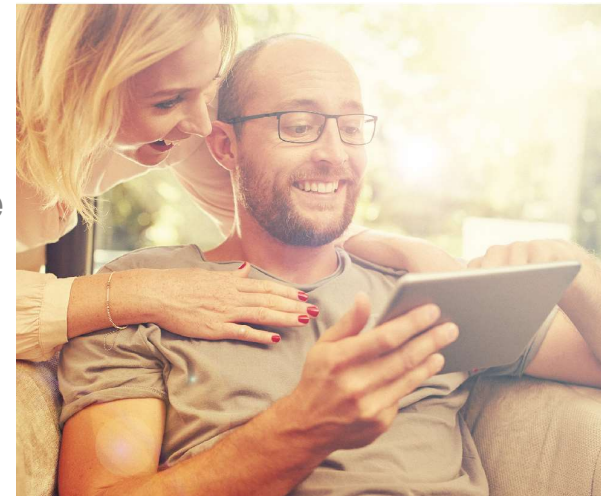
- The homes energy use, per fuel, multiplied by a primary energy factor
- The higher the energy factor, the more difficult to predict energy usage
- Electricity is now much closer to gas than ever before
- A heat pump with 3 to 4 times higher efficiency than a gas boiler will make compliance much more straightforward



## Householder affordability check

The equally important requirement to ensure heating systems are affordable to run

- **Whilst there is a move towards promoting electric heating systems in homes, electricity is still the most expensive fuel**
- **In order to ensure that energy bills are affordable it is proposed a further check is required based on the energy cost of the dwelling**
- **This is to ensure where direct electric heating is used bills are still reasonable**



## Householder affordability check - continued

Comparison of fuel costs sourced from SAP10.1

- Proposal that the check will be based on the EPC rating with a minimum EPC rating set

Fuel	£ SAP 2012	£ SAP 10.1	Efficiency	£ SAP 10.1 Useful kWh
Natural gas	3.48	3.93	93%	4.2
LPG	7.6	6.59	93%	7.1
Direct Electric	13.19	17.56	100%	17.6
ASHP (SCOP 3.5)	13.19	17.56	350%	5.0

## Energy efficiency standards

Phased increase in efficiency required to tackle the climate crisis

- In order to achieve Future Homes Standard and correct our trajectory on emissions a change is needed “as soon as possible”
- Therefore an uplift in energy efficiency standards in building regulations is proposed in 2020
- Two options proposed; “Future Homes Fabric” and “Fabric plus technology”



## Option 1: Future Homes Fabric

A step towards new dwellings with improved fabric thermal performance

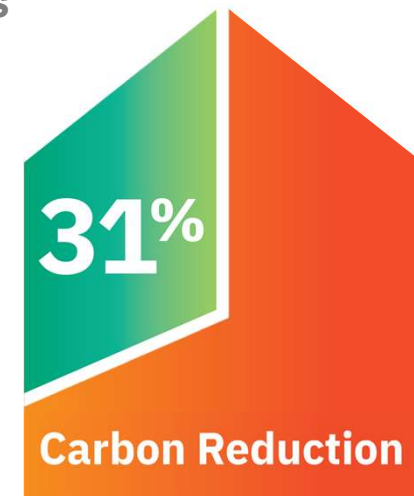
- **Designed to reduce carbon by 20% vs. current regulations**
- **Average cost increase of £2870 per dwelling**
- **Expected to be delivered by very high standards of fabric and is not reliant on renewables**
- **The target a dwelling is competing against would include; triple glazing, lower U-values, higher levels of air-tightness, waste water heat recovery & gas boiler**



## Option 2: Fabric + Technology

Additional step that is stated as the Governments preferred option

- **Designed to reduce carbon by 31% vs. current regulations**
- **Average cost increase of £4620 per dwelling**
- **Encourages the use of low carbon & renewable tech**
- **The target a dwelling is competing against would include:**
  - **Fabric improvements (not as tough as option 1)**
  - **Gas boiler, WWHR<sup>1</sup> & PV<sup>2</sup> Panels**



<sup>1</sup> WWHR = Waste Water Heat Recovery / <sup>2</sup> PV = Photovoltaic Panels



## Option 1 & Option 2 comparison

An analysis for both gas boiler and Air Source Heat Pump solutions

	L1A fabric standard		GAS		ASHP	
	2013	2020	Needed to pass option 1	Needed to pass option 2	Needed to pass option 1	Needed to pass option 2
Wall	0.3	0.26	0.18	0.18	0.22	0.22
Roof	0.2	0.16	0.11	0.11	0.12	0.12
Floor	0.2	0.18	0.11	0.11	0.11	0.11
Doors	2	1.6	1	1	1	1
Windows	2	1.6	0.9	0.9	1.4	1.4
Air-tightness	10	8	5	5	5	5
Technology			1.3 kWp PV	2 kWp PV	Additional technology is not required	-
			WWHR	WWHR		-
			-	MVHR		MVHR

<sup>1</sup> WWHR = Waste Water Heat Recovery / <sup>2</sup> PV = Photovoltaic Panels / <sup>3</sup> MVHR = Mechanical Ventilation with Heat Recovery

## Fuel factors

Changes required to help drive industry towards an increased uptake of low carbon solutions

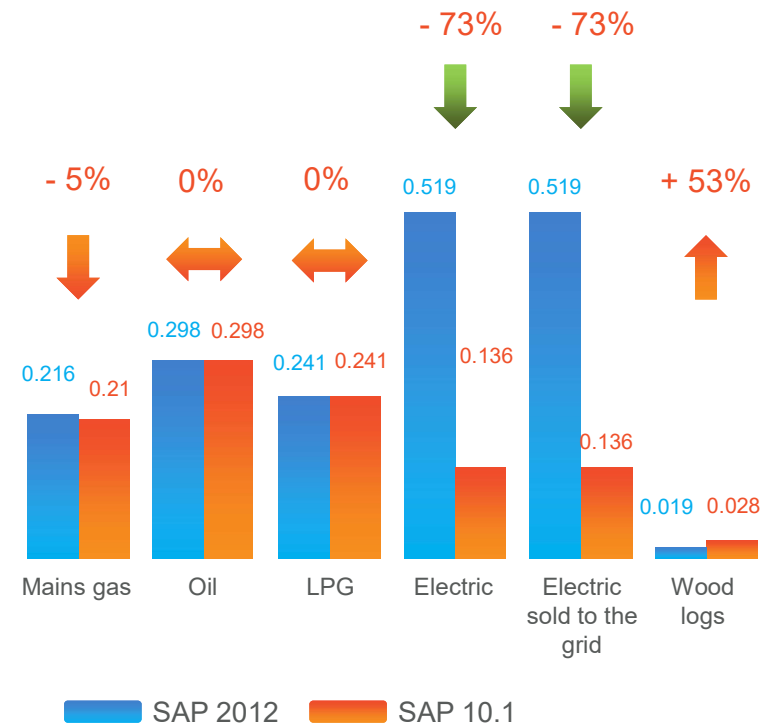
- **Currently, a factor is applied to electricity, LPG & oil based systems to match mains gas standards of compliance**
- **Fuel factors raise the target emission rates (TER) of a dwelling, making it easier for these systems to comply**
- **Proposals to remove fuel factors from SAP to deliver a level playing field have been issued; making it harder for carbon intensive heating systems to comply (e.g. Oil/LPG)**



## New CO2 Factors - SAP 10.1

Electricity – the future of zero carbon solutions

- This is important for the carbon metric within building regulations
- Electric now the lowest producer of carbon
- This will result in very low carbon emissions compared to gas and is therefore easier for heat pumps to comply to the carbon standard



## How will this change dwellings?

Designing for the future...

- We completed some modelling to compare currently compliant dwellings to the new standards
- Systems modelled include Mains Gas, Oil, LPG boilers and heat pumps
- Used BRE's free iSAP tool which uses SAP 10.1 and proposed standards in consultation



## Results

Heat pumps are the only technology capable of meeting both FHS primary\* & carbon targets

	2020 Carbon Emissions <sup>1</sup>	2020 Carbon Target <sup>1</sup>	2020 Primary Energy <sup>2</sup>	2020 Primary Energy Target <sup>2</sup>
Mains gas	13.33	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	79.84	56.97 <sup>a</sup> / 44.63 <sup>b</sup>
Oil	15.13	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	70.17	56.97 <sup>a</sup> / 44.63 <sup>b</sup>
LPG	14.94	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	78.22	56.97 <sup>a</sup> / 44.63 <sup>b</sup>
Std. ASHP	6.13	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	63.40 <sup>3</sup>	56.97 <sup>a</sup> / 44.63 <sup>b</sup>
Ecodan ASHP	5.26	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	54.97	56.97 <sup>a</sup> / 44.63 <sup>b</sup>
Direct Elec. Panel	6.56	10.24 <sup>a</sup> / 8.54 <sup>b</sup>	75.65	56.97 <sup>a</sup> / 44.63 <sup>b</sup>

<sup>a</sup> option 1 & <sup>b</sup> option 2; TER/TPER sourced from the FHS consultation / \* option 1 only / <sup>1</sup> kgCO<sub>2</sub>/yr / <sup>2</sup> kWh/yr / <sup>3</sup> oil is low due to renewable energy compliance supplement

## Poll Question

- Have you already considered the impact the changes that are coming into place next year through Part L and the important role air source heat pumps are expected to have?
  - Yes
  - No
  - Maybe

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## Q&A Session



Presented by

Rhys Jacob, Sunny Vashisht & Max Halliwell

## Final thoughts

Some key takeaways from our session today

- **The grid is decarbonising rapidly - electricity is becoming the favoured fuel**
- **Heat pumps are likely to be the favoured method of heating in the future**
- **Heat pumps offer one of the most cost effective ways to achieve compliance**
- **Low temperature heating is being future-proofed into homes.**
- **It will be increasingly more difficult for Oil and LPG systems to comply**