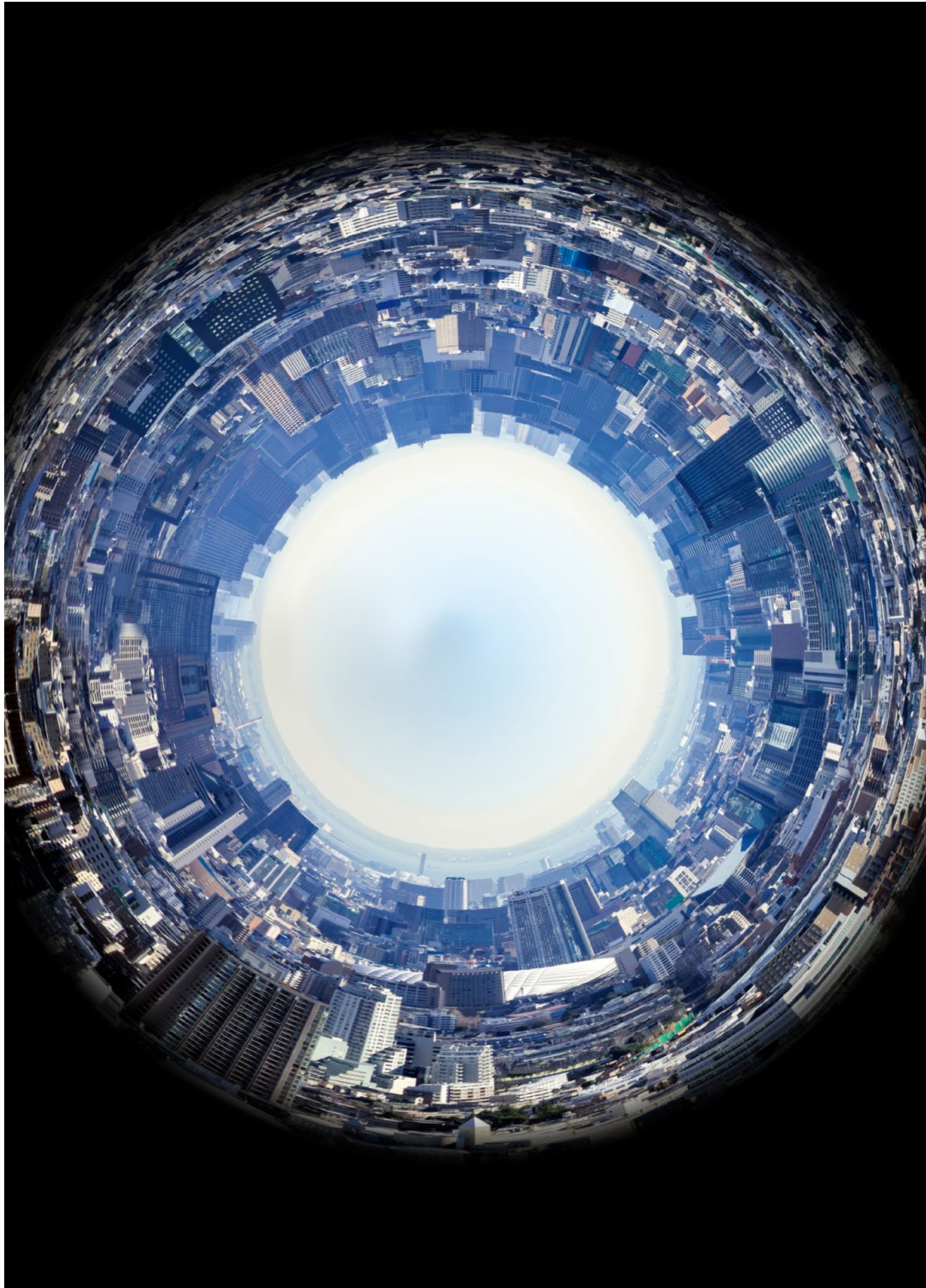


Future Homes Standard. Consultation summary.

SUSTAINABILITY GROUP
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Future Homes Standard. Providing context.

Just over a year ago, the Intergovernmental Panel on Climate Change (IPCC) published a ground-breaking report entitled 'Global Warming of 1.5°C' which concludes that, in order to mitigate the most devastating consequences of climate change on both ecosystems and human civilisations we must limit global warming to 1.5°C over pre-industrial levels. The report also concludes that, to stand a chance of achieving this, we need to reach net zero greenhouse gas emissions globally by 2050. This net zero target goes significantly further than the previously agreed target of an 80% reduction in greenhouse gas emissions over 1990 levels, which was adopted through the Kyoto Protocol in 2008 and reiterated through the Paris Agreement in 2015.

Understanding that we are already experiencing warming of 1°C highlights the magnitude of the challenge facing the people of Earth.

Whilst net zero is a global commitment, it requires robust, national strategies for us to stand a chance of meeting the international target. In response to this need, the UK's Committee on Climate Change released its own Net Zero report in May of this year which concluded that net zero could be reached within the same cost envelope (1-2% GDP) as the previous 80% target. On 27th June, the UK Government ratified the net zero target, enshrining it in UK law.

The built environment currently generates around 25% of domestic greenhouse gas emissions and as sponsors of the UK Green Building Council's Advancing Net Zero initiative, Hoare Lea contributed to the Net Zero Carbon Buildings definition, which seeks to establish a recognised route to decarbonising the UK's existing and future building stock.

However, whilst cities and industry are pushing the envelope to drive the zero carbon transition, national building regulations – the bar by which the minimum standards for the built environment are set – were last reviewed in 2013 and as such, have languished in the tumultuous political landscape of the last six years to the point where they are misrepresentative and not fit-for-purpose.

The recently released consultation proposes a Future Homes Standard, to be introduced in 2025, which aims to ready the UK's new build homes for a transition to zero carbon in 2050. As a meaningful stepping stone to the standard, the government is also consulting on an update to Approved Document L – Part L 2020 – which is likely to stimulate a step change in the approach to constructing and servicing new homes, commensurate to the evolving energy landscape in the UK and our ambitions for national decarbonisation.

1.5°C

The limit of global warming required to mitigate the most devastating effects of climate change.



Hoare Lea was a sponsoring partner of the UKGBC Advancing Net Zero framework definition.

[View PDF](#)

Future Homes Standard. Features and performance.

The following presents a brief summary of the features and performance a home built to the Future Homes Standard is anticipated to demonstrate.

Fabric.

A Future Homes Standard home will have 'very high fabric standards'. The fabric standards are anticipated to be in line with those shown below.

Parameter	Part L 2013	Future Homes Standard	% improvement
External Wall U-value (W/m ² K)	0.18	0.15	17%
Roof U-value (W/m ² K)	0.13	0.11	15%
Floor U-value (W/m ² K)	0.13	0.11	15%
Window U-value (W/m ² K)	1.4	0.8	43%
Window g-value	0.63	0.57	10%
Air permeability (m ³ /h·m ² at 50 Pa)	5	5	0%

These values represent a significant uplift on the Part L 2013 notional dwelling, approaching Passivhaus levels in some cases. The U-value of the windows is in line with the highest performing units currently available on the market.

Heating system.

Whilst reducing demand through improved fabric is important, this alone will not enable new homes to demonstrate net zero emissions by 2050. As such, a low carbon heating system will be integral to the specifications. This could be delivered through heat pumps, district energy networks, and in some instances, direct electric heating.

The consultation recognises that installation of heat pumps in the UK is at a level much lower than that necessary to meet the ambition of the Future Homes Standard and there is a need to establish heat pumps as a mass market solution for low carbon heating.

District energy networks are referenced as an important solution for higher density areas such as cities, demonstrating the ability to incorporate novel, low carbon solutions with limited impact on the consumer, as well as the ability to exploit renewable or waste sources of energy.

Direct electric heating could also have a role to play in heating homes of the future where heat demand is particularly low, for instance where a home is built to very high fabric standards, such as passivhaus. Homes heated by direct electric will need to consider strategies to limit exposure to high electricity costs.

Other technologies, such as hydrogen, are noted as having a potential role to play, but heat pumps, heat networks and, to a lesser extent, direct electric are anticipated to be the primary means of delivering low carbon heat in future.

It is anticipated that gas boilers would be banned in new homes from 2025 onwards.



Image: Assael Architecture

Ferry Lane, London
[Read the project story](#)

Net zero.

The provision of low carbon heating systems (e.g. heat pumps) leveraging the continued decarbonisation of the electricity grid could allow a home built to the Future Homes Standard to achieve net zero operational emissions (regulated sources) without the need for further material improvements in the future.

Recognising this, the standard suggests that primary energy, and CO₂ will be the key metrics for compliance, supported by minimum fabric and building services performance standards.

Energy efficiency standards.

Current legislation allows local authorities to set more stringent energy efficiency targets for new homes than prescribed by national building regulations (broadly in line with old Code for Sustainable Homes Level 4 standards). Government is likely to continue to explore emerging legislation which would inhibit local authorities from setting higher minimum standards for energy efficiency than building regulations to reflect that, as minimum standards through building regulations become increasingly robust, the need for local authorities to set their own energy efficiency targets may become less relevant.



120 BRIDGE ROAD

Part L 2020. What the changes mean.

Part L 2020 is due to come into force in late 2020 following this consultation and update to the documents. Due to the magnitude of the changes, this could stimulate one of the most significant changes in housebuilding strategy that has ever occurred.

Baseline uplift.

Whilst the government wishes Part L 2020 to go as far towards the Future Homes Standard as possible, for reasons regarding sector readiness, next year's update must represent a meaningful stepping stone on the route to the standard without causing market shock which would impede the necessary rate of housebuilding to meet the UK's housing crisis.

The government is exploring two potential options for uplifting the baseline against which compliance with the CO₂ and primary energy targets is established. These are summarised as follows:

OPTION 1

20% reduction in carbon emissions delivered by very high fabric standards.

OPTION 2

31% reduction in carbon emissions delivered by moderate improvements to fabric and the installation of solar PV or similar.

Option 2 is noted as the government's preferred option as "It would deliver more carbon savings and result in lower bills for the householder but has higher build costs." Additionally, the consultation notes that this "...would help to prepare supply chains for heat pumps and increase the number of trained installers."

Impact on CAPEX of the options

The consultation suggests the capital cost implications of the two options compared to a Part L 2013 compliant home are as follows:

	Part L 2020 OPTION 1	Part L 2020 OPTION 2
Detached house	£4,201	£6,524
Semi-detached house	£2,557	£4,847
Mid-terraced house	£2,195	£4,737
Apartment	£2,070	£2,256
Average (based on build mix)	£2,866	£4,615

Part L 2020. What the changes mean.

CONTINUED



Photo: Jon Craig

Wapping Wharf, Bristol

Performance metrics.

Part L 2020 proposes the following performance metrics:

- Primary energy target
- CO₂ emission target
- Householder affordability rating
- Minimum standards for fabric and fixed building services

Considering primary energy first and foremost (rather than CO₂ emissions) and including a consideration of the affordability of a given servicing strategy reflects the challenges and consequences of a shift to all-electric servicing strategies, including the increased demand on an already strained electricity grid and a possible increase in energy bills due to the higher relative cost of electricity compared to gas.

Primary Energy Target.

As the grid decarbonises further, CO₂ emissions will become “...a less important measure of performance because [electricity] will ultimately come from an electricity grid that is zero carbon.” However, reducing CO₂ emissions of new homes and buildings remains a critical objective for government and although primary energy is a good means of driving energy efficiency, it may not drive low carbon choices by itself. For this reason, use of CO₂ targets alongside a primary energy target is proposed.

Householder Affordability Rating.

As electricity has a lower carbon factor and a higher primary energy factor than gas, a direct electric servicing strategy "...could be an appealing low capital cost option for developers..." However, direct electric heating could increase bills by around £350 a year compared with gas heating. The affordability rating is proposed to ensure that new Part L standards do not result in unacceptably high energy bills.

The government is currently proposing that the Energy Efficiency Rating (calculated for the Energy Performance Certificate) could be used as the metric for assessing dwellings' compliance with the Householder Affordability Rating and is consulting on its suitability.

The Fabric Energy Efficiency (FEE) target.

To avoid overcomplicating the proposals with the suggested metrics alongside the existing metrics, it is proposed that the current Fabric Energy Efficiency target is scrapped; instead, improving the minimum standards for fabric performance.

Fuel factors.

The fuel factors which are applied to the heating and hot water demands of the notional dwelling when calculating the target emission rate (introduced to provide some relief for developments proposing using more carbon intensive fuels such as electricity) are to be abolished.

Minimum building services performance.

Alongside improvement to the minimum fabric performance, the proposals include an uplift to the minimum standards for building services performance. These include an increase in the operational efficiency of gas boilers and heat pumps for both heating and cooling.

Low temperature heating systems.

Due to the breadth of potential low carbon heating options, future-proofing for all potential scenarios is challenging. However, ensuring new homes have low temperature heating is likely to realise benefits both now and for any future heating systems. Having flow temperatures of 55°C or lower ensures heat pumps can be installed and operated efficiently, but can also improve the efficiency of condensing gas boilers, whilst also reducing losses and improving system efficiency of district heating.

The government is proposing incentivising/mandating the installation of low temperature heating in Part L 2020 by either designing the notional building in SAP with the assumption that its heating system operates at 55°C; or setting a minimum standard that heating systems should be designed to operate at temperatures of 55°C or lower. This proposal would likely result in larger heat emitters being installed, which would minimise the cost and disruption to homeowners should low carbon heating be retrofitted in future. A key consideration of this strategy will be the control of legionella bacteria in hot water systems.

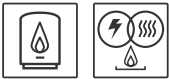
Compliance reporting.

In recognition of the fact that Part L SAP outputs for dwellings vary in detail and complexity, making comparison between developments and confirmation of compliance challenging, the proposals include the introduction of a domestic equivalent to the BRUKL document produced for non-domestic buildings; the BREL (Building Regulations England Part L) report. It is hoped this would drive higher levels of consistency.

Future Homes Standard. Potential strategies.

Understanding how the proposals will impact delivering homes in practice is integral to determining their viability.

Using the proposed SAP 10.1 carbon factors, a number of potential strategies for a typical 85m² terraced house were assessed to determine their dwelling emission rate i.e. the regulated CO₂ emissions per square meter of internal floorspace. The emissions reductions that could be achieved compared to a Part L 2013 baseline were identified to understand how effective a given strategy could be at achieving the stated 75-80% emissions reduction of the Future Homes Standard. The results of this analysis can be seen in Figure 1 opposite.



Gas boiler and CHP strategies

The gas boiler strategy demonstrates a 16% reduction in emissions compared to the Part L 2013 baseline by virtue of reduced carbon factor for electricity, whereas the CHP strategy, which offers a ~20% reduction in emissions under Part L 2013, results in a net increase in emissions of 17% using SAP 10.1 carbon factors. It is unlikely that gas CHP has a future for servicing homes.



Direct Electric (DE) strategy

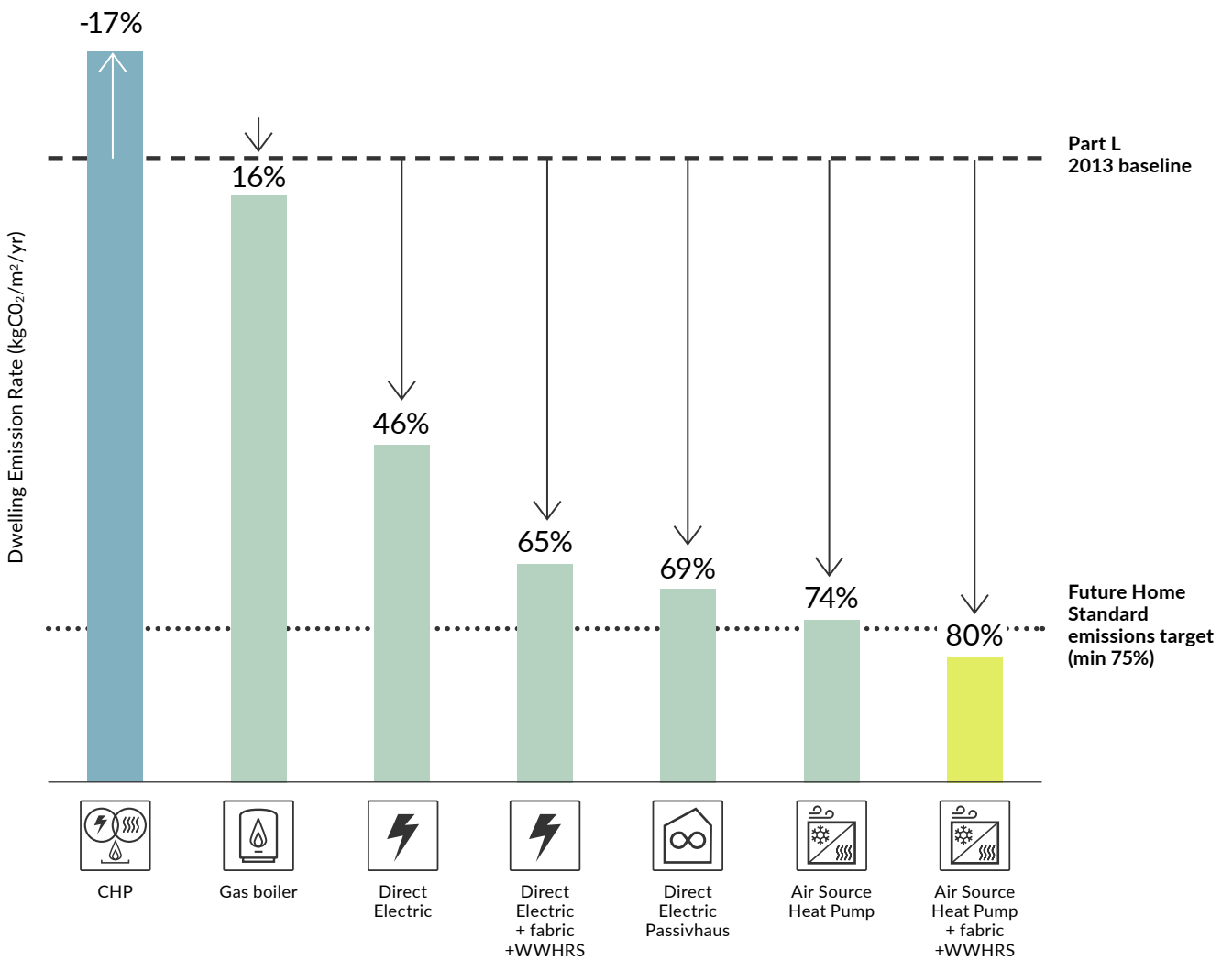
A DE heating strategy is anticipated to offer a 46% reduction in emissions compared to the Part L 2013 baseline. Combining this with improvements to building fabric and inclusion of WWHRS results in a total reduction of 65%. Even increasing the fabric performance to the point of Passivhaus levels of energy demand does not enable the strategy to meet the emissions reductions of the Future Homes Standard, achieving a total of 69% reduction. Further solutions would therefore be required to enable a DE strategy.



Air source heat pump (ASHP) strategy

Substituting the gas boiler for an air source heat pump (ASHP), without making any improvements to fabric or other systems' efficiencies, is anticipated to reduce emissions by 74% compared to the Part L 2013 baseline. The addition of waste water heat recovery system (WWHRS), moderate improvements to the building fabric, and an uplift in air tightness are anticipated to provide a further 6% reduction, achieving the 80% emissions reduction of the Future Homes Standard.

Figure 1: Emissions rate for a typical dwelling under a variety of servicing strategies using SAP 10.1 carbon factors



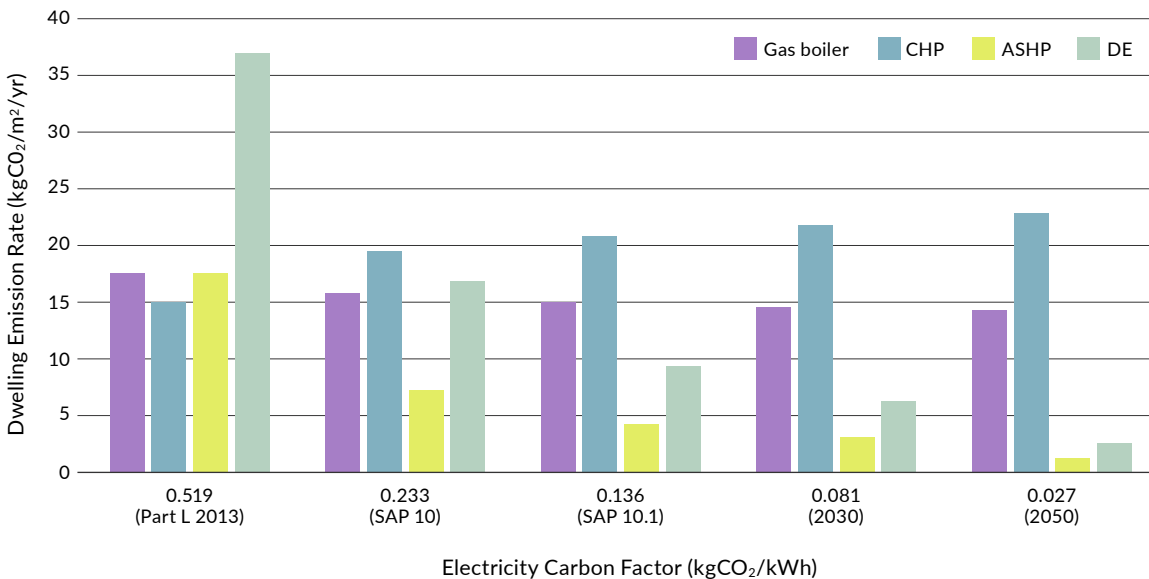
Future Homes Standard. Potential strategies.

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Net Zero 2050

The driving force behind the proposals is the UK’s legally-binding obligation to reach net zero by 2050. Figure 2 below shows the dwelling emission rate for the typical dwelling under a variety of carbon factor scenarios.

Figure 2: Dwelling emission rate for a typical terraced home for a variety of servicing strategies under current building regulations (Part L 2013) and proposed building regulations (SAP 10.1), as well as projected carbon factors for 2030 and 2050.



The results under Part L 2013 reinforce the de facto approach to servicing dwellings, with gas-CHP. Whilst the Fuel Factor which is applied to all-electric systems enables heat pump strategies to achieve emissions reductions compared with the Part L 2013 target, in absolute terms a heat pump strategy is comparable to a gas boiler strategy under Part L 2013.

The situation is significantly different under the new proposals, with gas-CHP causing an emissions increase and electric strategies offering marked improvements over a gas boiler.

Looking to the future, the benefit of electric systems at reducing regulated emissions becomes ever more apparent. Using the projected carbon factor for electricity in 2050 provided by BEIS, **the heat pump strategy is anticipated to demonstrate 96% fewer emissions than a gas boiler strategy.** This highlights the challenge of decarbonising fossil fuel-heated buildings: where all-electric strategies continue to leverage improvements in national- and regional-scale infrastructure, gas strategies must employ rigorous local mitigation (in the form of fabric improvements and renewable generation) to mitigate their remaining emissions. Even this becomes ever more challenging using electricity-generating technologies such as solar PV, as the emissions which can be displaced by these technologies reduces as the grid decarbonises.





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