REA Response to MHCLG Consultation on The Future Homes Standard

2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings

Introduction & Context

The REA is the UK's largest trade association for renewable energy and clean technologies, representing 550 members operating across heat, power, transport, and natural capital. A no-for-profit in operation since 2001, the Association's membership ranges project developers to manufacturers, installers, consultancies, financiers, and academic institutions.

Despite the transition to the low carbon energy system being well underway, just 1% of new homes built in 2018 were rated EPC band A (MHCLG, 2019). Strong progress has been made in decarbonising the power sector, although it is now clear that the buildings sector lags behind. Cross-sector collaboration between the construction and energy industries, and immediate action, is imperative to meeting our newly adopted net zero GHG emissions target by 2050.

The built environment contributes to around 40% of the UK's carbon footprint (UK Green Building Council, 2017). The Committee on Climate Change also recently released their damning report on UK housing (Committee on Climate Change, 2019), stating that it is simply "unfit to withstand the challenges of climate change". The report finds that emissions reductions from the UK's 29 million homes have stalled, while energy use in homes – which accounts for 14% of total UK emissions – increased between 2016 and 2017.

Homes and buildings have a key role to play in the transition to a decentralised energy system. On-site renewable energy generation, alongside clean tech such as EV charging and battery storage systems are crucial to creating the smart homes of the future. Not only is this part of a move to create more affordable, comfortable and healthy living spaces, but it is also striving to democratise the energy system by engaging prosumers and offering them the power to address climate change through their energy generation and consumption. The rollout of smart homes can also reap macro benefits such as offering grid flexibility to reduce the risk of blackouts and lower infrastructure costs, creating sustainable jobs, improving air quality and health, alleviating fuel poverty and more.

This consultation response demonstrates the opportunities for the review of Part L of the Building Regulations, to support the construction sector and related sectors to

transition the built environment into a net-zero emissions market. New buildings offer a no-regrets, obvious solution to tackling long-term carbon emissions reduction and improving housing stock.

This response calls for six key policy implementations which are crucial as a baseline for all new buildings:

1. **Solar PV Roofing mandated as a minimum standard**
2. **All new buildings to be smart electric vehicle charge point "ready"**
3. **Energy Storage mandated in all new buildings or developments**
4. **Three-Phase electricity supply connections in new homes as standard**
5. **Renewables and Clean Tech to be fairly acknowledged in Energy Performance Certificates (EPCs) and the Standard Assessment Procedure (SAP)**
6. **Renewable heat as standard in all new developments**

The REA has a preference towards option 2 (31% reduction in carbon emissions in comparison to the current standard), considering both proposed options, although we strongly believe that neither option is ambitious enough to support the construction sector efficiently to prepare for the FHS introduction in 2025, or for the related markets to prepare, consolidate and scale-up the required supply chains.

The urgency of the implementation of these updates is key. Numerous property and construction stakeholders have come forward to voice their commitment to progress and leadership in this space. Stakeholders including Barrat Developments, Berkley Group, JLL, Lendlease, RIBA and more, signed a letter to the Secretaries of State in March 2018, calling on them to use the Environment Bill to tighten new build standards **"without delay"** (UK Green Building Council, 2018).

Respondent Details

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Organisation description	Energy sector trade association
Size of organisation	Other: represent over 550 companies operating in renewable energy and clean tech across the UK

Key Steps towards creating our Future Homes Standard

Baseline requirements should be rolled out in all new buildings as soon as possible, if we are to meet our net zero GHG emissions targets, support the development of mature supply chains, and allow for the construction sector to become familiarised with these technologies before the 2025 introduction of the FHS. These minimum requirements include the following technologies:

1. Solar PV roofing as mandatory in all new buildings

Solar PV offers a solution for buildings to generate their own clean electricity, effectively becoming mini-power stations. This engages tenants in energy democracy, and offers a dependable method to tackle fuel poverty.

Now considered a relatively mature renewable energy technology, retrofitted solar PV has an average payback time of 9.5 years (Greenmatch, 2019), unlike standard roofing which is a sunk cost. This means that over a 30 year period, solar roofs will not only be effectively free, but will have paid back 2-3 times their cost. This is without government support, although Smart Export Guarantee tariffs allow prosumers to sell their excess power to the grid. Further to this, significant installation cost savings can be realised when installing solar PV on a new building, rather than when retrofitted, as scaffolding for example, will already be in place.

Solar PV costs have been falling rapidly since their initial development, and we are now seeing innovations from UK manufacturers such as Solar Roof Tiles (which can blend into roofs clad with concrete or clay roof tiles, or slates), solar glass (used for large office blocks or greenhouses), and solar bricks, falling to competitive prices. Clarification in legislation is also required on these building integrated solar innovations, confirming permitted development rights to local authorities on technologies such as solar tiles, solar glass and solar bricks – see box 1 for more on this.

Solar PV provides an easy, simple solution to generating zero-carbon electricity in many buildings, and despite the fact that it will not be appropriate for all homes (e.g. those heavily shaded by other buildings), the technology should be a core consideration from the early design stage of a building. Consideration should also be taken around the minimum amount of panels (or minimum capacity) to be installed, and all installs should aim to maximise on available roof or ground space, as buildings should have the opportunity to export excess power generation to the grid (supporting the nation's wider decarbonisation targets).

This mandate has already been implemented in a number of locations around the globe, including California. The California Energy Commission (CEC) passed the requirement in 2018 as an update to the state's 2019 Title 24, Part 6, Building Energy Efficiency Standards, which take effect in 2020 – requiring that all new homes under three stories install solar panels. The Californian model mandate is climate zone-specific and based on the floor area of the dwelling unit. The PV system must be sized to net out the annual kilowatt-hour energy usage of the dwelling. Under these parameters, coupled with the fact that new homes are more efficient overall, solar system sizes under the new rules are expected to range from 2.7 kilowatts to 5.7 kilowatts based on location. The average size of a solar installation on an existing home in California today (a retrofit system) is 6.8 kilowatts, in comparison to around 3.6 kilowatts in the UK (not accounting for the electrification of heating systems).

Box 1 - Innovations in Solar and Legislative Change Required

- Panels must be situated at least a speciffic distance from the edge of the roof under permitted development rights. This should not be required for building integrated solar panels or solar tiles on pitched roofs, to utilise the available space for energy generation. It should also not be required for panels on pitched roofs, and may be a drafting error following recommendation for it to be applied on flat roofs.
- Solar tiles, solar glass and solar bricks should be subject to visual impact regulations similar to windows or regular roof tiles, rather than solar panels, considering their similarity to roof tiles, and are a perfect fit for properties in conservation areas and World Heritage Sites.

Micro grids are also encouraged for apartment blocks, or relevant developments, offering greater savings than standalone houses due to the reduced costs of one large installation over many small installations, in addition to better utilised energy consumption (due to a larger range of consumption patterns from consumers) in comparison to smaller standalone installations.

University of Cambridge Apartments

Photon Energy installed solar PV across 9 apartment blocks, including student accommodation, homes for staff and supporting facilities.

"The brown roof and pebbled areas created obstacles that had to be worked around, but installation was carried out to a high standard across the development."
Adrian Wells, Project Manager at Wates

Result 1

- Generates 262,355 kWh/annum, saving 136.2 tonnes carbon per annum
- equivalent to 450,000 car miles

Project Details

- 1,175 SunPower 327 Wp modules, K2 D-Dome mounting systems and Zeversolar inverters
- Cost at around £3,000 per 3kWp unit – average UK home size

Result 2

- Aims to overcome Cambridge's rising land prices & overcrowding
- Development promotes sustainable living through triple insulation layers, a district heating system and solar PV

2. Energy storage as mandatory in all new buildings or developments

Energy storage costs are also falling rapidly, with Bloomberg NEF finding that there has been an over 73% fall in Li-ion battery pack costs since 2010 (Bloomberg NEF, 2017), and these are expected to fall further with the rollout of electric vehicles which use the same technology as most small scale and domestic battery storage systems.

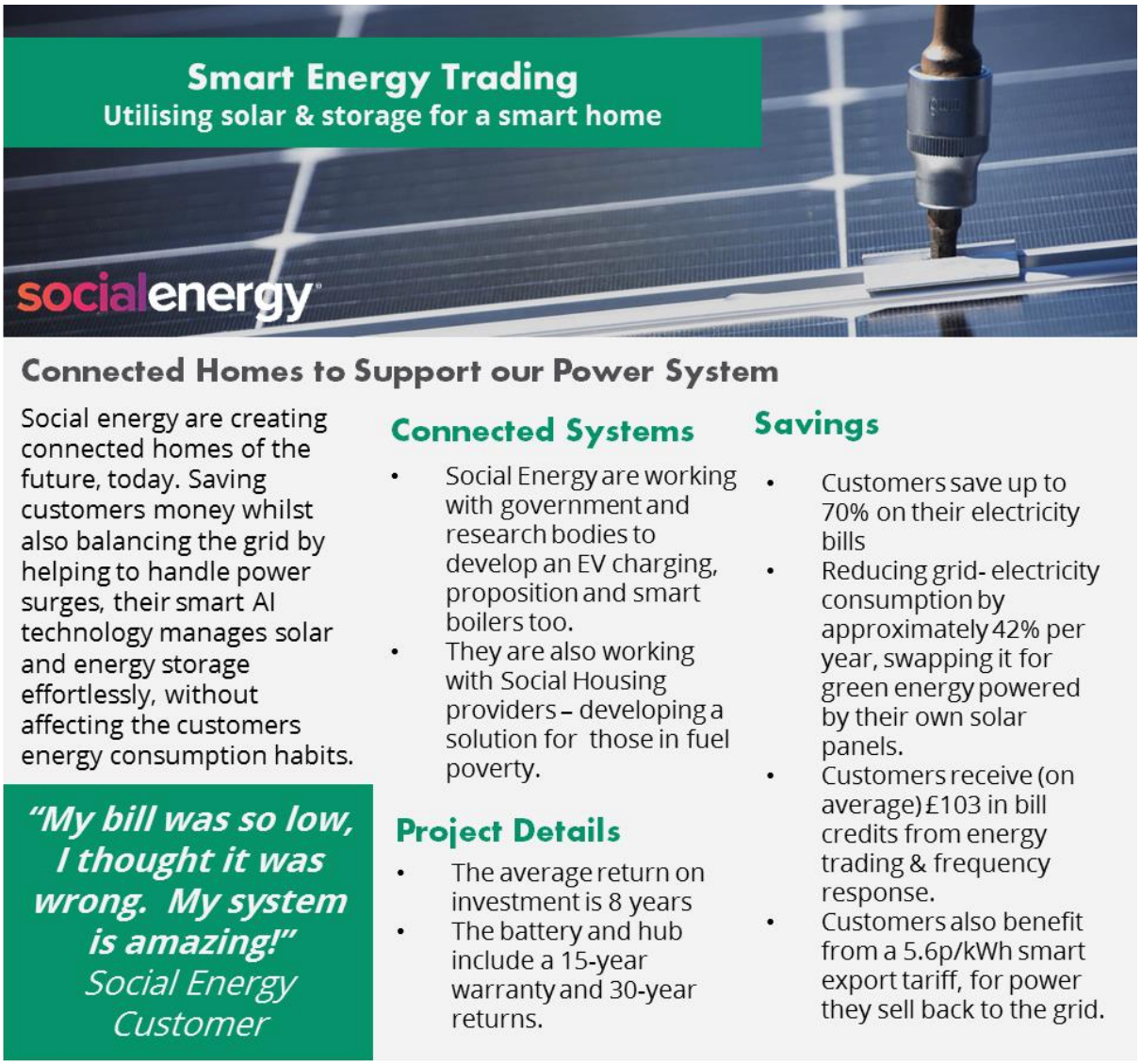
The rollout of battery storage and other energy storage applications in homes or developments (for example a new housing development installing storage at the sub-station site) offer benefits to the homeowner, through utilising self-generation, and also to the wider energy system through grid balancing services. By storing power at off peak times, and selling it at peak times, this would be another active revenue generator and would help reduce consumer bills further, helping tackle fuel poverty. This therefore also reduces grid reinforcement costs, effectively lowering consumer bills across the UK (rather than only among new homeowners), and reduces our reliance on fossil-fuel powered peakers as dispatchable power generation – supporting the wider energy system to meet net zero targets quicker.

In combination with mandated solar PV, energy storage supporting avoiding "duck curves" where there is high generation and therefore high load on the national grid. This takes a larger effect on grid infrastructure in countries with higher irradiance, such as that seen in Australia, although Bloomberg New Energy Finance's "Flexibility Solutions in High Renewable Energy Systems" (Bloomberg NEF, 2018) demonstrates the ability for energy storage to offer great savings to overall system costs (-2% in 2030), carbon emissions (-13% in 2030) and reliance on gas peakers (-12% in 2030).

Commercial and industrial sites offer larger opportunities, with storage systems and their associated services helping control energy costs and often offering additional revenue streams to the operator through newly developing flexibility markets, or colocation with EV charging and generation assets such as solar.

Incentives and support should be offered for the development of dwellings which offer support to the wider energy system, and relieve local distribution network constraints – these homes can provide flexibility services and the additional value should be reflected through the sale price or other mechanisms in retrofitted buildings, although should be mandated as a minimum standard in new buildings as not to increase pressure on local distribution networks and increase the cost of energy on all consumers. Ultimately, options to reach carbon emissions targets should be available, and MHCLG is correct in taking a technology-agnostic approach, offering consumers variations of options which work for their specific lifestyle. There are numerous routes to this outcome, one of which is to offer a 'points-based' system similar to those seen in California and Germany,

which incentivises low/zero carbon emissions in addition to flexibility, or "flexibility readiness".



Parc Hadau
35 Zero Carbon Homes in Pontardawe

sero

True Zero Carbon Homes For The Private Rental Sector

Sero Homes is delivering true Zero Carbon, actively tracking grid Carbon intensity to adjust energy demand. A first of its kind neighbourhood in Wales.

"The principles underpinning our vision for housing are simple – people's homes should minimise the harm done to our planet and they shouldn't cost the earth to run."

James Williams – Managing Director of Sero Homes

Result 1

- Using high energy efficiency and thermal mass to enhance comfort and operation.
- Heated via ground source heat pumps linked to MVHR.

Project Details

- Tenants' energy usage is incorporated as part of their monthly rent.
- Energy drawn from the grid will be replaced in equal carbon measure; thus balancing the grid to achieve Zero Carbon.

Result 2

- Zero Carbon optimised into the design from the outset. Utilising built form and thermal mass to enable further balancing of heating and cooling loads.

3. Electric Vehicle smart chargers, or the infrastructure to enable these, as mandatory in all new homes

Government has announced a ban on the sale of new Internal Combustion Engine (ICE) vehicles by 2040 (Pfeifer, 2018), with numerous auto manufacturers bringing their own deadlines forwards. The introduction of charge points in all new homes is required to both ensure smooth rollout of charging infrastructure and to support wider energy strategy interests in improving system flexibility. Support for charging hubs and on-street charging where homes do not have access to off-street parking is also required.

In line with the Energy Performance in Buildings Directive, the Office for Low Emissions Vehicles released a consultation on its plans for EV Charge points in new residential and non-residential buildings. The proposals span existing non-residential and new buildings, making amendments to part L of the Building Regulations to allow for those details set out in the table below (Department for Transport, 2019).

The REA is supportive of the proposed amendments, seeking all new homes to be equipped with the necessary cabling to allow for the installation of an EV charge point and recommends that all such charge points installed should be smart enabled, to allow for consumers to maximise the benefits offered by future Time of Use Tariffs rewarding them for shifting their demand to times which support the wider energy system. There are pre-existing work streams on 'smart' EV charging ongoing through the AEV Act and Government EV Taskforces, which the REA and members are engaged with and the outcomes of which should form the basis of future EV charge point standards in new buildings.

Please contact the REA's Daniel Brown (dbrown@r-e-a.net) for a full copy of the Association's response to the OLEV consultation on charging infrastructure in new homes and commercial properties.

	Existing	New
Residential buildings	Every building undergoing major renovations with more than 10 parking spaces to have cable routes laid in every parking space.	Every building with an associated parking space must have a charge point.
Non-Residential	At least one charge point in buildings with more than 20 car parking spaces, applicable from 2025.	Every building with more than 10 parking spaces to have one charge point at least, and cable routes for a charge point for one in five

spaces

The Hague Football Stadium

Alfen's energy storage system can store the solar energy that is generated from the stadium's roof top PV, to power fans' electric vehicles, and the pitch lights, during the night.

"Through this initiative, we hope we will further stimulate the use of electric vehicles and consequently improve the air quality in our city."
Ton Koning, Program Manager Air Quality at the municipality of The Hague

Result 1

- Stadium able to utilise their solar power generation at night, reducing bills
- EV charging creates an additional revenue stream & caters to new customers

Result 2

- New energy trading revenue stream with addition of storage
- Supporting wider energy system smoothing out surges in consumption from EVs and storing excess renewable energy generation

Project Details

- 2MW Li-ion battery with 20 EV charge points in a hub, added to an existing 800 kW rooftop solar PV installation
- advanced load balancing platform to maximize the utilisation of the existing grid connection

Energy Efficient Homes Built For The Future

Sero Energy is working in conjunction with Pobl Living & Tirion Homes to build 225 low carbon homes utilising fabric first construction, renewable energy generation & storage.

"The homes at Parc Eirin won't have any gas so they'll have batteries, solar PVs, ground source heat pumps and super-fast car chargers. They will be extremely innovative and should significantly reduce the amount people spend on their bills."

Julie James, Minister for Housing and Local Government

Result 1

- All homes have energy storage and 3 phase vehicle charging
- Every home is heated via ground source heat pumps

Project Details

- Sero will monitor and manage each home's usage and optimise energy use
- Residents will remain in control of their energy usage via the Sero Life App

Result 2

- Control systems on all technologies (including heat) enable the homes to support the grid system
- Largest development of it's kind in the UK with heat, electricity and transport optimisation

4. Three phase electricity supply connections as mandatory in all new homes

A move towards the electrification of heat in many buildings, the growth of home smart technologies, and the switch from filling your car with petrol at a petrol station, to charging your EV at home, will lead to larger power loads being placed on new homes. To support this development, three phase electricity supply should be required in all new buildings to ensure safe and optimised energy generation and consumption. Currently, many homes are unable to take a load of more than 3.6kW of power due to their single phase power supply, meaning many solar PV installations are capped at this (despite space for more power generation), or they install 4kW systems which spill electricity at peak generation times – wasting energy. Our Three Phase Supply position paper (REA, 2018) found that the additional cost to home builders would be a minimal amount per home for cabling, and it also details information on minimal changes to distribution boards and termination boxes which would be required, again, at a minor cost.

Wider reviews are required around grid connection costs for new developments, as currently DNOs (Distribution Network Operators) must charge for the greatest capacity required for a home's connection to the grid. This causes an overestimate in demand for homes and buildings which actually support the wider energy system through offering flexibility, rather than increased peak demand.

Three phase supply would enable the creation of buildings as power stations and flexibility assets, through generation such as solar panels collocated with behind the meter storage, or vehicle to grid technologies, in a truly decentralised, low carbon, flexible energy system.

Care should be taken though, to not overburden devices with three-phase requirements – a barrier which has been faced in Austria and Switzerland, where a number of single-phase clean technology manufacturers cannot apply their products.

The roll out of three phase electricity supply for this reason should be completed in a national form (rather than implemented by local authorities or left to the discretion of the local Distribution System Operator (DSO). This risks a patch-work system of different connection requirements and higher transaction costs for nation-wide technology providers, in addition to regional inequalities in the quality and availability of smart homes and integrated clean technologies.

The REA's report and analysis on three-phase electricity supply connections in new homes can be found here.

Box 2 - Buildings as powerstations - preparing our infrastructure for a flexible energy systm

- Grid connection costs - costs involved in connecting homes to the grid fall on housebuilders, and with increased energy loads resulting from self generation, higher energy consumption due to electrifying transport and heat, and the introduction of flexibility services, homes & buildings play a new role in our energy system transitioning away from purely consumers to active participants.
  - Current regulations around the distribution of the costs of the grid are being revised, primarily though the Targeted Charging Review, and Access and Forward Looking Charges review.
- The govenrment announced in Nov 2019 its decision to resturcture the charging regime, implementing a fixed capacity charge, which does not account for flexibility on the grid & penalises renewable power generators, and flexible buildings.
  - The REA urges that these hurdles are reduced through the access and forward looking charges review (currently scheduled to be implemented in 2023) as soon as possible.
- Further research is also required around electricity supply licencing, peer to peer trading and general landlord-tenant sale of power. This is to allow for any potential solar/on-site generation installations to serve the whole building, including dwellings, rather than be restricted to serving the common parts, optimising available space for power generation and on-site consumption.

5. Renewables to be better acknowledged in SAP

One of the most pertinent measures of a building's "green" credentials is its Energy Performance Certificate (EPC) rating. EPCs are a tool which offer an A-G rating based on energy efficiency technologies and immoveable features in a building, such as insulation and boilers. They are used by a range of stakeholders, including consumers (to understand their expected energy bills and gain recommendations into how to upgrade their home), tenants (when choosing properties to rent), landlords/investors (when undertaking due diligence on acquisitions), policy makers (for a holistic view of the quality of the UK's building stock), policy measures such as the minimum energy efficiency standards (MEES – which ban the letting of extremely energy inefficient properties), financial institutions (whom are developing innovations in finance such as "green mortgages" rewarding those who choose to purchase more energy efficient buildings) and more.

EPCs are calculated through a complicated model called the Standard Assessment Procedure (SAP). The SAP requires frequent updates, especially where technologies are falling in cost, improving efficiency, and reducing their carbon intensity rapidly – which can be seen at its peak in renewable energy and clean technologies. Current SAP calculations are extremely out of date, meaning renewable energy technologies, especially including solar, energy storage, biomass boilers, and heat pumps, are at a strong disadvantage in comparison to longstanding, carbon intensive technologies such as gas boilers. While renewable heating fuels such as bio-propane are also excluded from SAP, their integration being crucial to keep these decarbonisation pathways open.

Out of date efficiency calculations for renewable heat technologies within the SAP can produce results that favour fossil fuel heating systems and fail to reward flexibility. The SAP therefore also sets up contradictory assumptions within Government heat policy, with the calculations behind the RHI being at odds with that of the SAP, creating inconsistencies in policy making. The most recent version of the calculation methodology, SAP10 was introduced in July 2018, despite now being 2020, building regulations still rely on SAP 2012.

SAP 10.1 and 11 methodologies should be updated as soon as possible, possible so that renewable energy is the primary focus within the SAP calculation, while taking into consideration the loss of that generated heat. This should create a more robust method which can keep up with technological advances and fairly reflect the benefits of renewable energy and low carbon technologies and should be updated more frequently. Once complete, this should also be implemented with the introduction of this review of building regulations, not years later.

Any future iterations of the Standard Assessment Procedure should reflect:

- How a technology impacts the running cost of a dwelling
- How a technology impacts the carbon emissions of a dwelling – rather than primary energy solely
- How a technology supports the wider energy system's costs and carbon emissions, for example by supporting the wider energy system through offering flexibility

Government could also consider the introduction of a thermal imaging survey of a property so that the EPC is based on performance of the building as built, rather than just the design.

In addition, it is important that SAP recognises the carbon savings from the use of biomethane or biomass in District Heating Schemes (e.g. where a gas co-generation/CHP plant distributes heat to a number of domestic or non-domestic buildings). Currently there are no biomethane 'factors' considered in SAP so these should be included.

There are no simple options to decarbonise heat networks fuelled by existing gas cogeneration plants other than using biomethane or biomass, and in the future, when this become available, renewable hydrogen. Supporting the use of bioenergy in these existing assets would also help stimulate deployment and advance the decarbonisation of the gas grid.

6. Renewable heat must be included in all new homes and developments

Decarbonising heat is one of the largest challenges facing the built environment; heating is the second largest source of greenhouse gas emissions in the UK after transport (Department for Business, Energy & Industrial Strategy, 2019). However, current government support under the Renewable heat Incentive (RHI) is only budgeted up until 2021, and there are currently no clear future polices incentivising the use of renewable heating in all new buildings.

The Committee on Climate Change has made clear that it will be necessary for almost all heating in buildings to be decarbonised by 2050 if net zero is to be realised. As such, with targets of no new homes being connected to the gas grid by 2025, new homes built today must have renewable heating mandated through the Future Homes Standard & Part L review. Failure to do this will result in significant future costs for both homeowners and Government when retrofitting homes with renewable heating and high energy efficiency materials.

It is crucial that the Future Homes Standard incorporates heat in two respects:

1) **Mandating the use of high energy efficiency materials, thereby reducing the energy demand of properties**
2) **Ensuring all homes utilise a suitable low carbon heating system**

The nature of heat demand within different types of building means that there is no 'one size fits all' solution. Rural areas, apartment blocks, houses and commercial buildings all face differing challenges and opportunities. The current consultation correctly puts a strong focus on electrification of heat, however potentially also risks stifling the opportunity to use other renewable heat technologies more appropriate to regional infrastructure opportunities. Building Regulations will need to reflect this by specifying that the most suitable form of low carbon heating is used and that these systems genuinely meet the needs of the building and its occupants. This calculation will need to consider technology and operational costs, the heat load required, ability to utilise the gas or electricity grid, proximity to industrial heat producers (such as biomass or energy from waste CHP plants)), proximity of local feedstocks such as energy crops or forestry and the ability and the ability of new developments to utilise heat networks. As such the Future Homes Standard will need to reflect the 'toolbox' of solutions now available as well as ensure that suitable standards are in place so that, when installed, systems are fit for purpose.

Some of the key technologies expected to play a role here, and therefore also better recognised within the SAP include:

- ***Heat pumps*** –The electrification of heat is expected to play a very prominent role in new builds, where new energy efficient properties are well suited to heat loads provided by air, water or ground source pumps. Air-source heat pumps for example are very well suited to residential apartments and houses in cities or towns due to their small internal and external space requirements. Heat Recovery Ventilation systems should also be considered as part of this, increasing efficiencies by using already generated heat to reheat fresh air coming into the house. Consideration will, however, need to be given to the increased electricity demand on some localised grid infrastructure, especially when combined with an increasing numbers of electric vehicles.
- ***Biogas, biomethane and other green gases*** – most suited to existing commercial and residential sites already connected to the gas grid. An instant and direct replacement for natural gas, green gas from Anaerobic Digestion and thermal gasification can be used to produce clean heat in cooking, hot water and space heating.
- ***Biomass*** – a versatile alternative particularly suited to contexts where a high heat load is required and/or where levels of energy efficiency are low, typically in off-gas grid rural areas and certain on grid urban areas (e.g. district heating). There is also potential in urban areas with larger residential or commercial sites, such as schools and hospitals or in new developments combined with heat networks. Utilising biomass is also particularly efficient where there are significant capacity or grid connection cost constraints.
- ***Renewable Heating Fuels:*** Bio-propane and Bio-LPG offer a drop in low carbon alternative for off gas grid homes and commercial sites that would traditionally burn fossil oil for heat. The ability to use existing heating technology, but burn a renewable fuel instead of a fossil fuel, enables an affordable solution for decarbonising heat. Similar to biomass such fuels are also a very effective low carbon heating solution in rural off-grid, households with high heat demand, typically low levels of insulation and where the electricity network may be expensive to upgrade.
- ***Hybrid systems*** – green gases or renewable heating fuels combined with heat pumps also allow for the installation of lower powered heat pumps in localities where there are constraints on the electricity network (where grid connection costs prove to be high), and switching to green gas such as biomethane from AD or thermal gasification, renewable hydrogen and bio-propane when electricity prices are high, offering a low carbon cost relief for large heat consumers.
- ***District heating*** – heat networks for local areas can be powered by a range of technologies, such as biomass boilers, CHP plants or geothermal heat. Despite being relatively immature in the UK, district heating offer a particular opportunity to decarbonise heat in more populated areas, where a number of homes could share resources; as well as in non-domestic clusters (e.g. industrial estates). District heating networks should also be encouraged in new rural, multi-property developments, and should be powered by renewable heat sources.

- ***Solar thermal*** – this technology provides baseload water heating which may be most suited to domestic or commercial settings with high energy efficiency levels, or low heating requirements.

Further support for decarbonising heat will be needed to ensure installation of the above systems are cost effective and can compete upon a level playing field with fossil fuel alternatives. Wider energy polices beyond building regulations are required to address these challenges. The REA's Bioenergy Strategy (REA, REA Bioenergy Strategy, 2019) provides recommendations as to exactly how this can be done.

Specific consultation questions

1. **Do you agree with our expectation that a home built to the Future Homes Standard should produce 75-80% less CO2 emissions than one built to current requirements?**
    a. **Yes**
    b. **No – 75-80% is too high a reduction in CO2**
    c. **No – 75-80% is too low a reduction in CO2**

If no, please explain your reasoning and provide evidence to support this.

Our views are that the Future Homes Standard, which combines both high energy efficiency and onsite renewable energy generation, should mandate at least a net-zero carbon standard. In addition, anything beyond this would offer energy positive buildings. We believe government should set out a trajectory for tightening building regulations to ensure all new buildings in 2030 operate at net zero carbon for regulated and unregulated energy.

It has repeatedly been shown that building to higher standards over existing building regulations adds less than 10% to build cost (PassivHaus Trust, 2019), as the volumes we build in the UK (up to around 250,000 homes a year), this marginal cost would fall rapidly. There is a lack of ambition by aiming for a 75-80% reduction rather than 100% reductions. In the UK we have the technology, experience, competence and motivation to deliver for net zero; there are examples of standards that can lead to zero emission buildings such as
passivhaus. The key action required would be to invest in the supply chain over the next 5 years to support such a standard.

2. **We think heat pumps and heat networks should typically be used to deliver the low carbon heating requirement of the Future Homes Standard. What are your views on this and in what circumstances should other low carbon technologies, such as direct electric heating, be used?**

It is crucial that the Future Homes Standard incorporates heat in two respects:

- Mandating the use of high energy efficiency materials, thereby reducing the energy demand of properties
- Ensuring all homes utilise a suitable low carbon heating system

The nature of heat demand within different types of building means that **there is no 'one size fits all' solution.** Rural areas, apartment blocks, houses and commercial buildings all face differing challenges and opportunities. Building Regulations will need to reflect this by specifying that the most suitable form of low carbon heating is used and that these systems genuinely meet the needs of the building and its occupants. This calculation will need to consider technology and operational costs, the heat load required, ability to utilise the gas or electricity grid, proximity to industrial heat producers (such as biomass or energy from waste CHP plants) and the ability of new developments to utilise heat networks. As such the Future Homes Standard will need to reflect the 'toolbox' of solutions now available as well as ensure that suitable standards are in place so that, when installed, systems are fit for purpose.

While it is largely agreed that the majority of new high energy efficiency properties will utilise heat pumps, this may not be suitable for all new developments. The Future Home Standard needs to provide flexibility for local realities. For example rural off gas grid areas, where local grids may have a low share of network reinforcement may not be suitable for high levels of heat pump use, especially if combined with high levels of electrified transport. Renewable solutions such as bio-LPG, bio-propane and biomass could provide efficient solutions for these areas. Local infrastructure developments such as a biomass power or energy from waste CHP facility may also provide better efficiencies through use of heat networks. The future home standard should aim to promote the best technology for the particular development.

The range of renewable heat technologies offering solutions are highlighted above, in point 6. An extension of the current government subsidy for renewable heat (the Renewable Heat Incentive, RHI which is due to close in spring 2021) is also strongly advised, until a replacement mechanism has been confirmed.

3. **Do you agree that the fabric package for Option 1 (Future Homes Fabric) set out in Chapter 3 and Table 4 of the impact assessment provides a reasonable basis for the fabric performance of the Future Homes Standard?**
    a. **Yes**
    b. **No – the fabric standard is too demanding**
    c. **No – the fabric standard is not demanding enough**

If no, please explain your reasoning.

The proposed fabric standards are minimal improvements on the current standards, and are at a lower rate than many homes are built to today. The proposed fabric

standards are lower than the minimum standards imposed by a number of local authorities, such as those seen in London.

Higher fabric standards are required to avoid the need to retrofit homes in the future which is costly, and the cost of which would likely be borne by the consumer.

4. **When, if at all, should the government commence the amendment to the Planning and Energy Act 2008 to restrict local planning authorities from setting higher energy efficiency standards for dewllings?**
    a. **In 2020 alongside the introduction of any option to uplift the energy efficiency standards of Part L**
    b. **In 2020 but only in the event of 31% uplift (option 2) to the energy efficiency standards of Part L**
    c. **In 2025 alongside the introduction of the Future Homes Standard**
    d. **The government should not commence the amendment to the Planning and Energy Act**

Please explain your reasoning.

Local authorities have a good understanding of capacity of local builders and requirements for new housing, should have the opportunity to implement higher standards where possible as all support is required to reach net zero targets.

A number of local authorities have already implemented minimum standards higher than those proposed.

Additionally, some geographical areas face higher fuel poverty rates and/or higher house prices than others, and some areas may face better opportunities in terms of renewable resource than others. Standards should reflect the needs of each locality, with the centrally set standards a minimum for the whole country, rather than creating a barrier to innovation & higher standards.

There have been a significant number of districts and councils that have declared climate emergencies and of those 265 declarations around 150 have a target date of 2030, only 10 years away. To restrict local authorities from setting higher energy efficiency standards for dwellings would hamper decentralised efforts for decarbonisation and diminish the ambitions of these districts and councils which are paving the way towards our national ambitions of net zero by 2050. Regional authorities have consistently shown important leadership when central government has failed to do so, such as Reading's new local plan and the London Zero Carbon Standard which maintained the Zero Carbon Homes proposal in that area following its cancellation.

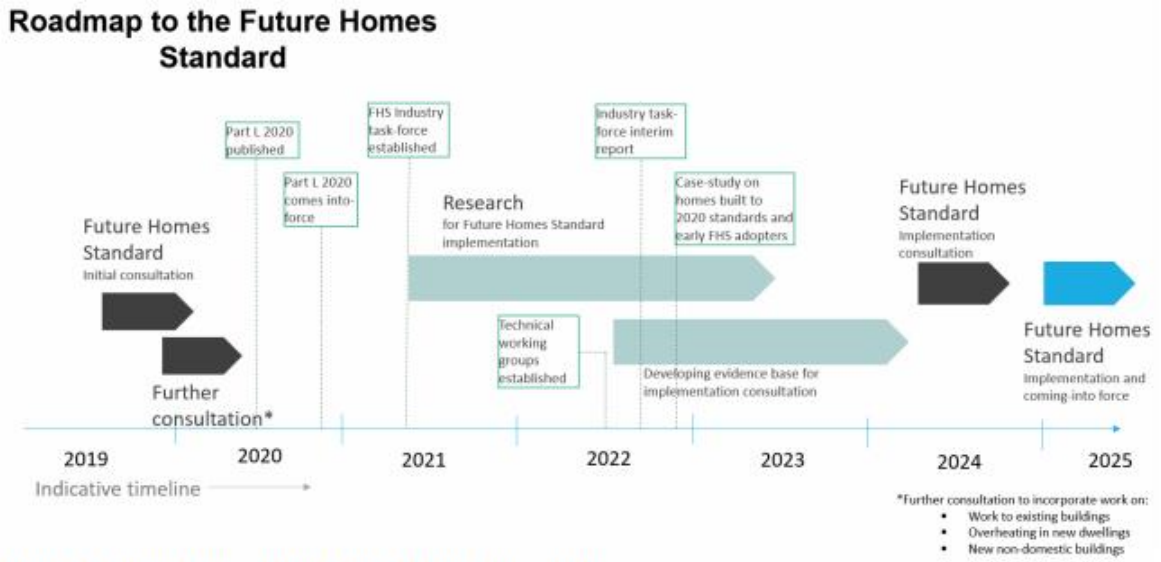


Figure 2.1: Roadmap to the Future Homes Standard

5. **Do you agree with the proposed timings presented in Figure 2.1 showing the Roadmap to the Future Homes Standard?**
    a. **Yes**
    b. **No – the timings are too ambitious**
    c. **No – the timings are not ambitious enough**

If no, please explain your reasoning.

Homes built between now and 2025 will last for generations. Easy and low cost solutions are available now, so the Future Homes Standard introduction should be brought forwards. We are reminded that back in 2015 the UK Government were already in a position to commit to Zero Carbon Homes by 2020, for this policy to be later abandoned in 2016. As such the Future Homes Standard could already be considered to be late and we encourage government to bring it into force as early as reasonably practicable.

Over the next 5 years, it is expected that over 1 million homes will be built, with a further 5 million between 2025 and 2050; around a fifth of the current stock. Many of those homes would require retrofit if we are to meet our legislated net zero goals. If we are to reduce the cost implications and disruption for the future occupants of these homes, the standards for the transitional period should be as close to the FHS as practicable and the date for implementation brought forward.

We understand that some elements of the process to create the Future Homes Standard will take time, however extensive research has been done in this area by consultants, institutes and others, as well as that already completed for the Zero Carbon Homes proposal.

It is disappointing to see the level of ambition for our housing standards decrease since the announcement of plans for net zero homes over 10 years ago.

6. **What level of uplift to the energy efficiency standards in the Building Regulations should be introduced in 2020?**
    a. **No change**
    b. **Option 1 – 20% CO2 reduction**
    c. **Option 2 – 31% CO2 reduction**
    d. **Other**

Please explain your reasoning.

The key issue with the options provided is that they are compared to reductions in current standards.

Currently, there are no specific levels of carbon emissions or operational energy targets mandated. This method is flawed as inherently benefits buildings of poor shape and design.

Therefore, the REA recommends setting actual operational energy efficiency targets for homes. Setting actual operational energy targets encourages architects, developers and homeowners to be innovative with their design.

We believe that at least 50% improvement on current carbon emissions should be introduced in 2020.

7. **Do you agree with using primary energy as the principal performance metric?**
    a. **Yes – primary energy should be the principal performance metric**
    b. **No – CO2 should be the principal performance metric**
    c. **No – another measure should be the principal performance metric**

Please explain your reasoning and provide evidence to support this.

With the UK having moved towards a target of net-zero Greenhouse Gas Emission by 2050, carbon emissions should now be the principal performance metric of all buildings. This is to allow for buildings where reducing primary energy consumption may prove expensive, to take a lower cost alternative to reducing their carbon emissions by offsetting the energy consumption through on site low carbon generation.

8. **Do you agree with using CO2 as the secondary performance metric?**
    a. **Yes**
    b. **No**

Please explain your reasoning.

Primary energy should be secondary performance metric to reduce our total energy consumption and reduce strain on the grid. Consideration should also be given to including "flexibility readiness" or "flexibility" as a performance metric, to support lowering costs and strain on the grid.

9. **Do you agree with the proposal to set a minimum target to ensure that homes are affordable to run**
    a. **Yes**
    b. **No**

Please explain your reasoning.

We need to create homes which are built with consumers at the heart – better quality homes can reduce running costs for consumers but also alleviate national costs in other areas such as health care.

10. **Should the minimum target used to ensure that homes are affordable to run be a minimum Energy Efficiency Rating**
    c. **Yes**
    d. **No**

If yes, please suggest a minimum Energy Efficiency Rating that should be achieved and provide evidence to support this.

If no, please suggest an alternative metric, explain your reason and provide evidence to support this.

We believe that the minimum rating should be A grade, although the energy efficiency rating should only be used if SAP 11 is introduced in line with the FHS. A new, or drastically improved modelling and assessment method is strongly preferred.
Current SAP modelling is too outdated, strongly underrating renewables and it does not reflect importance of flexibility. Current EPC methodology can perversely incentivise fuel switching to high-carbon fossil fuels by using outdated assumptions about efficiencies and fuel costs, as such need reconsidering.

The MEER should be based on a levelised cost which includes the upfront cost, running cost and on-going maintenance – to offer more reflective heating costs.

Thought should also be given to improving the enforcement of, and compliance with, Building Regulations. The proposed requirement for mandatory photographic evidence is welcome, but does not go far enough. A digital record should be created for every home, containing all relevant evidence from design through construction – along the lines of the 'golden thread' recommended in the Hackitt Review. In addition, Building Control Bodies must be adequately resourced and upskilled; and fines for non-compliance significantly increased.

16. **Do you agree with the proposal of removing fuel factors to aid the transition from high-carbon fossil fuels?**

    a. **Yes**

    b. **No**

If no, please explain your reasoning.

The REA does not support a blanket removal of fuel factors, although supports proposals to remove fuel factors from high-carbon fossil fuels. We believe that:

- It should only apply to high-carbon fossil fuels – coal and oil.
- Support for bio-LPG should continue until bioLPG / biopropane is recognised in SAP
- A blanket removal on bio-LPG would effectively ban the use of bio-LPG and close off a credible and genuine decarbonisation solution for rural, off-grid areas. The Committee on Climate Change have recognised bioLPG as an important decarbonisation solution for use in hard-to-decarbonise homes in rural, off-grid areas particularly when used as part of a hybrid system.

21. **Do you agree with the proposal to adopt the latest Standard Assessment Procedure, SAP 10?**
    a. **Yes**
    b. **No**

    If no, please explain your reasoning.

SAP (and SBEM) were not developed to predict energy consumption and they do not relate to real world energy and carbon performance. Therefore, SAP and SBEM are inappropriate methodologies to use to reduce the climate impact of the built environment.

SAP is based on a percent reduction from notional baseline building measurements which does not address poor design. In addition, SAP uses a gas boiler as default in the notional building which inflates the improvement in a new building if a more energy efficient heating system (for example a heat pump) is used.

SAP cannot deliver the improvements needed for designing to an operational energy standard. This is a significant hurdle to delivering net-zero buildings.

SAP should be replaced with a more sophisticated advanced modelling methodology that can more accurately model building performance.

Government should consult on this new tool and look to existing models, such as the Australian NABERS, CIBSE's tools on evaluating operational energy performance of buildings at the design stage (TM54 and DomEARM), Passivhaus Planning Package (PHPP) and Dynamic Thermal Simulation (DTS), as a starting points.

22. **Do you agree with the proposal to update the source of fuel prices to BEIS Domestic energy price indices for SAP 10.2?**

a. **Yes**
b. **No**

If no, please explain your reasoning.

As mentioned above, SAP does not relate to real world energy and carbon performance and cannot deliver the improvements needed for designing to an operational energy standard.

23. **Do you agree with the method in Briefing Note – Derivation and use of Primary Energy factors in SAP for calculating primary energy and CO2 emissions factors?**
    a. **Yes**
    b. **No**

    If no, please explain your reasoning.

As mentioned above, SAP does not relate to real world energy and carbon performance and cannot deliver the improvements needed for designing to an operational energy standard.

Furthermore, the REA does not agree with the use of primary energy as a metric for energy efficiency.

36. **Do you agree with the proposal to specify the version of Part L that the home is built to on the EPC**

    a. **Yes**

    b. **No**

Please explain your reasoning.

To show reflect the actual standard of the home and account for improvements in SAP calculations over time.

65. **Do you agree that the transitional arrangement for the energy efficiency changes in 2020 should not apply to individual buildings where work has not started within a reasonable period – resulting in those buildings having to be built to the new energy efficiency standard?**

    a. **Yes – where building work has commenced on an individual building within a reasonable period, the transitional arrangements should apply to that building, but not the buildings on which building work has not commenced**

    b. **No – the transitional arrangements should continue to apply to all building work on a development, irrespective of whether or not building work has commenced on individual buildings**

If yes, please suggest a suitable length of time for the reasonable period in which building work should have started.

If no, please explain your reasoning and provide evidence to support this.

Upgrading homes which are being built now is crucial as they will last well into our net zero targets. Transitional arrangements should apply to as few buildings as possible.

67. What is your view on the possible transitional arrangements regarding changes to be made in 2025?

We agree with the proposals to reduce the time period for transitional arrangements, and encourage homes to be built to the most recent standards as possible.

Conclusion

The upcoming review of Building Regulations Part L (conservation of fuel and power) offers an immense opportunity to kick-start the transition of the buildings sector in its transition to zero-carbon in line with newly adopted UK targets of net-zero GHG emissions by 2050.

Bringing together the construction and renewable energy and clean tech sectors, is imperative to realising the prospects at stake, for both consumers – in creating more cost-efficient, healthier, and more sustainable living spaces, and the wider energy sector – in offering decentralised power generation and flexibility services to reduce grid reinforcement costs.

This consultation response highlights six key areas for new buildings where action can be taken now, as minimum standards for the next set of building regulations. These solutions offer a no-regrets, first step to the decarbonisation of the built environment. They include:

1. **Solar PV powering all new buildings**
2. **Energy Storage utilising power generation and supporting flexibility**
3. **Electric Vehicle charge points, to offer a seamless transition for consumers to zero carbon transport**
4. **Three-Phase electricity supply connections in new homes as standard, to support the electrification of heat and other smart technologies**
5. **Renewables and Clean Tech to be fairly acknowledged in EPCs and SAP**
6. **Renewable heat as standard in all new developments**

For more information or feedback on this consultation response, please contact the REA.

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Please do not hesitate to contact us (Nadia Smith) to discuss any of the content in this response further.

REA, January 2020