What Next For

Heat & Buildings Policy?

June 2022

SUSTAINABLE ENERGY ASSOCIATION

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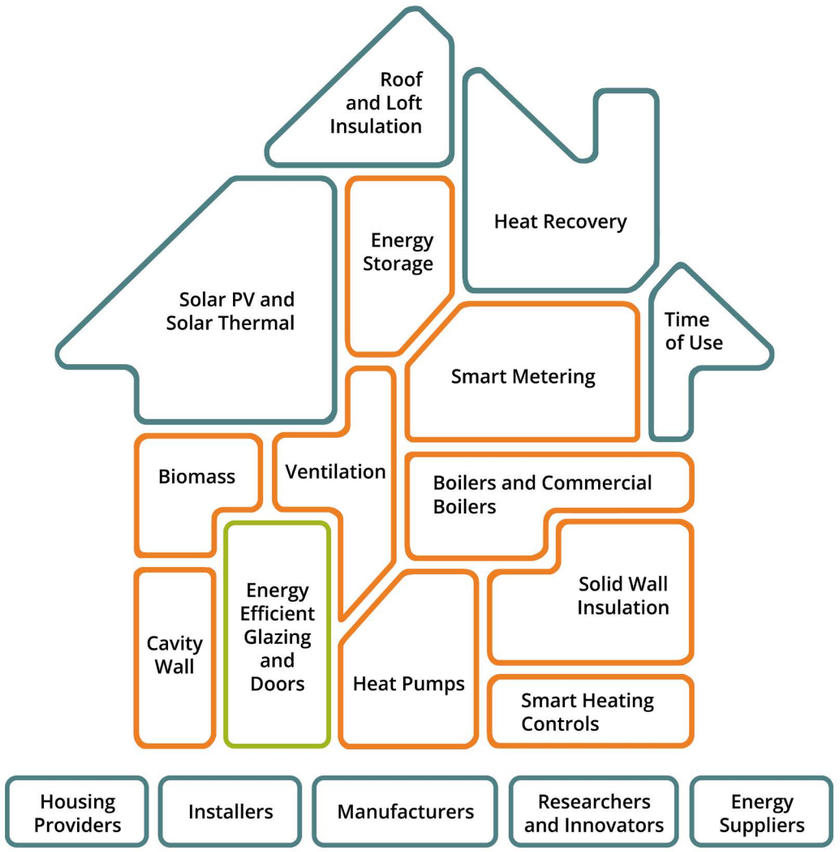
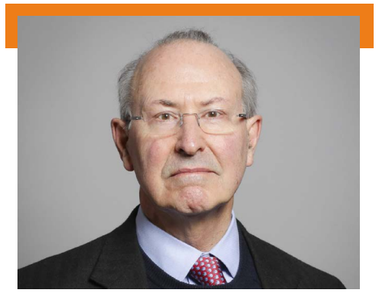


In a world of finite resources, the Sustainable Energy Association exists to help create living and working spaces fit for future generations. Our work seeks to align the interests of business, politicians and consumers to make this a reality.

Foreword | Lord Best

President of the Sustainable Energy Association



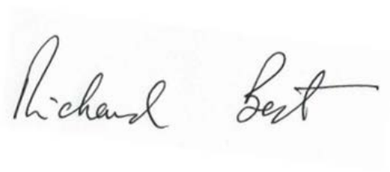
2021 was an eventful year for anyone working in the sustainable energy sector. In November representatives of many nations, gathered once more to address climate change at the 2021 United Nations Climate Change Conference (COP26), hosted in Glasgow. All eyes turned to the UK and alongside COP26, the Government published a whole host of policies and strategies, including the long-awaited Heat and Buildings Strategy.

There is no question about the need for such a strategy to address our buildings: they account for a third of the total Greenhouse Gas emissions, of which heating accounts for 79%[1]. However, as we come to the next phase of policy development, and the Sustainable Energy Association (SEA) and our members continue progress towards delivering our carbon reduction targets, the question remains: how far these policies will help us to fulfil our vision for creating net-zero buildings, to improve health and well-being for our nation and deliver sustainable buildings fit for future generations!

In its independent review of the Heat and Buildings Strategy, the Climate Change Committee commended the Strategy as an important step forward, that offered a foundation for making progress in the sector but acknowledged it had further to go. This report evaluates how current heat and buildings policy can be improved to ensure that we are on track to realise our transition to Net-Zero.

The report highlights gaps in policy that have been identified through discussions with key sector stakeholders and our membership, via industry workshops and events. These omissions range from the need for long term, joined up policy, to tackling owner-occupied properties (the able to pay sector), the need for a national retrofit strategy with equal consideration for health, wellbeing, and adaptation alongside our net-zero targets. Our recommendations offer practicable solutions to improve upon existing policy and inform future policy development.

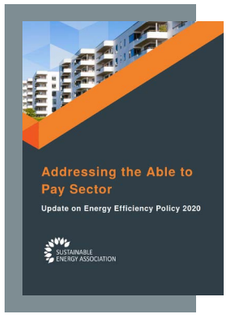
I commend the Sustainable Energy Association and its members for this timely contribution toward a resurgence of climate change action as our focus begins to shift to the delivery of our targets. We urge the Government to start acting on the gaps we have identified, and we look forward to continuing to collaborate with officials in the development of new improved policies to help deliver buildings fit for the future.



Executive Summary

Over the past 18 months we have seen a huge range of new policies and strategies being published by the Government, including the highly awaited *Heat and Buildings Strategy*. The UK has passed legislation for achieving net zero by 2050, and yet, despite the influx of policy, there are significant gaps that remain. With one third of our greenhouse gas emissions coming from our building stock, it is imperative that if we are to reach our targets, the Government must address these gaps as a priority.

This report outlines the remaining gaps that the Sustainable Energy Association (SEA) has identified and makes recommendations for what the Government should do to address them. The key policy gaps are summarised below.



Address the Able to Pay Sector

A significant gap remains for the 60% of existing homes which are owner-occupied and not fuel poor, as explored in the SEA's *Addressing the Able to Pay Sector Report*[2]. With the current Energy Bill Crisis, which is expected to remain with us for the long term, we are concerned that many more households will fall into fuel poverty, and this is something we are determined to help prevent. Energy efficiency is the most effective long-term solution.

Addressing this key stakeholder group is crucial to facilitate the movement away from a heavy reliance on government funding into an independent retrofit market which is self-sufficient and delivers at scale.

Consumer and Supply Chain Knowledge & Skills

Knowledge of alternative heating technologies have been increasing in recent years through increased awareness of climate change. However, there is still a significant lack of consumer and installer knowledge regarding low-carbon technologies compared to traditional fossil fuel heating systems.

Industry skills must incorporate a holistic approach to ensure an efficient installation without unintended consequences. We need a competent workforce capable of designing, building, and retrofitting to deliver energy efficient, net zero carbon, healthy homes and buildings.

There needs to be a commitment to provide independent consumer advice through a 'one stop shop', as this will be crucial to helping homeowners through the transition.

The new build housing sector has the Future Homes Hub[3], but we do not have the same in the retrofit sector to help plug the knowledge and skills gap, helping deliver a whole house, multi-measure, fabric first approach to retrofit.

Technology Agnostic Approach and Innovation

The SEA advocates a fabric first, technology agnostic approach. Therefore, low-carbon technologies, and energy efficiency measures that meet the space and water heating demands of the building in question and lead to the right outcomes, should be supported by government schemes, like the recently launched Boiler Upgrade Scheme (BUS)[4].

Government schemes must also support the use of innovation to help the adoption of new and existing, but not widely adopted, technologies. SMEs have a considerable challenge to get their products certified and eligible for government schemes due to the costs and complexities involved. There must be an efficient process to allow businesses the chance to demonstrate the impact of their products and solutions and help aid the transition to Net Zero, whilst ensuring quality.

Long-Term, Joined-up Policy

Long-term, joined-up, consistent, and effective policy and regulation, which exists to drive energy efficiency and sustainable energy in buildings, is the centrepiece of all the gaps in policy. To reach the targets specified by the Government this principle must be followed.

The Government and Industry must work together to form a definitive National Retrofit Strategy, setting out the policies and programmes required to improve the energy efficiency of our buildings, with realistic timescales for implementation, and which places energy efficiency at the heart of the UK's Net-Zero target.

All buildings can be much more energy efficient; many could even be healthier and energy productive—the net zero transition gives us a once in a lifetime opportunity to address this era-defining challenge. To ensure we get it right we need to measure and monitor energy use, assess the effectiveness of different types of approaches, and examine interventions for all types of end users and customers, deploy appropriately, and build our collective capacity to deliver.

A full set of recommendations can be found below, and the SEA is committed to collaborating with the Government and key industry stakeholders to develop the next phase of policy and help deliver homes and buildings fit for future generations.

Recommendations

Long-term, joined up and effective policy and regulation exist to drive energy efficiency and sustainable energy in buildings	
LONG-TERM, JOINED-UP POLICY	The Government must work collaboratively with industry in the development of a clear roadmap for heat and buildings through to the 2050 target, building upon the work of the UKGBC. Cross-party consensus should be sought to prevent changes occurring due to party politics. Once the roadmap is implemented, unplanned changes should be avoided. Delivery according to the original plan is key.
	Consistency in policy helps encourage industry to invest; it is for this reason the SEA recommend the Government take steps to enable the tracking of its promised targets. Commitment from the Government to set trackable targets where swift and decisive action will take place, should there be any barriers or impediments to the fulfilment of the target, will go a long way to foster faith and trust from industry.
WHOLE HOUSE, MULTI-MEASURE, FABRIC FIRST APPROACH TO RETROFIT	The Government must support the development and execution of a national retrofit strategy, such as the work of the Construction Leadership Council[5]. The generation of a long-term plan for the 28 million homes in need of retrofit must be seen as a policy priority.
	The Government must at every opportunity seek to take a whole house, multi-measure approach to retrofit which prioritises the fabric first, to maximise the benefits of low-carbon heating technologies, avoid unforeseen circumstances and unintended consequences, and reduce energy demand.
	The Government must begin the development of a nation-wide Building Renovation Passport (BRP), in consultation with industry, to ensure the correct improvement of our building stock with cost, carbon and health objectives in mind.
MARKET-BASED MECHANISM	The Government must take a whole system approach and implement other policies alongside the Market-based Mechanism to ensure the supply chain is ready to handle the influx of demand its policies will create.
	The Government must further, enable other forms of low-carbon heating to be included in the market mechanism to drive innovation and preserve optionality for new buildings and retrofitting existing properties.
	The Government must focus on building up policies and incentives to encourage installers to recommend low-carbon heating solutions. To build the capability that will enable this change, support is needed to help train installers. Installers are much more likely to recommend a technology that they can install, and often they are the first to be asked for advice.
	The Government should consider extending this obligation into the non-domestic market to incentivise the supply chain to mobilise more widely for the installation of low-carbon heating.
	The Government must factor in a mechanism to manage post-installation quality to guarantee correct installation and operation to ensure maximum compatibility and efficiency.

Good quality and high performance are the norm in the sustainable energy and energy efficiency sectors	
PREVENT ROGUE INSTALLERS	The Government must ensure protections are in place for schemes which involve the installation of energy efficiency and low-carbon heating measures, and that the consumer is informed adequately before commitment.
	The Government and industry must work together to ensure those involved in the installation of measures are competent and well informed to a suitable standard before carrying out any work under any government scheme.
MINIMUM ENERGY EFFICIENCY STANDARDS AND POWERS OF ENFORCEMENT	The Government must work together with local authorities to ensure they have the necessary powers and funding to enforce mandated Minimum Energy Efficiency Standards.
	The Government must assist local authorities in the development of a public database of landlords, which demonstrates compliance to the Minimum Energy Efficiency requirements of their properties.
	The Government must work together with local authorities to ensure landlords are aware of their responsibilities and have access to impartial advice and information on improving their properties.
FLEXIBILITY AND IN-USE PERFORMANCE	The Government must implement regulations that, by 2025, require all homes to demonstrate that design specifications have been achieved and the intended outcomes have been successfully delivered. Post-occupancy data should be made open source, to ensure learnings guide future policy, and testing should be carried out independently. Housebuilders will need to confirm that the building meets the performance standard required by law before a sale is made.

	The Government must introduce 'in-use' minimum performance standards to underpin certain policies, perhaps the Social Housing Decarbonisation Fund (SHDF)[6] initially, and publish a roadmap to transition towards the incorporation of an in-use performance element into all building's efficiency policy.
	The Government should consider implementing a straightforward 'Gas Feed-out Tariff', an 'able to pay' policy where the Government pays a sum per measured and certified avoided kWh of energy through a new low-carbon heating system and energy efficiency improvement.

The knowledge and skills exist in the industry to deliver a holistic approach to energy efficiency and sustainable energy in buildings	
INDUSTRY SKILLS AND A COMPETENT WORKFORCE	The Government must work together with industry to set out a clear long-term roadmap for delivering the necessary certifications, skills and competencies.
	Installers and companies should be given access to financial support and accredited training to achieve set levels of competence and ensure the sector's preparedness for the Government's policies and schemes.
	The Government and Industry must work together to form a retrofit hub where expertise and best practice can be shared to improve our existing building stock.

There is strong consumer and client demand for energy efficiency and sustainable energy	
ADDRESS THE ABLE TO PAY SECTOR	The Government must implement policy drivers, such as variable Stamp Duty/ Council Tax, set according to the energy efficiency standards of a property or conditional mortgages, and financial enablers, like ISAs and zero interest loans, to encourage action in the able to pay sector (as set out in the SEA's 2020 report, *Addressing the Able to Pay Sector*).
	The Government must introduce a long-term ECO+ scheme that supports households not eligible under ECO4, with partially subsidised energy efficiency measures, providing the confidence and certainty that is necessary to create a sustainable market for energy efficiency measures.

CONSUMER KNOWLEDGE AND AWARENESS	A Government backed consumer awareness campaign to showcase best practice, build knowledge, and ultimately, generate interest.
	The Government and industry must provide consumers with cost data and inform them of the benefits of installing low-carbon heating technologies, as opposed to traditional fossil fuel heating systems.
	The Government and industry should work together in the formation of a 'one stop shop', to provide independent, simple, clear, and joined up consumer advice to help guide homeowners through the transition to Net Zero.
ENERGY BILLS AND ENERGY SECURITY	The Government must prioritise energy efficiency alongside energy supply to safeguard against future fluctuations in the energy market and address fuel poverty.
	The Government must ensure in policy that wherever improvements are made to a building, a holistic, fabric first approach is prioritised.
ENHANCE HEALTH AND WELLBEING AND ADAPTATION FOR CLIMATE CHANGE	The Government must follow the Welsh Government's example, and create a UK 'Future Generation Act', which requires public bodies to think about the long-term impact of their decisions to prevent persistent problems such as poverty, health inequalities and climate change.
	The Government must develop a national healthy homes and buildings policy, and a national optimum standard for new buildings.
	The Government must make consumers aware of the risks and measures they can take to adapt to a changing climate and improve their health and wellbeing. This could be included as part of a wider campaign to raise awareness in the able to pay sector.
	The Government must include measures to address overheating, adaptation to climate change, and wider health and wellbeing improvements within retrofit schemes.

Rapid adoption of innovation, of new and existing technologies, to advance the delivery of energy efficient and zero carbon buildings	
TECHNOLOGY AGNOSTIC APPROACH	The Government must take a technology agnostic approach to the decarbonisation of heat in buildings and develop policies that assist in growing the market for all forms of low-carbon heating, energy efficiency and required ancillary products.
	The Government must consider developing a 'Carbon Intensity Standard'—as set out in our '*Off grid, Off carbon*' report[7]—an emissions standard for heating, and set limits to the permitted emissions per kWh of heat provided that progressively tighten over time.
SUPPORT INNOVATION	The Government must provide a streamlined and well signposted methodology for businesses to utilise to get their products certified and ready for government schemes and the general market, which minimises cost and burden for SMEs, who are pioneers in their respective innovations.

Introduction

The Sustainable Energy Association (SEA) is a membership organisation made up of manufacturers, energy suppliers, housing providers, installers, innovators, and other organisations with expertise on energy in buildings.

In a world of finite resources, the SEA exists to help create living and working spaces fit for future generations.

Our work seeks to align the interests of business, politicians, and consumers to make this a reality, supporting improvements in public health, increasing national employment, and generating sustainable economic growth. We are industry leaders in energy in buildings. We are technology agnostic and provide objective, evidence-based policy positions which help shape how we think about, generate, and use energy. We are constructive, collaborative and committed to achieving our vision, by ensuring that buildings are energy efficient, net zero-carbon, warm and healthy. The SEA recognises that there is no single solution to decarbonising energy in buildings. A range of technology solutions, financing models, and delivery methods are required. In practice, reducing the energy needs of buildings requires a multi technology solution, tailored to the circumstances of the building and its occupants. In other words, a whole house, technology neutral approach, which starts with the building fabric. Our vision will be achieved when all buildings are energy efficient, net-zero carbon, warm and healthy.

The SEA has identified five key deliverables that must be addressed if we are to achieve this vision:

1 | Long-term, joined up and effective policy and regulation exist to drive energy efficiency and sustainable energy in buildings

2 | Good quality and high performance are the norm in the sustainable energy and energy efficiency sectors, as well as across the built environment

3 | The knowledge and skills exist in industry to deliver a holistic approach to energy efficiency and sustainable energy in buildings

4 | There is strong consumer and client demand for energy efficiency and sustainable energy

5 | Rapid adoption of innovation, of new and existing technologies, to advance the delivery of energy efficient and zero carbon buildings

Over the past 18 months we have seen a huge range of new policies and strategies being published by government, including the long-awaited *Heat and Buildings Strategy*[8]. The SEA welcomes that there has been a monumental shift in the UK Government's focus, with Net Zero placed firmly on the policy agenda. It is a major step in the right direction. However, there are still numerous gaps that need to be addressed to help us realise this vision.

The purpose of this report is to assess where we are in terms of this new policy landscape and ability to meet our net zero and wider aims. First, we will begin by outlining policy gaps that the SEA and its membership have identified, outlining the issues and gaps against each of our deliverables. The report will then proceed to outline potential solutions and make recommendations to address what we as an industry, alongside the Government, have left to accomplish, in order to assist the transition of our nation to Net Zero and deliver buildings which truly are 'Fit for the Future'.

1 LONG-TERM, JOINED UP AND EFFECTIVE POLICY AND REGULATION EXIST TO DRIVE ENERGY EFFICIENCY AND SUSTAINABLE ENERGY IN BUILDINGS

Long-Term Policy: Policy Deployment and Effective Timing

It is critical that the Government works collaboratively with both regional and local governments, citizens, and the private sector, delivering their consultations in good time so that we can work together to address gaps in policy. Without clarity the industry and consumers can become entrenched with rumours and 'policy voids' of uncertainty. SMEs and more isolated organisations can fall prey to rumours and uncertainty, which may affect investment opportunities which could otherwise have borne fruit and provided key assets in our nation's transition to Net Zero. For example, a delay in the new Energy Company Obligation (ECO4)[9], has the potential to introduce an element of uncertainty throughout the SMEs who are vital for executing the ECO programme—a group that is collectively worth £16.7bn, supporting 114,000 jobs, and imperative to the delivery of such Government schemes[10].

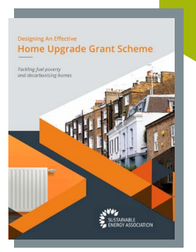
There are a number of policy ambitions that exist in the near future, yet lack clarity today, for example:

- The future deployment of hydrogen, and whether and to what degree it will provide domestic heating in different parts of the country.
- Clarity on how the ban on new gas boiler connections will come into force.

Clearly these will affect other viable low-carbon technologies and their own paths of progression; as well as being liable to the effects of wider policy moves, for example the EU's commitment to ban gas boilers from 2029.

A roadmap, with regular and progressive updates would go a long way to ensure adequate preparation and help gear up industry to meet the opportunities of this changing market for domestic heat.

Move Away from Stop-Start Funding



The SEA report, *Designing an Effective Home Upgrade Grant Scheme*[11], found that short-term funding terminated at the last minute, distorted the market for energy efficiency measures and home upgrades, and decimated the number of installers in the market. There was a clear consensus from the wide range of stakeholders involved in the report, that a long-term guarantee instils confidence to enable upskilling, product development, service offering, and innovation in the market.

Short term schemes introduce an element of concern from an installer supply chain perspective. A key recent example is the Boiler Upgrade Scheme, with its short life span of three years, which also introduces the question as to how we move from the current 30,000 heat pump installations a year to 600,000 a year from 2028, as targeted by the Government in their *Heat and Buildings Strategy*.

Within our industry, there is a general reluctance to fully commit, following policies such as the Green Deal, and more recently the Green Homes Grant, being withdrawn after companies had spent valuable time and resources to prepare to play their part in the delivery. This is affirmed by the Environmental Audit Committee, who concluded that overall energy efficiency policy is introduced piecemeal and not delivering at the scale or pace required[12].

The industry has become more wary and careful before significant investment can be made and are now, as a result, more risk averse. This issue also affects individual installers, when it comes to significantly investing in their own skills and retraining; it is difficult to justify investment in training on a specific technology if its future is not guaranteed.

This point is best summed up by Russell Smith from RetrofitWorks, who, when giving evidence to the Environmental Audit Committee, said that when it comes to funding, it is '*not about being thrown money. It is about saying there is a viable business opportunity in the long term...*'[13]. Consistency would go a long way to help create a foundation where many of those aspiring to work or currently working in our industry, can truly thrive.

Long-Term Certainty

Research carried out by the University of Sussex into why heat pumps are so widely adopted in places like Finland, found that it is the long-term policy environment that supports business investments and individuals to choose a career in the low-carbon heating industry[14]. The research identifies three distinct phases of Finland's Heat Pump journey and concludes that the UK has been unable to break out of the 'first phase', due to a lack of a 'prominent vision for the sector'. The UK has taken longer to overcome such barriers and is impeded by the broad lack of awareness among consumers, architects, installers, and housing developers. Below are the identified steps for the realisation of heat pumps as a technology in Finland.

The **start-up phase (1975-1985)**, which featured pilots with ground source heat pumps (GSHPs), largely in response to the global oil crises of the mid-1970s.

The **acceleration phase (1995-2015)**, saw user-producers continue to advocate heat pump technologies at trade fairs. Improvements in technology, the introduction of air source heat pumps (ASHPs), and positive examples from neighbouring Sweden, supported expansion.

And finally, during the **stabilisation phase (2015-present)**, the established industry offered off–the–shelf products, giving all users affordable, low-maintenance heating options that meet the energy demands of Finnish dwellings and buildings. Total heat pump sales reached one million in 2020, and heat pumps have become an established heating choice for many households.

Our report, *Designing an Effective Home Upgrade Grant Scheme*, found that due to lessons learned from the Green Homes Grant Scheme, many installers have informed local authorities that they have no appetite for involvement in future government schemes. It has been suggested that the rollout of short-term policies into an immature market has in fact had an opposite reaction to its intended effect and instead, increased installation costs for eligible measures. Reassuring installers will be a challenge, but necessary, if we are to progress any future schemes on a meaningful level.

Jade Lewis of the SEA co-authored a report, '*A Study of the Factors Underpinning Investment in the Construction Products Industry*', on behalf of the Construction Product Association (CPA)[15], which outlines the factors supporting investment in construction product manufacturing within the UK. The report details how government and industry can develop policies that give greater certainty and confidence to industry to encourage investment, innovation and growth. It also contains case studies of past policies that were effective at driving investment. The key findings are relevant to this report, and include:

- Effective regulations are clearly defined, target-driven and not prescriptive.
- Industry needs policy and regulation that is simple with minimal administrative burden.
- Policy works best when government consults industry, and others, early and regularly to identify problems, review measures, provide solutions and evaluate results.
- Government can create greater certainty for industry by providing a roadmap with a long-term plan, not just over five-year parliamentary cycles, and clear goals which allow time for industry to prepare. [*Note, this would also help provide certainty for consumers*].
- Once the roadmap is implemented, unplanned changes should be avoided. Delivery according to the original plan is key. Consistency of policy helps industry to invest.
- Cross-party consensus should be sought in advance for policies which are key drivers in major markets (e.g., infrastructure and housing), to prevent changes occurring due to party politics.

The Government acknowledged the mistakes of the Green Homes Grant in the Committee of Public Account's report, specifically around the 'unrealistic implementation timescale'[16]—the SEA echoes these recommendations made to the Government. The success of policy schemes such as ECO, lay with its continuity, and the fact it fulfils the criteria listed above. ECO has remained stalwart throughout consecutive governments, meaning people have a long-term visibility over it and can, therefore, rely on its continuation. ECO is a scheme which has provided energy efficiency measures for millions of our most vulnerable households, and entire businesses have been set up because of the certainty of demand the scheme provides. Schemes, which if they are to survive for as long as ECO, must follow a long-term vision and provide a roadmap for certainty. Each iteration of ECO is followed by a consultation and industry is consistently able to provide views upon how they wish the scheme to evolve.

The supply chain is seeking commitment in the form of a pipeline of spend much longer than one year. A forecast of five years would instil confidence, longer would be preferable, given how long it takes to tool and upskill sufficient capacity. We note that the price control period for the energy networks is currently five years, e.g., for the Distribution Network Operators (DNOs) it will be 1 April 2023 to 31 March 2028, while they collectively have the confidence to suggest they will support deployment of over 2.5 million heat pumps during that period.

In addition, the Government can assist the supply chain in developing a timeline of proposed or requested funding. For example, when will the Local Authority Delivery (LAD) scheme/Home Upgrade Grant (HUG)[17]/SHDF phases begin and end, and how much will be offered within each phase, for each programme? If installers believe they will have certainty of long-term work, they will invest in training and certification. A clear timeline, specific for government energy efficiency and low-carbon heating funds, would go far in reassuring the myriad of stakeholders who will be involved in their successful implementation[18]. Long-term guarantee will enable local authorities to successfully deliver schemes specific to them, such as HUG, through planning, proposals, and benchmarking ahead of government grants. Advice, guidance, and training must be developed in collaboration with industry to ensure engagement and agreement on what is defined as best practise for any key scheme. It is important that a balance is struck between ensuring quality and a positive outcome, whilst not stopping work from being undertaken. The Government will need to develop guidance, which will need a route to reviewal and challenge.

To develop this point further, alternative technologies, such as Hydrogen and Heat Networks, are given targets which contain a date, yet there is no visible roadmap on how the technology will be implemented in accordance with the specified targets, details on how the ambition will be realised, and a general progress report on the target. This is especially prominent when up against targets such as the 600,000 per year target for heat pump installations (which is a technology many in the industry have endorsed), or heat networks, which are globally well established. Whilst large companies and the Government have announced ambitious green hydrogen intentions for the next two decades, it remains uncertain how many of these projects will be commissioned on time and on budget. The timeframes between the decision and implementation have caused issues, when in policy, the implementation of hydrogen-ready boilers (2026) could potentially happen at the same time as the decision on proceeding with hydrogen domestically (2025). Therefore, this has the consequence of requiring upfront investment to already be committed, a decision which carries risk and a reliance on faith. Although the Government sets targets, the risky decision ultimately falls onto industry in choosing where to invest in regard to a specific policy; installer skills and certifications; and perhaps most importantly, the investment for the scaling up production or infrastructure for a specific technology.

The KfW 'Energy-efficient Construction and Refurbishment' scheme in Germany, provides a policy example which has been a proven success. The policy itself is 15 years old and has succeeded in providing €260 billion in building measures and secured an average of 320,000 jobs per year in the construction industry and regional trades[19]. In essence, the KfW scheme provides a low interest rate loan, augmented by a government subsidy covering the interest rate. For example, in 2011, the state put in just under €1bn, which created €6.5bn in loans, and a total investment of €18.5bn. The scheme, similar to ECO,

has the benefit of being long term, provides industry with a clear roadmap, and gives industry adequate time to mobilise in accordance with the criteria listed in the CPA report.

The SEA proposes that the Government work together with industry to provide visibility on targets and alongside this, provide status updates. There must be a commitment from Government to address targets that are not being met, or targets that show signs of becoming off track, and, when this occurs, to take swift, decisive action to rectify the poor performance. Government initiatives need to provide a suitable lead in time to allow the industry to prepare, train and resource effectively. Various roadmaps exist throughout industry, with work being done by the UKGBC, who have developed their own *Net Zero Whole Life Carbon Roadmap*[20] with industry. Building upon work such as this, and consolidating a wide range of stakeholders, would ensure that every eventuality or solution is accounted for, considered, and prepared for in the most efficient, fair and all-encompassing way possible. The purpose of implementing such a timeline, is to give industry certainty to invest and scale up as the scheme grows.

Recommendations

The Government must work collaboratively with industry in the development of a clear roadmap for heat and buildings through to the 2050 target, building upon the work of the UKGBC. Cross-party consensus should be sought to prevent changes occurring due to party politics. Once the roadmap is implemented, unplanned changes should be avoided. Delivery according to the original plan is key.

Consistency in policy helps encourage industry to invest; it is for this reason the SEA recommend the Government take steps to enable the tracking of its promised targets. Commitment from the Government to set trackable targets where swift and decisive action will take place, should there be any barriers or impediments to the fulfilment of the target, will go a long way to foster faith and trust from industry.

Whole House, Multi-Measure, Fabric First Approach to Retrofit

The lack of an integrated offer on home retrofit for most households remains a real source of concern. The UK's existing 28 million homes must be addressed, many of these properties will exist in 2050, so remain vital to achieving our target. The UK's housing stock is one of the oldest and worst insulated in Europe, with only around 15% of existing stock built post-1990 [21]. In October 2020, the UK Energy Research Centre projected that approximately one million homes will need to be retrofitted each year for the next thirty years to meet the net zero target by 2050[22].

The Construction Leadership Council (CLC), supported by the SEA, has called for a national retrofit strategy (NRS). The conclusion was that if the Government invested just over £5 billion by the end of this Parliament, then this would unlock 100,000 jobs, generate government revenues of more than £12 billion, and provide additional GDP of up to £21 billion[23]. The Energy Efficiency Infrastructure Group (EEIG) are calling for the energy efficiency retrofit of homes to be made a national infrastructure priority and advocates for a 20-year national infrastructure programme to bring all UK homes up to a decent standard of energy efficiency, warmth, and comfort, without increasing energy bills[24]. There also exists international best practices', as exemplified by the decade long KfW scheme in Germany, which is now largely self-funding.

In essence, the Government and Industry (both the energy and construction sectors) must work together and form a definitive National Buildings Retrofit Plan, setting out the policies and programmes required to improve the energy efficiency of our buildings, with realistic timescales for implementation, and which places energy efficiency at the heart of the UK's Net-Zero target. The SEA understands there should be different approaches for houses of different ages and build type. This point is reflected in the CLC's *National Retrofit Strategy*, which calls for each property to have its own 'Building Renovation Passport' (BRP). The SEA's vision is for all living and working spaces to be fit for future generations, and therefore, we strongly encourage a NRS to be adopted by the Government to take forward the necessary task of retrofitting homes using a whole house, technology agnostic approach, with aid from a comprehensive BRP. This will help us to achieve our societal, economic, environmental, and health goals, through reducing the energy demand of properties, increasing energy security, improving the health and wellbeing of occupants, and decarbonising our building stock.

The SEA supports a holistic, whole house approach, starting with the building fabric. Energy efficiency offers a long-term solution for improving the wellbeing and health of a householder, by making it easier and cheaper to heat a home to an acceptable level of comfort—less energy wasted means lower energy bills. Addressing the fabric of a building first is an immediately impactful yet long-term action that benefits a household for many decades. While the *Heat and Buildings Strategy* supported a fabric first approach, details of how this and other energy efficiency measures would be delivered were not effectively addressed.

A key facet in achieving these goals lies in instating a BRP. A BRP is a comprehensive framework that both records the precise status of our building stock, in relation to every building's energy efficiency, carbon intensity, cost, etc., and then maps out the pathway to reducing the cost of living as energy demand falls, substantially improving the living conditions in all buildings, and decarbonising our building stock. The risk of unintended consequences through poorly managed retrofit, alongside simplified, standardised, and averaged retrofitting templates, such as those the SAP system produces for EPCs, may regress the delivery of living and working spaces fit for future generations, and induce greater cost and disturbance to the average householder. A well thought-through and extensive BRP, that uses building information beyond EPCs, and considers wider health and wellbeing qualities is essential to delivering a successful retrofit strategy.

Recommendations

The Government must support the development and execution of a national retrofit strategy, such as the work of the Construction Leadership Council. The generation of a long-term plan for the 28 million homes in need of retrofit must be seen as a policy priority.

The Government must at every opportunity seek to take a whole house, multi-measure approach to retrofit which prioritises the fabric first, to maximise the benefits of low-carbon heating technologies, avoid unforeseen circumstances and unintended consequences, and reduce energy demand.

The Government must begin the development of a nation-wide Building Renovation Passport (BRP), in consultation with industry, to ensure the correct improvement of our building stock with cost, carbon and health objectives in mind.

Market-Based Mechanism

In order to build up the capacity within the market to deliver the 600,000-heat pump target for 2028 and beyond, the Government have introduced a Market-based Mechanism for low-carbon heat. The mechanism is an obligation for manufacturers of fossil fuel heating appliances (gas and oil boilers) to achieve the sale of a number of heat pumps proportional to their boiler sales within a specific time period. The SEA has found that industry is generally supportive of the Government taking measures to drive the market towards low-carbon heating solutions, and the SEA has been advocating for this over many years. However, if the Government does implement the mechanism outlined in its consultations, it must be part of a suite of effective policies. The CCC conclude in their own review that the Market-based Mechanism in its current form, must be given as much clarity as possible and cannot be relied upon in isolation.

Furthermore, the market mechanism includes in its title, 'for low-carbon heat', yet the only form of low-carbon heat permitted in the obligation are heat pumps. The impact of a heat pump-exclusive policy intervention will stifle heating system innovation and remove optionality for new buildings and retrofitting existing properties. The policy should be extended to other forms of low-carbon heating in the interests of driving up the installation of a range of measures, a selection of which may suit some properties more than others.

Government policy and action is required to help remove barriers to manufacturers in delivering the set obligation. This additional policy must:

- Support upskilling, re-skilling, and training of new installers for low-carbon heating systems;
- Improve the EPC process in identifying the measures appropriate for the home; and
- Drive consumer demand for low-carbon heating and energy efficiency upgrade packages.

Following the installation and commissioning of a heat pump system, the cost of heating must not be greater than that of the heating system that it replaces. Applying the market mechanism without addressing these barriers creates unfairness for any manufacturer trying to supply low-carbon heating products. There must be a development of rewards and incentives for those who are innovating in the correct way to reach their targets. The news of the EU moving to ban gas boilers from 2029, further highlights the importance of not developing policies in isolation, as this will undoubtedly have an effect on our domestic market.

The boiler/heating system manufacturer only has a limited impact on the type of heating system installed within the property, where the key decision maker is the consumer in existing homes. According to BSRIA, of the 32,000 heat pumps sold in 2019, the majority (62%) were retrofit applications with the remaining 38% used in new buildings[25]. In the same year, only 8% of UK boiler sales were destined for new-builds and 86% for refurbishment or replacement. Of these, over 80% were "distress purchases" due to a failed boiler. During a 'broken beyond repair incident' the consumer is typically looking for a direct replacement technology to minimise the disruption and cost. Policies and incentives to encourage installers to recommend heat pump/low-carbon heating systems to consumers is key. These policies and incentives must be available during this decade. Currently the BUS is scheduled to finish in 2025, only one year after the proposed start of the market mechanism.

If such an obligation, as stated in this consultation, is to be implemented in 2024, the industry will simultaneously require policies that drive consumer/installer behaviour change away from fossil heating and towards low-carbon solutions—current policy proposals are not sufficient. The BUS is one such incentive, with grants of £5,000 available for an ASHP or biomass boiler and £6,000 for a GSHP. PAS 2030/2035 is not mandated for the installer through the BUS, but the Microgeneration Certification Scheme (MCS) is. The Government must continue to take steps to ensure that a heat pump is never incorrectly specified (especially if whole house, fabric efficiency and property suitability is not fully considered) as an entirely suitable technology for a particular property.

Despite the upcoming regulatory changes for the domestic heat pump market, the SEA is of the view that this obligation can be extended into the non-domestic heat pump market. The current proposal for the obligation acts as an incentive for installers to become qualified to install a heat pump. For the commercial sector, the market is less regulated, there is no Microgeneration Certification Scheme (MCS) standard equivalent. An obligation would see the non-domestic market more regulated and should have a similar impact in growing the market, increasing quantity of installs and reducing costs. Moreover, expansion of the obligation from the heat pump market into other, well-established forms of low-carbon heating products, will benefit the non-domestic market with more choice for retrofitting and constructing buildings to reduce cost and carbon emissions, and make buildings healthier to inhabit.

It is important to design the obligation to avoid a fossil fuel manufacturer simply complementing a fossil fuel boiler install with a heat pump, to fulfil the obligation. There must be strict regulation to ensure the heat pump obligation is for a particular number of full heat pump systems, as opposed to hybrid systems. There is a risk that hybrid systems are not sized correctly, and there could be brand damage for the heat pump technology.

A robust set of criteria for when a heat pump system is not appropriate must be created and enforced. A limit to the number of hybrid heat pump system installs must also be implemented. There is a requirement for robust hybrid and hybrid control standards—this should be separate to the mechanism where it should be used for government funded schemes.

It is very important to manage quality post-install. There is a shortage of building inspectors, and inspecting the heat pump installation, and checking thermal efficiency, is vital. This could be undertaken by the Retrofit Coordinator/Assessor. Alongside adequate training, qualification, and competence, it may be appropriate to develop a self-reporting mechanism where consumers report on how much energy is being generated and used. The inclusion of a heat meter would add to the cost of installation; however, this procedure would help to preserve the reputation, quality of installation, and aid in the diagnosis of problems should the need arise. This is the case in the Domestic Renewable Heat Incentive (RHI) Scheme, where consumers are able to apply for the add-on service, Metering and Monitoring Service Package (MMSP), and have their heat pumps monitored for efficiency and receive an additional incentive based on the performance of the heat pump. The data will inform the scheme administrator whether heat pump installations are working properly and have been well installed; additionally, the data can be used to gain valuable insights into the performance of renewable installations and aid future policy design. The administrative burden that a self-reporting mechanism creates for the scheme administrator will need to be managed.

There is concern across the SEA membership on the implications of placing a lot of responsibility on the installers to log all of the required information. In the gas industry, some SEA members have found that installers do not register their jobs through various schemes, which is free to do and are incentivised to do so with reward points (e.g., for holidays). The type of installer typically undertaking this work is not a contracted installer but a 'one-off' individual, where there is high pressure to install the system correctly and to register the job property. Some SEA members are of the view that the more complexity added (e.g., number of sites to visit and forms to fill) the less incentivised installers will be to log this work properly. Installers and industry participants will need to be well informed of this obligation, perhaps two years in advance, in order to prepare. It will need to be manageable, clear and concise for installers. Further training sites will be required from industry to satisfy demand for heat pump installers.

Recommendations
The Government must take a whole system approach and implement other policies alongside the Market-based Mechanism to ensure the supply chain is ready to handle the influx of demand its policies will create.
The Government must further, enable other forms of low-carbon heating to be included in the market mechanism to drive innovation and preserve optionality for new buildings and retrofitting existing properties.
The Government must focus on building up policies and incentives to encourage installers to recommend low-carbon heating solutions. To build the capability that will enable this change, support is needed to help train installers. Installers are much more likely to recommend a technology that they can install, and often they are the first to be asked for advice.
The Government should consider extending this obligation into the non-domestic market to incentivise the supply chain to mobilise more widely for the installation of low-carbon heating.
The Government must factor in a mechanism to manage post-installation quality to guarantee correct installation and operation to ensure maximum compatibility and efficiency.

2 GOOD QUALITY AND HIGH PERFORMANCE ARE THE NORM IN THE SUSTAINABLE ENERGY AND ENERGY EFFICIENCY SECTORS

Prevent Rogue Installers

There is nervousness in the industry that the current focus on heat pumps brings with it a risk that 'rogue' installers will incorrectly install them into unsuitable properties or carry out poor quality installations.

Negative stories reaching the press may create negative attitudes towards heat pumps, as well as other low-carbon heating technologies, and damage the reputation of schemes, like the BUS. This could mean it is later withdrawn, and further damage the general reputation of the technology and market as the long-term oversight of funding and support is removed. Implementing strong quality controls, building upon the MCS quality assurance scheme, and consumer protections, is paramount to avoid unintended consequences. The consumer must be provided with information about the protections in place for them to be instilled with confidence and made more likely to transition to low-carbon heating.

The industry does not want the reputation of low-carbon heating systems being damaged in what is an essential time for our country. We advocate for policy longevity and stability for all consumers to reap the benefits of low-carbon heating as we make our transition to Net Zero. We ask that there are safeguards in place to ensure that consumers and the industry are protected.

In the Citizen's Advice report, '*The net zero protections puzzle: Helping people piece together home energy improvements*'[26], as well as their policy campaign for Net Zero Consumer Protections, Citizen's Advice ask that the Government focusses on the following three key pillars:

- Invest in high quality information and advice;
- Establish a single consumer protection scheme for low-carbon home technologies and installations to support people if things go wrong; and
- Support people to access the right financial support.

The SEA affirm the need for consumer protection and advice.

Recommendations
The Government must ensure protections are in place for schemes which involve the installation of energy efficiency and low-carbon heating measures, and that the consumer is informed adequately before commitment.
The Government and industry must work together to ensure those involved in the installation of measures are competent and well informed to a suitable standard before carrying out any work under any government schemes.

Minimum Energy Efficiency Standards and Powers of Enforcement

The SEA has campaigned for many years to have legally binding energy efficiency targets to provide confidence to the sector via our EPC Band C Campaign. Now, what should be effective regulation, such as the Minimum Energy Efficiency Standards in the private rented sector (PRS), are not being enforced due to a lack of funding and low numbers of Environmental Health Officers within local authorities, meaning that poor quality homes are still being let to tenants. Better enforcement must be funded and implemented.

The SEA would like to see the Government announce plans and timeframes for tightening standards in the PRS and implement similar legally binding targets in other sectors, e.g., for non-domestic buildings. We are aware the Government released a consultation entitled, '*Improving the energy performance of privately rented homes*', which concluded on 8th January 2021, and we await the Government's response to this[27].

The SEA supports action to have landlords registered to a public database to give visibility on the status of their compliance. This database will allow for greater autonomy for local authorities and consumers themselves, to target non-compliance and hold landlords to account in the improvement of building stock. The final aim being a deterrent, which allows local authorities to determine patterns and act accordingly to address them, it also has the added effect of rewarding landlords who think long-term and provide credibility for their property portfolio.

Recommendations
The Government must work together with local authorities to ensure they have the necessary powers and funding to enforce mandated Minimum Energy Efficiency Standards.
The Government must assist local authorities in the development of a public database of landlords, which demonstrates compliance to the Minimum Energy Efficiency requirements of their properties.
The Government must work together with local authorities to ensure landlords are aware of their responsibilities and have access to impartial advice and information on improving their properties.

Flexibility and In-Use Performance

Heating in homes and buildings, and local transport, will be heavily electrified in the future. To support that transition, all homes and buildings must be proven to be efficient to ensure we do not build unnecessary electricity capacity. To work with the intermittency of renewable electricity supply, homes and buildings must be flexible, especially when heating at peak wintertime. That means, in addition to being efficient, they must be managed by smart energy controls to respond to the peaks and troughs of energy supply and demand. As we transition to ever greater renewable grid penetration, and home heating and transport electrification, smart home energy decisions must be incorporated across all buildings, creating an optimal heating and energy use strategy across our building stock. This digital revolution will offer a cost-optimal route to a net-zero building stock released from a reliance on fossil fuels.

There are three crucial areas important to the role of in-use performance and making our buildings and data adapt to the consumer:

1 | How much (metered) space heating energy **can be removed** from homes?

2 | How much **energy** does that retrofit then **leave with a specific home for space heating in a typical weather year** (for example has a retrofit project turned a 15,000kWh a year home into a 7,000kWh a year home)?

3 | How '**flexible**' is that space heating in a specific home (if it has a heat pump/direct electric heating), i.e., how far can you move daily heating from peak times in order to save energy?

The Government's Smart Meter Enabled Thermal Efficiency Ratings (SMETER) project is seeking to bring forward in-use performance testing through a demonstration programme. The SEA would like to see provisions to test in-situ performance, and be encouraged up to 2025, to embed good practices into the supply chain to minimise the performance gap. By 2025, regulations should require all homes to demonstrate that design specifications have been achieved and high installation standards have been delivered. Post-occupancy data should be made open source to ensure learnings guide future policy and testing should be carried out independently. We propose that from 2025, housebuilders will need to confirm that the building meets the performance standard.

One solution to drive improved in-use performance, would be to implement a straightforward 'Gas Feed-out Tariff', an 'able to pay' policy, where the Government pays a sum per measured, and certified, avoided kWh of energy. This would put energy demand reduction on an equal footing to demand generation and remove the performance risk from the occupants, as the policy will require evidence of improved performance over time. It also means genuine measured carbon reduction for the Government.

The tariff could work with other policy ambitions, i.e., contributions from the able to pay, perhaps supported by green mortgage extensions to make up any cost shortfall.

Once the metrics are established and trusted, and the technology 'cost of calculation' falls, the tariff rate could fall and private capital could come in to displace it, such as homeowner contributions or green mortgages. m_2

Another solution could be 'in-use' minimum performance standards to underpin certain policies, perhaps the SHDF initially, and publish a roadmap to transition an in-use performance element into all building's efficiency policy (including building regulations), following the successful pathfinder retrofit schemes.

Minimum Performance Standards, based on the current Energy Performance Certificate methodology, are a policy tool already being used. Variations on the minimum performance standard exist in the SHDF, which sets a kWh per m^2 space heating target post-retrofit.

The EPC action plan already proposes a transition from estimated home heating measurement (kWh/m^2) to an in-use measured performance; "*EPCs will need to move from a reflection of the features of a building to the true measure of 'in-use' building performance*"[28].

A certified in-use kWh/m^2 figure would create a robust, measured cost of running the home into the future—so this is a policy requirement that focuses on the actual future cost of home space heating (in a typical weather year), rather than the 'Feed-out Tariff' model, which is about rewarding how much energy a retrofit has saved (i.e., the nWh (negawatt hour) measures the avoided energy due to retrofit over time, rather than the energy that is still required for space heating).

A transition to in-use minimum performance standards would also compliment a 'heat pump-ready' metric; a target of home energy efficiency at which it meets certain threshold criteria e.g.:

- Hours away from peak electricity time that the home can be heated but still retain heat. This is a measure of home 'flexibility' and will demonstrate how well a home can benefit from 'Time of Use' tariffs to manage supply peaks and troughs. I.e. a home not as efficient as promised will end up needing both more kWh to achieve heat, but also likely pay more per kWh, as they will need more peak time electricity.
- Peak demand in 'average winter weather' and 'extreme winter weather'.

The complexity could be hidden from the homeowner, who would simply receive a home with a guaranteed fabric efficiency, provided by the supply chain.

Recommendations

The Government must implement regulations that, by 2025, require all homes to demonstrate that design specifications have been achieved and the intended outcomes have been successfully delivered. Post-occupancy data should be made open source, to ensure learnings guide future policy, and testing should be carried out independently. Housebuilders will need to confirm that the building meets the performance standard required by law before a sale is made.
The Government must introduce 'in-use' minimum performance standards to underpin certain policies, perhaps the Social Housing Decarbonisation Fund (SHDF) initially, and publish a roadmap to transition towards the incorporation of an in-use performance element into all building's efficiency policy.
The Government should consider implementing a straightforward 'Gas Feed-out Tariff', an 'able to pay' policy where the Government pays a sum per measured and certified avoided kWh of energy through a new low-carbon heating system and energy efficiency improvement.

3 THE KNOWLEDGE AND SKILLS EXIST IN THE INDUSTRY TO DELIVER A HOLISTIC APPROACH TO ENERGY EFFICIENCY AND SUSTAINABLE ENERGY IN BUILDINGS

Industry Skills and a Competent Workforce

In order to deliver the SEA's vision, we need a competent workforce with the knowledge and skills to design, build, and retro-fit homes to holistically address requirements of energy efficiency, low-carbon heat and wider health and wellbeing.

If we are going to ensure that gas boilers aren't simply replaced, it is important that we are reskilling and training heating engineers to address the skills gap. Up-skilling or re-skilling existing heating engineers, as well as updating college courses for apprentices and trainee heating engineers (to focus on low-carbon heat) is imperative. Historically, courses focussed on traditional plumbing, gas and electric, without including low-carbon heating and energy efficiency. Energy efficiency is the other half of the heat decarbonisation challenge; if engineers are unaware of the fabric efficiency required for a particular home, the heat pump can be incorrectly installed and not operate effectively. Industry skills must incorporate a whole house approach, so that those who install products have an awareness of the entire property and therefore, can efficiently and effectively install low-carbon heating systems.

To aid the knowledge of those who work in this industry, the new build housing sector has the Future Homes Hub, and some advancements have been made to ensure installers are ready for the Future Homes and Buildings Standard and beyond. However, we do not have the same in the retrofit sector to help plug the knowledge and skills gap. There are pockets of expertise within the industry upon which to begin an initiative. Given government endorsement, they could more widely share lessons learned and knowledge gained, and produce guidance so installers are competent enough to recommend the best solutions to their customers and deliver high quality workmanship across the sector.

Recommendations
The Government must work together with industry to set out a clear long-term roadmap for delivering the necessary certifications, skills and competencies.
Installers and companies should be given access to financial support and accredited training to achieve set levels of competence and ensure the sector's preparedness for the Government's policies and schemes.
The Government and Industry must work together to form a retrofit hub where expertise and best practice can be shared to improve our existing building stock.

4 THERE IS STRONG CONSUMER AND CLIENT DEMAND FOR ENERGY EFFICIENCY AND SUSTAINABLE ENERGY

Address the Able to Pay Sector

A significant gap remains for the 60% of homes which are owner-occupied and not fuel poor, the so called 'able to pay' sector. Targets for mortgage providers have been proposed, and we are aware that the Government plans to develop this policy area. We await the Government's response to the consultation on 'Improving home energy performance through lenders', which concluded on 12th February 2021, in order to advance this policy forward. However, we do not have a national strategy on this area and past schemes, which have endeavoured to address this, have been unable to gain any long-term traction. With the current Energy Bill Crisis, which is expected to remain with us for the long-term, we are concerned that many more households will fall into fuel poverty, and this is something we are determined to help prevent.

Historically, government interventions in the energy efficiency market to solicit greater consumer engagement, have largely been subsidy-based, which has led to the creation of a degree of subsidy dependency in the energy efficiency market. This is evident as the sector's investor confidence has become highly sensitive to decisions taken by the Government and the availability of subsidy-based schemes, which is neither sustainable nor conducive to the development of an open market for energy efficiency.

In England, 63% of households are owner-occupied, and of these, 92% are classified as able to pay. This means that the able to pay sector represents 13.2 million properties in total, or 58.5% of all English households. Almost 18% of owner-occupied homes do not meet the Decent Homes Standard, the standard set for social housing.

True progress in Net Zero needs to address this key stakeholder group, and alongside that, it is crucial to facilitate the movement away from a heavy reliance on government funding into an independent market, which is self-sufficient and delivers at scale.

The SEA set out solutions for the able to pay sector in our 2020 report, *Addressing the Able to Pay Sector*, which focusses on encouraging action at key trigger points, where the homeowner is enabled to or incentivised towards installing energy efficiency measures, for example, when a new home is purchased or renovation works planned.

The SEA recommends a number of policy drivers that could be implemented.

Firstly, variable Stamp Duty Tax, which will stimulate the able to pay consumer to move towards an energy efficient, low-carbon home. The report emphasises that houses could be scored based on the property's SAP rating, where stamp duty would be lower the more energy efficient the property is.

The SEA also advocates for conditional mortgages. Issuing mortgages offers an opportunity for home improvements to be included, such as the installation of energy efficiency measures. A mortgage could be issued based on a property's current energy performance level, with higher mortgage offers for A to C rated properties.

Council tax could be used to encourage retrofit, either by linking rates to the energy efficiency of a property, or alternatively, by offering a rebate when measures are installed. The former, while placing an extra administrative burden on councils, and requiring all affected properties to have a valid EPC in place, could have a very significant impact on the market, while retaining revenue neutrality for the Government.

An EPC is required whenever a property is built, sold or rented. A homeowner is required to order an EPC prior to marketing a property for sale or rent. This proposal recommends that a minimum EPC level is set for a homeowner to sell their property, although, a caveat here, is that it must be demonstrable that the actions taken adhere to a 'whole house, holistic approach', to ensure maximum benefits for the building and its future occupiers in the long-term. This is a regulatory intervention that has been highlighted by multiple stakeholders, such as the Climate Change Committee and BEIS select committee inquiries, as an option to improve our housing stock.

In addition to the measures listed above, and to continue the need to capitalise on trigger points for a property or householder, the SEA propose targeting new owners of properties with an energy efficiency improvement plan. The Department for Business, Energy and Industrial Strategy's Public Attitudes Tracker, indicates that the majority (80%) of consumers are concerned about climate change[29]. However, there is a mismatch between what consumers think they need to do to reduce the impacts of climate change and the actual behavioural changes needed. An energy efficiency improvement plan, introduced at the correct time, takes that burden away from the consumer and gives them clear direction. An energy efficiency improvement plan will enhance the chances of long-term energy efficiency work being carried out, with the added component of introducing a means of engaging a consumer. The consumer will already be logistically and mentally prepared for major renovations, and will be more likely, from a behavioural standpoint, to make a long-term investment into their new property.

The report also recommends policy enablers, which would help finance energy efficiency and low-carbon heating measures, such as ISAs and zero interest loans. It also called on the Government to develop a robust framework to ensure that the able to pay market is incentivised and able to carry out energy efficiency improvements.

Alongside the above measures, the SEA endorses an 'ECO+ Scheme', which would build upon the success of the current ECO scheme, bringing its benefits to the 'able to pay'. It would run adjacent, but separate to, the current iteration of ECO, to ensure the key support ECO brings to vulnerable households is not impacted. However, due to rising energy costs it is not appropriate to add further policy costs to energy bills at this time and therefore, ECO+ would have to be funded through general taxation. A dynamic subsidy model must be adopted, allowing subsidy levels to be optimised and to ensure the scheme delivers value for money. The customer offer must remain within the control of ECO+ participants, driving innovation and competition.

ECO+ must be an ambitious long-term scheme that provides scheme participants, supply chain partners, and consumers with the confidence and certainty that is necessary to create a sustainable market for energy efficiency measures. Energy suppliers already have supply chains in place actively delivering the existing ECO scheme. These supply chains could be leveraged to deliver an expanded programme of energy efficiency measures to a broader set of households. It is our view that a doubling of the currently planned scale of the next phase of the existing ECO scheme (ECO4) is a realistic and deliverable target—this would represent an additional £1bn per year of investment in energy efficiency up to 2026.

A key benefit of this approach, is that the current administration and oversight provided by Ofgem, could be adopted using processes and procedures already in place for the existing ECO scheme, ensuring delivery and value for money.

To remove any risk to the Government in utilising taxpayer funding, we propose that a pay after delivery model is adopted, whereby funding would only be provided to energy suppliers once the measures have been installed and signed off by Ofgem (using existing ECO quality controls). However, to mitigate any cashflow issues for suppliers and their delivery partners, it will be key that this money is provided as quickly as possible after delivery.

In addition, we propose that, unlike the current ECO scheme, this is a voluntary mechanism where energy suppliers would not be obligated to deliver ECO+, but would instead be offered a budget allowance from the scheme linked to their market share. Any unused allowances could be recycled to other suppliers to ensure delivery across the scheme in its entirety.

When the House of Commons Business, Energy and Industrial Strategy Committee published their report on energy efficiency, they acknowledged that whilst ECO serves its purpose, additional schemes were needed as its existence as the primary scheme for energy efficiency was inadequate in its current form. The SEA believes an expansion of ECO is the means to achieve this.

Recommendations

The Government must implement policy drivers, such as variable Stamp Duty/Council Tax, set according to the energy efficiency standards of a property or conditional mortgages, and financial enablers, like ISAs and zero interest loans, to encourage action in the able to pay sector (as set out in the SEA's 2020 report, *Addressing the Able to Pay Sector*).
The Government must introduce a long-term ECO+ scheme that supports households not eligible under ECO4, with partially subsidised energy efficiency measures, providing the confidence and certainty that is necessary to create a sustainable market for energy efficiency measures.

Consumer Knowledge and Awareness

Consumer and supply chain knowledge of alternative heating technologies have been increasing in recent years through increased awareness of climate change. However, there is still a significant lack of consumer and installer knowledge regarding low-carbon technologies, compared to their traditional fossil fuel heating system counterparts. Evidence suggests that even if consumers have positive environmental values, attitudes, and intentions, this frequently fails to translate into green purchasing behaviours and other pro-environmental behaviours[30]. There is a lack of knowledge on how to overcome perceived barriers to green consumption and scepticism about the marketing of green products. Interventions should not only focus on attitudes or knowledge but change the contexts within which consumers act to foster habits that produce better environmental outcomes, for example, Carbon taxes can incentivise reductions in fuel consumption and increase the efficiency and use of cleaner fuels and technologies.

The House of Lords Environment and Climate Change Committee carried out an inquiry into mobilising action on climate change and environment and behaviour change. Experts have stated consistently that consumers often lack information about what the most effective things to do are to reduce their personal carbon footprint and contribute to wider emissions savings across the economy. It was also affirmed that the issue is multifaceted and that a one-size fit approach will not suffice[31]. What is obtainable for one consumer, will not necessarily work for another, from urban versus rural, to the UK's most deprived areas versus the wealthiest; each approach requires its own solution and its own bespoke form of messaging. The last major government communications campaign around climate in the round, was the Act on CO_2 campaign, which ran from 2007 to 2010. This campaign utilised TV adverts and billboards primarily and focussed only on individual actions one could take to lessen their own personal environmental impact.

There is a need to build household awareness and confidence so that consumers know how heat pumps and other low-carbon heating technologies operate; how they are maintained; and perhaps most importantly, that consumers are advised and protected as we transition to the next phase of domestic heating.

We require a government-backed, nationwide awareness and information campaign, as well as high-quality, independent, support and advice. The Government has the capability, as exemplified by learnings from the COVID-19 pandemic and previous Climate Change initiatives. The media can play a key role in driving up awareness of the impact of heating on climate change and the costs of living. Sharing of case studies and exemplar projects across industry and getting positive messages in the media to the right demographics about low-carbon heat, would help to raise the profile of energy efficiency and low-carbon heating and therefore, encourage uptake. The Government must consider running a high-profile consumer awareness campaign about low-carbon technologies and the need for a fabric first approach. This campaign should showcase best practice, the consumer journey, and ultimately, generate interest.

Installed correctly and ensuring a good level of energy efficiency, switching to low-carbon heating systems will reduce costs for consumers, and maintenance will be reduced particularly in comparison to oil heating systems. The value of energy efficiency and low-carbon heating needs to be reflected in property prices and consumers need to be made aware of the benefits.

In a roundtable event that the SEA held with TPAS, PlaceShapers, and a focus group of tenants, those in attendance reported having concerns and scepticism against low-carbon technologies, in this case heat pumps. One of the recommendations to combat this was that the Government and industry could assist consumers by providing indicative costs of running a low-carbon heating system and general cost data for consumers[32]. Other recommendations were:

- As a matter of urgency, the Government, industry, and the social housing sector, should work together to provide independent, simple, clear, and joined up consumer advice. This should be freely and readily available to all social housing tenants.
- In addition, the Government should run a high-profile consumer awareness campaign about low-carbon heating technologies. This campaign should help answer key questions, showcase best practice, build interest, and create demand.

Although, these recommendations were in relation to the social housing sector, the same action is required for private homeowners.

There must be a commitment to providing independent consumer advice through a 'one stop shop', as this will be crucial to helping homeowners through the transition. Northern Ireland has proposed this approach in their *National Retrofit Plan*[33], and a similar model is demonstrated by Home Energy Scotland[34] which could be adopted. These initiatives ensure consumers can access information easily, reach out to local authorities, Retrofit Co-ordinators, and manufacturers. A readily available support mechanism for consumers before they consider whether to replace their heating system must be established. This includes mobilising local authorities, and services such as Simple Energy Advice and distributors/SMEs to inform consumers. These three groups are central to informing the consumer and pivoting consumer behaviour towards Net Zero. This will, in itself, provide a layer of protection so that the consumer can rest easy knowing they have made the right investments for their home.

Recommendations
A Government backed consumer awareness campaign to showcase best practice, build knowledge, and ultimately, generate interest.
The Government and industry must provide consumers with cost data and inform them of the benefits of installing low-carbon heating technologies, as opposed to traditional fossil fuel heating systems.
The Government and industry should work together in the formation of a 'one stop shop', to provide independent simple, clear, and joined up consumer advice to help guide homeowners through the transition to Net Zero.

Energy Bills and Energy Security

It is important that, when people make the switch to low-carbon technologies, they are being rewarded for using cleaner heat, not penalised with higher bills. The *Heat and Buildings Strategy* stated an intention by the Government to investigate rebalancing the levy costs between electricity and gas and addressing any systematic imbalances that impede the uptake of low-carbon technologies, such as heat pumps. We are asking the Government to accelerate their timeline for rebalancing those costs through taxation and clearly communicate the steps that are taking place to make this happen.

In recent times the energy price cap, which will apply from 1 April to 31 September, has risen by 54% to £1,971 a year, a record increase largely driven by wholesale gas prices. The cost-of-living rising means that now more than ever, energy prices are a key political, as well as a practical, issue. National Energy Action (NEA) estimates that the number of UK households in fuel poverty following the April price cap rise, has increased by 2 million, from 4.5 million to 6.5 million; an increase of more than 50% in just over six months. This means that almost a quarter of all UK households are in fuel poverty[35]. Urgent action is needed.

The UK's journey towards a smarter, lower carbon energy system, and use of innovative technologies, has already started; we need to maintain the momentum and accelerate the rate of change. The UK must reduce its reliance on energy imports to protect the economy and its citizens against the risks of energy supply security and reliability, as well as from volatile price fluctuations. The SEA believes that the Energy Security Strategy does not place enough emphasis on energy efficiency, which is the most effective way to provide long-term security against future energy bill rises. Energy efficiency provides additional benefits like supporting the UK's transition to Net Zero, stimulating investment in industry and improving comfort and wellbeing.

Buildings are responsible for a third of the UK's total greenhouse gas emissions and a significant part of these emissions are a result of space heating. The Government faces a significant challenge to improve the thermal efficiency of the UK's housing stock, which is classified as one of the least efficient in Europe. Improving the thermal efficiency of the housing stock will reduce energy demand, which will help improve the security of supplies and reduce building related carbon emissions. According to the EEIG, bringing all homes up to at least EPC Band C—cutting energy demand in homes by 25%—represents an energy saving equivalent to the annual output of six power stations the size of Hinckley Point C. Their appraisal is based on HM Treasury's methodology for energy and climate policy and finds that the net present value of this saving would be £7.5 billion[36].

The SEA strongly advocates for low-carbon heat, but we also advocate for taking a holistic, fabric first approach. A fabric first approach must be taken, where the consumer will benefit from a warmer building and lower energy bills. Installing a heat pump without efficient fabric can result in further 'piecemeal' retrofit works having to be carried out in the future. Having installers returning to properties is an inefficient and expensive method to decarbonise our building stock, whilst causing additional disturbance to householders. Not upgrading the fabric, radiators, and pipework necessary for a well-performing, low-carbon heated home, will lead to unintended consequences and prevent us tackling the level of fuel poverty that exists in the UK. The proposed ECO+ scheme would support households in upgrading the fabric efficiency of their home as part of a transition to a low-carbon heating system.

Recommendations
The Government must prioritise energy efficiency alongside energy supply to safeguard against future fluctuations in the energy market and address fuel poverty.
The Government must ensure in policy that wherever improvements are made to a building, a holistic, fabric first approach is prioritised.

Enhance Health and Wellbeing and Adaptation for Climate Change

The indoor built environment contributes directly to people's health and wellbeing. Houses and buildings that cause or exacerbate health conditions cost the economy and our society each year: in healthy life years, reliance and use of healthcare services, educational attendance and attainment and work productivity and absenteeism. The cost of poor health is clearly set out in the All Party Parliamentary Group for Healthy Homes and Buildings' White Paper along with key asks of the Government, of which the SEA is an official sponsor[37].

We spend on average 90% of our time indoors, therefore, addressing this, alongside carbon reduction, is more important now than ever. By tackling the numerous health and wellbeing issues in UK homes and buildings, we have a real opportunity to create and use buildings to promote positive health and wellbeing, make savings in healthcare costs, increase educational attainment, improve productivity, and allow our citizens to lead longer, healthier, and happier lives. Whilst we as a nation are on a journey to enhance our homes to make them net zero, we are also given an ideal opportunity to adapt our buildings work for our health.

Health is defined by the World Health Organisation as, 'a state of complete physical, mental and social well-being'. Therefore, healthy homes and buildings are not simply those where there is a lack of ill health, but homes and buildings that maximise the occupant's physical, mental and social well-being.

Adaptation to climate change is an issue which relates to this, in particular overheating, which is an area of building design that will only become more important within the next fifty years as climate change worsens and the UK experiences more extreme hot weather. Geographical areas across the nation already face a significant risk of overheating, with large cities experiencing the urban heat island effect. Research shows that conurbations like Manchester and Birmingham have, at times, been up to 5°C warmer than their surrounding rural areas within the last few decades. This point is further affirmed by the Climate Change Committee, who argue that adaptation should be a requirement and priority for all buildings and that overheating and potential flooding present a very real threat to our way of life.

Addressing health and wellbeing in our buildings should sit as a priority alongside the levelling up and net zero agendas and should be considered alongside these policies. An example of how this could be addressed, is the action the Welsh Government has taken. Their Future Generations Act requires public bodies to think about the long-term impact of their decisions to prevent persistent problems, such as poverty, health inequalities and climate change.

Currently the UK Government is taking steps to fund energy efficiency improvements to homes of those in fuel poverty, but not to address wider improvements to aid health. A focus on carbon reduction and thermal comfort alone will not necessarily lead to improved health and could in fact, lead to unintended consequences like poor air quality and mould and moisture problems. A national healthy homes and buildings policy is needed.

Industry and the Government need to gather data from across the building stock on building performance standards in relationship to occupants' health and help to strengthen the evidence for driving improved standards of health and wellbeing in housing and buildings. For example, schools and the link to educational performance. A national league table of housing standards by Local Authorities could help to drive change. The data would also help the Government make more informed decisions on building policy and health and develop a national optimum standard for buildings.

Whilst the SEA supports the focus on overheating for new buildings in recent consultations for Building Regulations, there is yet a lack of policy to tackle this issue, just like for health and wellbeing within existing buildings.

Recommendations

The Government must follow the Welsh Government's example, and create a UK 'Future Generation Act', which requires public bodies to think about the long-term impact of their decisions to prevent persistent problems such as poverty, health inequalities and climate change.
The Government must develop a national healthy homes and buildings policy, and a national optimum standard for new buildings.
The Government must make consumers aware of the risks and measures they can take to adapt to a changing climate and improve their health and wellbeing. This could be included as part of a wider campaign to raise awareness in the able to pay sector.
The Government must include measures to address overheating, adaptation to climate change, and wider health and wellbeing improvements within retrofit schemes.

5 RAPID ADOPTION OF INNOVATION, OF NEW AND EXISTING TECHNOLOGIES, TO ADVANCE THE DELIVERY OF ENERGY EFFICIENT AND ZERO CARBON BUILDINGS

Technology Agnostic Approach

The SEA advocates a technology agnostic approach and believes that overly prescriptive policy can inhibit innovation and lead to unintended consequences. A host of low-carbon heating technologies, ancillary products, and energy efficiency measures that meet the heterogenous space and water heating demands of a building, and lead to the right outcomes, should be supported by government schemes. An inherent element to government policy on heat in buildings, should be to enable the right solutions to be applied to a property—this requires the preservation of optionality and openness to a range of suitable technologies that deliver the cost, carbon and health and comfort outcomes a policy should be aimed at. This opens the full potential of the energy and construction industry to the consumer and reinforces a multi-measure approach, without leaving promising innovative solutions behind.

Currently, policies are in favour of the mass rollout of heat pumps; with the Government's target for 600,000 heat pump installations per year by 2028 underpinning this policy direction. The Government itself acknowledges that, 'there is no one–size–fits–all solution'[38], yet its approach is largely centred around heat pumps, heat networks, and potentially boilers that burn hydrogen as fuel.

In practice, reducing the energy needs of buildings requires a multi-technology solution, tailored to the circumstances of the building and its occupants. Therefore, to meet our 2050 Net Zero target, we will need to see an increase in capacity in other product lines and services, in addition to heat pumps.

The SEA is driven to protect and grow the market for heat pumps, whist also asking the Government to assist in growing the market for all other forms of low-carbon heating, energy efficiency and ancillary products. This includes biomass technologies, solar photovoltaics, solar thermal, and solar PVT, battery and thermal storage, smart controls, etc.

The SEA advocates for government policy to preserve optionality and approach to heating and buildings policy with technology agnosticism. This means delivering long-term, consistent, and financially stable policies that allow for the installation and running of a broad range of suitable technologies to decarbonising the UKs building stock.

We advocate for both industry and the Government to work together to create choice within the low carbon heating sector. The Government should be technology agnostic and consider relevant innovations and new technologies within their future policy and funding streams.

The SEA set out a solution for delivering a technology agnostic approach to low-carbon heating in our '*Off grid, Off carbon: regulating the decarbonisation of heat in homes off the gas grid*' report[39], which proposes an emissions standard for heating that takes a carbon intensity approach, setting a limit to the permitted emissions per kWh of heat provided. Standards, including mandating condensing gas boilers and 'Boiler Plus' policies, have proven effective at delivering substantial emissions reductions from the residential sector. The regulation would be a function of both the carbon (CO_2) intensity of the energy vector (e.g., electricity, gas, oil, etc.) and the efficiency of the heating system. The value is calculated using the $kgCO_2e/kWh$ of heat provided. The regulation would apply to heating systems only at the point of replacement to encourage a shift to efficient heating technologies and lower-carbon fuels; alongside the carbon intensity threshold tightening over time to gradually phase out carbon-intensive heating systems once they reach their end of life.

Recommendations

The Government must take a technology agnostic approach to the decarbonisation of heat in buildings and develop policies that assist in growing the market for all forms of low-carbon heating, energy efficiency and required ancillary products.

The Government must consider developing a 'Carbon Intensity Standard'—as set out in our '*Off grid, Off carbon*' report—an emissions standard for heating, and set limits to the permitted emissions per kWh of heat provided that progressively tighten over time.

Support Innovation

The market for energy efficiency and low-carbon heating products is supported by the availability of grant funding, with many large-scale retrofit projects being generated by government policy. This means suppliers of new products and solutions are reliant on such schemes to demonstrate the benefits of their products at scale and subsequently, gain acceptance to a wider market. The schemes offering this funding (including, but not limited to, ECO, HUG and SHDF) have regulations or rules, processes and standards in place to ensure that measures and products are installed correctly, are effective, reliable and do not cause unintended consequences. While such controls and protections are highly necessary, these measures can pose a significant challenge to innovators and in turn the route to market for innovative products. These products have the potential to be part of the solution that we will require if we are going to meet our carbon reduction targets.

Policy must support the use of innovative products within government schemes. Rapid adoption of innovation will assist the journey to Net Zero.

SMEs, in particular, have a considerable challenge to get their products certified and eligible for government schemes. There must be an efficient route into such schemes to allow business a chance to demonstrate the impact of their innovative technologies and solutions and help aid the transition to Net Zero, whilst ensuring quality. There needs to be a streamlined and well signposted methodology for businesses to utilise in order to get their products certified and ready for the wider market.

Recommendations

The Government must provide a streamlined and well signposted methodology for businesses to utilise to get their products certified and ready for government schemes and the general market, which minimises cost and burden for SMEs, who are pioneers in their respective innovations.

Conclusion

This paper has explored the existing policy gaps that impede the Government from fulfilling their targets and ambitions for making our buildings more energy efficient, moving away from fossil fuels, and help to make people's homes warm and comfortable, whilst keeping their bills low.

The SEA welcomes the advancements in Net Zero policy that the Government has made over the past few years. The landmark policies of the *Heat and Buildings Strategy*, and the *Net Zero Strategy*, will undoubtedly begin to pave the way for the necessary changes our nation requires in the fight against climate change. We can appreciate the magnitude of the challenge before us and understand that we are seeing the beginnings of a momentum that will change the way we operate in the energy and construction sectors for decades to come. However, clear gaps in policy remain, and it is the role of the SEA to work with policymakers and the wider industry to raise awareness and collaboratively bridge them to ensure they do not impede our progress.

With gaps in policy, such as the need for a *National Retrofit Strategy*, consumer awareness raising, installer skills requirements, and addressing the able to pay and owner-occupied sectors, it is clear that these areas need addressing as a priority. Provided we, as an industry, seek to work collaboratively with the Government to address the gaps and improve the clarity, consistency, and confidence that is needed from policy to stimulate investment in the necessary resources, we believe that we will be on the right path towards a just and efficient transition to Net Zero and delivering buildings fit for the future.

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