Written evidence submitted by

The Institution of Engineering and Technology

in response to the Energy Efficiency call by

Business, Energy and Industrial Strategy Committee

This document is a response to the following question:

Existing housing stock: Are the Government's targets to improve the Energy Performance Certificate (EPC) ratings of our existing housing stock ambitious enough? Is there sufficient support in place to deliver targets for all homes to be EPC band C by 2035? Is the Energy Company Obligation (ECO) an adequate mechanism to ensure fuel-poor homes are upgraded to EPC band C by 2030?
SUMMARY

Report

In 2018 The Institution of Engineering and Technology and Nottingham Trent University published ‘Scaling Up Retrofit 2050 - Why a nationwide programme to upgrade the existing housing stock is the only way for the UK to achieve its carbon saving goals1’, the report upon which this submission is based.

Social housing can lead the way

Local Authority and Housing Association homes account for 17% of homes – that’s approximately 4.5 million homes in the UK and an ideal place to start scaling up demand and driving down costs.

It is an effective use of capital. Owners can be encouraged to take a longer-term view of housing quality and performance than the private housing market. A one-off deep retrofit cost versus 30 years of ongoing maintenance costs gives better economic outcomes and a quicker improvement in housing quality and energy performance.

Developing the programme

This is not just a technological challenge. Governments – both national and local – must take the lead in encouraging and supporting the necessary changes which will in turn support clean growth.

If we are to meet the 2050 targets of the Climate Change Act, then all housing in the UK must have zero carbon emissions from space and water heating, and space cooling. They should be near net-zero for overall energy. New build developments will always assist in reducing costs and improving energy performance, but sufficient work has already been done in research and pilot studies, such as the report’s case study in Nottingham, to show that massively reducing the carbon emissions and energy requirements of existing housing is achievable.

There is experience – nationally and internationally – in financing deep retrofit projects, managing them, and engaging with the householders.

Current barriers

- There is a lack of customer demand – the proposition is not yet attractive enough.
- There is no effective policy driver for change.
- Costs per home are too high, and we do not yet have a supply chain that can deliver deep retrofits, cost effectively, in volume, and at speed.
- Projects find it hard to attract financing.

Developing a national deep retrofit programme needs four overlapping strands of activity:

1. Create clear, consistent policy objectives and a national programme for deep retrofit and climate resilience, with an initial focus on social housing, which makes up 17% of UK homes.
2. Reduce costs and build the supply chain capacity by developing more pilot projects and demonstrators. This will bring the cost-per-property to below 30-year repair, maintenance and refurbishment budgets.
3. This is a big economic opportunity for the supply chain. Engage with the home owners by identifying the best ways to discuss the benefits of deep retrofit and developing trusted intermediaries to be a single point of contact for owners and tenants.

1 https://www.theiet.org/factfiles/built-env/retrofit.cfm?type=pdf
4. Encourage investment by creating larger projects that are more attractive to investors, by aggregating smaller retrofit projects into bigger blocks and introducing more flexible ways for local authorities to borrow and invest in retrofit programmes.
WHY RETROFIT?
The Climate Change Act of 2008 sets a legal target for the UK to reduce greenhouse gas emissions by at least 80% of the 1990 baseline by 2050. The pathway to 2050 is steered by a series of 5-year carbon budgets set with the advice of the independent Committee on Climate Change. All parts of the UK economy must contribute to reducing greenhouse gas emissions, including the built environment.

IMPACT ON UK ENERGY DEMAND AND GREENHOUSE GAS EMISSIONS
Domestic energy consumption accounts for about 30% of the UK’s total energy budget, and 20% of UK greenhouse gas emissions. Reduction in carbon emissions from domestic properties is essential to achieve the goals of the 2008 Climate Change Act.

NEED TO DECARBONISE HEAT
Over three-quarters of household energy demand is for space and hot water heating. We must decarbonise or reduce heating demand.

There are several cases across Europe where retrofit development at scale has already been achieved or is being delivered, several of which are highlighted the report.

DEEP RETROFIT IS ESSENTIAL TO REDUCE HEAT DEMAND
If the heat demand stays at the same level and , we will not be able to switch to solely low-carbon electric heating at the required rate - particularly as increased deployment of electric vehicles will be demanding more electricity at the same time.

Heat demand must be reduced, and this is most effectively achieved by dramatically increasing the thermal efficiency of our housing stock. Although new homes could be built with very high energy efficiency, current standards are not sufficient to achieve the 2050 objectives and the rate of house building in the UK is low. 80% of the homes we will be living in by 2050 have already been built. A nationwide programme of deep retrofits and refurbishment of the existing stock is the only way to deliver the required carbon savings and an improvement in energy efficiency.
Deep retrofit is an integrated and whole house approach to upgrading the energy efficiency of a dwelling that brings it to the standard required to meet 2050 targets in one step, rather than as a series of single and incremental interventions carried out over a long time. Deep retrofit will improve the energy performance rating of a building.

The requirement for deep retrofit is clear but is not happening at the scale required to meet the challenge. What is happening is piecemeal and incremental, driven by short-term support programmes that favour a stepwise approach. New thinking is required to unlock the benefits.

**SOCIAL HOUSING IS THE BEST PLACE TO START**

Social housing has a significant role to play in developing the market. Local authority and housing association homes account for 17% of the total housing stock. Social housing is an easier market to access than private rental or owner-occupied, as the owners have an explicit social goal, and can be encouraged to take a longer-term view of housing quality and performance than other sectors. 17% of the stock (~4.5m homes) is a sufficiently large market to develop and deploy scalable retrofit solutions which can later spread to the rest of the stock.

![Figure 2 Distribution of Tenancy Types in the UK](https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants)

Social housing is already in the lead in delivering thermally efficient new homes. Figure 3 shows that the SAP rating (Standard Assessment Protocol for evaluating the thermal efficiency of buildings) has been consistently much higher for social housing compared to both private rental and owner-occupied. Social housing is the most appropriate starting point for a large-scale programme of deep retrofit.
ADDITIONAL BENEFITS OF DEEP RETROFIT

Deep retrofit of the existing housing stock will bring benefits beyond reducing carbon emissions and meeting the challenges of the Climate Change Act.

Calculations from Nottingham City Homes show that using the budget they would have spent on just maintaining stock over 30 years can bring additional benefits if this money is directed into deep retrofit. The most efficient way for the UK to achieve 2050 standards in social housing is for the providers to invest money that would have been spent over 30 years on repairs and maintenance on long-term refurbishment.

Poor-quality housing leads to poor health outcomes. It has been estimated that it costs the NHS £1.4 billion per annum in additional treatment costs for conditions arising from bad housing. At least £145 million of those costs arise directly from cold homes. Warmer housing could also prevent many of the 35,000 excess winter deaths recorded annually.

Modifying homes for an ageing population not only reduces stress on the NHS, it directly impacts care budgets. Adaptation and improvement of home quality reduces social care costs by between £1,700 and £4,500 per person per annum and can cut GP visits by almost 50%.

Quality and availability of housing has a direct impact on productivity and economic growth. Housing must be integrated into local infrastructure and be available at sufficient quality and cost to bring workers into the local economy. In the longer term, poor-quality housing has been shown to affect educational attainment, reducing the locally generated pool of talent.

Deep retrofit of housing should not be considered purely from an energy efficiency and carbon emissions standpoint but should be fully integrated into the plans for a thriving and resilient local economy that meets the current and future needs of citizens.

BARRIERS TO PROGRESS

Large-scale retrofitting of the existing stock is not happening fast enough. Barriers have been identified with the most commonly reported being:

- Technical
• Financial/economic
• Social barriers among home occupiers
• Organisational issues within social housing providers
• Regulatory/legal

The most important barriers are:

• A lack of user demand. Retrofit for energy savings is not an attractive consumer proposition for owners or occupiers
• A lack of clear and consistent government policy and actions that demand delivery of the 2050 targets
• High costs and insufficient supply chain capability and capacity
• A lack of finance

These barriers interact. Lack of clear government policy means there is no incentive to invest in innovative solutions and supply chain capability. Lack of user demand and government mandate means that the market is not large enough to drive down costs and investment. High current costs mean it is difficult to get the volume needed to drive those costs down in the absence of government policy and pressure.

FACTORS LEADING TO SUCCESS

A review of domestic and international programmes and identified several features that contribute to the success of these programmes, although not all are found in every programme. They include:

• A clear policy lead
• Public sector subsidy, or access to low-cost finance
• Whole-house approach to retrofit
• Aggregation of properties into larger projects
• Single, trusted point of contact for owners and tenants that will stay with them throughout the retrofit process
• A good consumer proposition
• A long-term strategy

RECOMMENDATIONS

The report lists 22 recommendations (see Annex A) to address the challenge which are broadly divided into four categories:

1. **Establishing a long-term plan** by creating clear, consistent policy objectives and a national programme for deep retrofit and climate resilience, with an initial focus on social housing. Cities and local authorities should also be asked to develop long-terms plans for all properties while receiving additional support for innovative procurement processes that encourage innovation and shared risk-taking.

2. **Reducing costs and building supply chain capacity** by developing pilot projects and demonstrators as well as a plan to bring the cost per property to below 30-year repair, maintenance and refurbishment budgets. A national programme will also require a Centre of Excellence, along with support for innovation across the supply chain and utilising modern construction methods.

3. **Engage with the consumers** by identifying the best ways to discuss the benefits of deep retrofit with householders and developing trusted intermediaries to be a single point of contact for owners and tenants.
4. **Encourage investment** by aggregating projects in large blocks to attract investors and reduce costs while introducing more flexible ways for local authorities to borrow and invest in retrofit programmes. There needs to be more revenue-neutral methods of incentivising deep retrofit, more assistance for registered social landlords (RSLs) to develop long-term financial plans and more learning from investment approaches used for other forms of national infrastructure.

We highlight the following as being particularly pertinent to the question raised in this submission:

1. A clear statement of the importance of deep retrofit for energy efficiency, and creation of a national strategy to deliver it, is vital.

   **Recommendation:** The UK Government working with the Devolved Administrations should promote a clear policy objective and a national programme of upgrading the UK housing stock to be zero-carbon for heating, near net-zero overall energy and resilient to future climate change by 2050. Policy should be developed with the involvement of all stakeholders and specify outcomes, not means.

2. The attention of Registered Social Landlords needs to be directed towards developing plans to deliver the 2050 targets.

   **Recommendation:** The regulators of Registered Social Landlords in the UK should require that each RSL should have a 30-year plan showing how they will manage their stock to deliver the 2050 target. This plan should be regularly reviewed and updated.

3. The Nottingham pilot project in the report has demonstrated that alternative procurement processes, such as competitive dialogue, can be very helpful in supporting the outcome focused procurement required for deep retrofit. These methods are available, but not yet widely used.

   **Recommendation:** The UK Government and Devolved Administrations should actively encourage and support the use of innovative procurement processes by local authorities that stimulate innovation and shared risk-taking.

4. Although the challenge of large-scale retrofit is not primarily technological, innovation in the supply chain will still be required, particularly in reducing costs of delivery using standardisation and modern methods of manufacturing and construction.

   **Recommendation:** The Department for Business, Energy and Industrial Strategy should take the lead in encouraging and supporting innovation within the retrofit supply chain, specifically in modern methods of construction, such as off-site manufacturing and prefabrication of retrofit systems.

5. The payback for investment in retrofit is not currently attractive. We need new approaches that shift the economic balance in favour of investment whilst not requiring excessive public subsidy.

   **Recommendation:** the UK Government and the Devolved Administrations should explore revenue neutral ways of incentivising deep retrofit. For example, properties with significantly better performance than the stock average could be charged a substantially reduced stamp duty on sale, and properties with the performance below the average significantly more. This would help to progressively lift the stock average.
6. There is evidence that by combining the planned investment in the maintenance and refurbishment of their stock over 20 - 30 years with energy cost and other savings over the period, social landlords can make an economic case for investing in deep retrofit to jump the stock to 2050 standards now. However, social landlords are finding it difficult to develop such long range financial plans.

Recommendation: Social landlords should be supported to develop whole life investment plans against their long-term budgets, reduction in projected costs and reduction in energy consumption. These should be used to develop long term funding schemes with the financial institutions.

THE WAY FORWARD

Many of the recommendations will take time to deliver; particularly developing a clear and supportive policy lead. Work in this area should be initiated immediately through the UK Government and Devolved Administrations with the support of professional and trade groups.

The Institute of Engineering and Technology and its partners has already started a series of activities to develop an evidence base that will support future policy decisions.

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## Annex 1

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<thead>
<tr>
<th>Recommendation</th>
<th>Owners</th>
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<tbody>
<tr>
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<td>Central Gov.</td>
<td>Local Gov.</td>
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<tr>
<td><strong>Establish a Long Term Plan</strong></td>
<td></td>
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</tr>
<tr>
<td>1 Create a clear policy objective and National programme for deep retrofit</td>
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<td>2 Ensure policy consistency over time</td>
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<td>3 Focus initially on social housing</td>
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<td>4 Require RSL’s to have a 30-year plan to deliver 2050 targets</td>
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<td>5 Ensure Right to Buy does not impede a National retrofit programme</td>
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<td>6 Ask cities and local authorities to develop long-term plans for all properties, regardless of tenure</td>
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<td>7 Support innovative procurement processes for local authorities that encourage innovation and shared risk taking</td>
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<td>8 Ensure planning law, standards and practice are not a barrier</td>
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<td>9 Integrate planning of deep retrofit with strategies for the future of the city</td>
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### Reduce Costs and Build Supply Chain Capacity

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<th>Owners</th>
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<tr>
<td>10 Develop pilot projects and demonstraters to build capacity and reduce costs</td>
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<td>11 Develop a roll-out plan to reduce cost per property below 30-year repaid, maintenance and refurbishment budgets</td>
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<td>12</td>
<td>Create a centre of excellence to support a National retrofit programme</td>
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<td>13</td>
<td>Support innovation in the retrofit supply chain - modern methods of construction</td>
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<td>14</td>
<td>Develop standard menu of options for typical construction types</td>
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<td>15</td>
<td>Collect and share evidence of performance in use</td>
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<td>16</td>
<td>Engage with Consumers</td>
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<td>16</td>
<td>Identify the best ways to communicate benefits of deep retrofit to householders</td>
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<td>17</td>
<td>Develop trusted intermediaries to be a single point of contact</td>
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<td>18</td>
<td>Encourage Investment</td>
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<td>18</td>
<td>Aggregate projects into large blocks to attract investment and reduce costs</td>
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<td>19</td>
<td>Increased flexibility for local authorities to borrow to invest in retrofit programmes</td>
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<td>20</td>
<td>Develop revenue neutral ways of incentivising deep retrofit</td>
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<tr>
<td>21</td>
<td>Assist RSL's to develop long-term financial plans</td>
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<tr>
<td>22</td>
<td>Learn from investment approaches used for other forms of national infrastructure</td>
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