



COP26 Policy Brief: Decarbonising Our Buildings and Cities with Technology

The energy used by many buildings is costly to the environment and to our bills – but this is changing with technological research

KEY POLICY RECOMMENDATION:

Invest in technology which aims to reduce primary energy resources in the built environment and guide subtropical climate cities to be more sustainable in the future.

Background

Buildings currently account for over 30% of final energy use in the UK, and around 38% of its greenhouse gas emissions. A drastic reduction of energy use and CO₂ emissions is required to significantly reduce the built environment's dependence on primary energy resources and curtail household energy bills, thereby meeting the UK government's ambitious carbon neutrality target by 2050.

Research at Nottingham

The Buildings, Energy and Environment (BEE) Research Group at the University of Nottingham works with industrial partners to research methods to reduce the impact of technologies such as ventilation, heating, cooling and power, to improve the sustainable practice of buildings and engineering, in order to enhance the quality of the built environment.

Holistic Electrification Retrofit (HER) is an emerging strategy which seeks to alter the very source of energy in buildings, and can adapt buildings to switch to electric power, thus reducing dependence on fossil fuels. Deep Energy Retrofit (DER) is another strategy which adapts existing buildings to be more energy-efficient; though challenges of cost-efficiency of this strategy, and its long-term performance remain. Our research compares both HER and DER to analyze energy performance, cost and sustainability at the community scale, and we find that HER could bring multiple advantages- it is more affordable, installation is 30% quicker, it suffers less from the issues of indoor heating, and can ensure communal grid security and stability.

Another significant research from BEE is the production of 'photovoltaic' glass, a thinner solution to double-glazing windows which turns solar energy into electricity. This can be included in windows to produce electricity directly into homes and save customers from having the heating turned on during winter, while providing electricity in the summertime.

BEE research has also investigated microclimates caused by Urban Heat Island (UHI), a global phenomenon where there are higher temperatures in urban areas compared



with the rural areas that directly surround them, which can subsequently increase energy consumption, air pollution and CO₂ emission. We propose mitigation strategies for this phenomenon, such as increasing the reflectance of the sun's energy through strategies such as expanding the green spaces in cities and using highly reflective pavements to dissipate excess heat.

Implications for Climate Change

Technological research can lead to substantial reductions in the cost of the energy used by buildings to the environment, and our bills. 20-41% more carbon emissions reductions could be achieved using the emerging HER strategy to provide energy to buildings. The photovoltaic glass window could reduce the energy demands and therefore bills in the average UK household, with an installation cost comparable to that of double-glazing windows. UHI research can provide valuable guidance to local governments on multi-stakeholder mitigation strategies which are most effective and suitable.

Further Reading

Read about the Rezbuild project [here](#) and the Surefit project [here](#)

Read the [COP26 blog](#)

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