IN THE SPOTLIGHT

The heat transition: Progressing climate action in the building sector

Poorly insulated buildings and outdated heating systems use substantial amounts of energy. Overall, the building sector is responsible for around 25 percent of Germany's carbon emissions and 30 percent of its final energy consumption. The German government aims to transform the German building stock into a nearly climate-neutral state by 2050, with a target of a 40 percent reduction in greenhouse gas emissions by 2030 against the 2014 baseline.

Achieving these climate targets will require a significant increase in the current refurbishment rate in the building sector. Roof and wall insulation, high-insulation doors and windows and elimination of thermal bridges, combined with energy-efficient heat production based largely on renewables, are proven measures to reduce heat consumption in residential buildings. Furthermore, a building that has been modernised to improve its energy performance is a more comfortable and cosy living space.

Ambitious energy standards must be set for the new-build sector, because once a building is standing, it consumes energy for years to come. Or perhaps not: from 2021 onwards, the nearly zero-energy standard will apply across the EU. Sustainable construction materials from regenerative sources also make a contribution to climate protection and resource conservation. The substantially reduced heat demand can be met using modern technologies such as heat pumps in combination with photovoltaics or solar thermal.

Policy frameworks are needed

In order to progress the heat transition (German: Wärmewende) in the building sector, appropriate policy frameworks must be put in place. In view of the very long investment cycles that apply in the building sector, swift and decisive policy action is essential. Appropriate measures can include more favourable terms and conditions for the financing of renovations to bring buildings into line with ambitious retrofit standards, the introduction of target values that building owners must comply with over the long term, and a pricing reform for energy inputs. The incentives and rules applicable to the conversion of existing heating systems to renewables and/or low-temperature distribution systems should also be improved.

More research is needed on energy upgrading of buildings. Efficient and sustainable high-performance insulation materials create new opportunities for modernising the existing building stock. Modern renovation techniques – such as the use of prefabricated insulation elements in refurbishment projects – can help to reduce costs.

The building trade and the insulation sector are increasingly impacted by the skilled labour shortage. Policy-makers have a responsibility to ensure that there is an adequate supply of well-qualified entrants to the crafts and trades so that skilled workers are available to meet the growing demand for renovation and retrofitting services. And lastly, strategies are required to halt any further growth in land take for housing and industry. Less built-up area means less consumption of energy, no matter how efficiently that energy is generated.

Study: A climate-neutral building stock in 2050

In a 2017 study commissioned by the German Federal Environment Agency (UBA), the Oeko-Institut and the Fraunhofer Institute for Solar Energy Systems (ISE) considered how a nearly climate-neutral building stock can be achieved in Germany by 2050. The technical feasibility has been demonstrated already; what is lacking, however, is a vision showing how the 2050 target can be reached. The researchers looked at two central dimensions in the study.

As the first dimension – the individual building level – they developed various technology options for a climate-neutral building stock. Here, they focused mainly on the technology mix and the associated costs of energy upgrading. This latter aspect is of particular relevance to building owners.

The second dimension concerned the building stock as a whole. Here, the researchers explored different target states of how a nearly climate-neutral building stock could be realised in 2050. For each of the target states, the researchers mapped transformation pathways showing how the existing building stock can be brought up to the required standard. As a final step, they analysed how the building stock interacts with the transformed energy system as a whole.

Final energy demand can be reduced by 80 percent

The target states show the great potential of an ambitious upgrading programme. The most ambitious target state, from an energy efficiency perspective, would achieve a 60 percent reduction in final energy consumption. In order to reach this target, all residential and non-residential buildings that in principle could be renovated need to be refurbished with passive house components. The remaining very low final energy demand would mainly be supplied by renewable energy sources, i.e. by more than 50 percent.

If final energy demand is reduced by just 35 percent – the target hypothesised for the least ambitious target state – more than 80 percent of energy demand would have to be supplied by renewable energies. In addition, electricity consumption would then be around 50 terawatt hours higher than in the most ambitious target state. This equates to around half of Germany's total wind energy output in 2017.

More energy efficiency – less pressure to expand renewables

The authors of the study therefore recommend maximising investment in high-performance external insulation and energy-efficient building technologies, as each kilowatt hour of final energy that can be saved by any form of efficiency measure – whether in the building envelope or supply technology – lessens the pressure to expand renewable capacities.

The authors also show that it is worth investing in energy efficiency. Although the annual costs are slightly higher for the target state with the highest energy efficiency ambitions, the difference in overall costs and in cost trajectories is very small.

Study: A climate-neutral building sector in 2050, by the Oeko-Institut on behalf of the German Federal Environment Agency (UBA)

Policy Paper: The role of skilled craft workers in energy transition in the building sector

The energy transition will not happen of its own accord – it needs people to drive it forward, and this holds for the building sector as well. According to an Oeko-Institut study commissioned by the Federal Ministry of Education and Research (BMBF), around 100,000 additional skilled craft workers are required annually in Germany for window manufacturing, heating installation, painting and plastering.

The study utilised data on investments in building retrofit and employment figures in selected trades. The researchers also conducted a survey of single-family and two-family home owners who had carried out thermal retrofit or had tried to do so. Many reported that it was difficult to find adequately skilled craft workers or said that they had received fewer quotations from companies than they would have liked.

Enhancing the appeal of the skilled crafts: Policy recommendations

In their paper, the researchers put forward initial policy recommendations that aim to address the major shortage of skilled labour. For example, companies in the crafts and trades sector need reliable policy frameworks for better investment planning over the long term. A consistent and focused recruitment programme is also needed to bring new entrants into the sector.

More generally, it is essential to increase the appeal of the skilled crafts and trades so that the newly qualified do not switch to other sectors or industries. Decent pay is a key factor here. Although the paper can do no more than recommend possible courses of action to policy-makers and trade associations, it is important to raise stakeholders' awareness of the issues and work together to find solutions.

Policy paper: The role of skilled craft workers in energy transition in the building sector, by the Oeko-Institut, funded by the German Federal Ministry of Education and Research (BMBF)

Further information

Oeko-Institut study: Contribution of Renewable Cooling to the Renewable Energy Target of the EU

Oeko-Institut study: *Wärmewende Freiburg - Transformationsstrategien für eine CO2-freie Wärmeversorgung des Freiburger Gebäudebestandes* (Freiburg's heat transition – Transformation strategies for a CO2-free heat supply for Freiburg's building stock)

Study: Evaluation of the Renewable Heat Act, conducted by Ifeu, the Oeko-Institut, Fraunhofer ISI and Econsult; commissioned by the Baden-Württemberg Ministry of the Environment, Climate Protection and the Energy Sector

Oeko-Institut study: *Einbindung des Wärme- und Kältesektors in das Strommarktmodell PowerFlex zur Analyse sektorübergreifender Effekte auf Klimaschutzziele und EE-Integration* (Integrating the heat and refrigeration sector into the PowerFlex electricity market model for analysis of sector-wide effects on climate goals and renewables integration)

Study: *Wissenschaftlicher Bericht zur Vorbereitung des Erfahrungsberichts zum EEWärmeG* (Scientific Report on the preparation of the progress report on the Renewable Heat Act) by Prognos, the Oeko-Institut, Fraunhofer ISI, DLR and KIT

Study: *Sektorale Emissionspfade in Deutschland bis 2050 – Gebäudesektor und Stromverbrauch Privathaushalte* (Sectoral emission pathways in Germany to 2050 – the building sector and electricity consumption of private households) by the Oeko-Institut, Fraunhofer ISI and IREES

Oeko-Institut/ISOE study: *Klimatisierungsbedarf und dafür abgerufener Stromverbrauch für Wohngebäude in Deutschland von 2020 bis 2050* (Air conditioning needs and associated electricity consumption in German residential buildings, 2020-2050)

Oeko-Institut study: *Entwicklungsperspektiven des Gebäudesektors* (Development outlook for the building sector)

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