

## Press release

### International Institute for Applied Systems Analysis (IIASA)

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## Rethinking energy demand can foster sustainable development and reduce emissions from buildings and transport

**In a new study, IIASA scientists show that a mix of policy measures, including both technological solutions and behavioral changes, can significantly reduce greenhouse gas (GHG) emissions from energy use in buildings and transport.**

Energy use in buildings and transport is a significant source of GHG emissions, accounting for over 20% of those globally. In a recent study, IIASA scientists and their colleagues from other institutions highlight that a set of comprehensive demand-focused strategies could reduce CO<sub>2</sub> emissions from buildings and transport by 51-85% and 37-91% respectively, compared to a scenario based on current policies.

“Reducing energy demand also has major benefits beyond greenhouse gas emissions reduction,” says Bas van Ruijven, IIASA Sustainable Service Systems Research Group Leader and a coauthor of the study. “The demand-side measures explored in this study lead to higher energy security, better air quality, more food security, and several other Sustainable Development Goals.”

The study outlines a mix of promising policy measures, which could help to maximize the benefits. In buildings, measures such as electrifying energy use through heat pumps, improving insulation, and reducing energy demand through behavioral shifts can significantly lower emissions. Similarly, in transport, electrifying vehicles, enhancing efficiency, and promoting the behavioral shift to popularize the use of public transport and cycling can drastically reduce emissions. Moreover, the study shows that many of the identified measures can interact synergistically with minimal trade-offs, further accelerating decarbonization.

“Demand-side strategies are essential for achieving both rapid and significant emission cuts,” says Alessio Mastrucci, senior research scholar in the IIASA Energy, Climate, and Environment Program and coauthor of the study. “Such strategies could help governments address the root causes of emissions directly, as well as lower energy demand and reduce the need for costly supply-side investments and infrastructure.”

The study uses quantitative scenarios generated with global Integrated Assessment Models (IAMs), specifically designed to capture the interactions between the energy system, the economy, and the environment. In addition, to refine the scenarios, the authors have also gathered input from policymakers and experts in demand sectors.

“Shifting to renewable energy is vital for achieving net-zero, but how we use energy is just as important,” concludes Rik van Heerden, researcher at the Netherlands Environmental Assessment Agency (PBL) and lead author of the study. “With support of the right policies and infrastructure, final energy users can make a powerful contribution to reaching climate goals.”

Reference:

van Heerden, R., Edelenbosch, O. Y., Daioglou, V., Le Gallic, T., Baptista, L. B., Di Bella, A., Colelli, F. P., Emmerling, J., et al. (2025). Demand-side strategies enable rapid and deep cuts in buildings and transport emissions to 2050. Nature Energy. 10.1038/s41560-025-01703-1.

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