Buildings for a more productive and low-carbon economy

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The American Council for an Energy-Efficient Economy is a nonprofit 501(c)(3) founded in 1980. We act as a catalyst to advance energy efficiency policies, programs, technologies, investments, & behaviors.

Our research explores economic impacts, financing options, behavior changes, program design, and utility planning, as well as US national, state, & local policy.

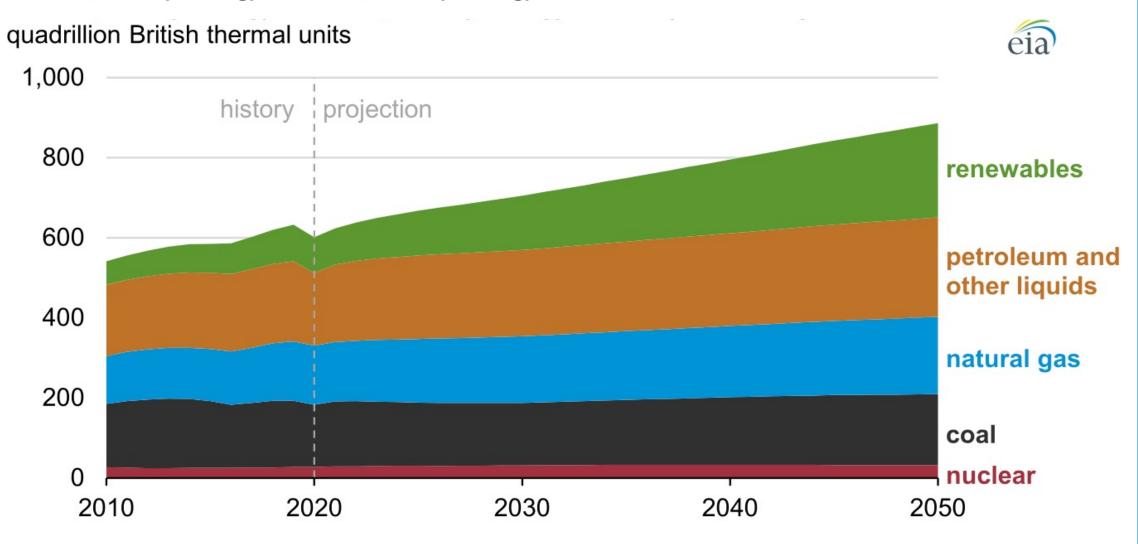
Our work is made possible by foundation funding, contracts, government grants, and conference revenue.

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If current policy and technology trends continue...

Global primary energy consumption by energy source



Global energy consumption and energy-related carbon dioxide emissions will increase through 2050 as a result of population and economic growth.



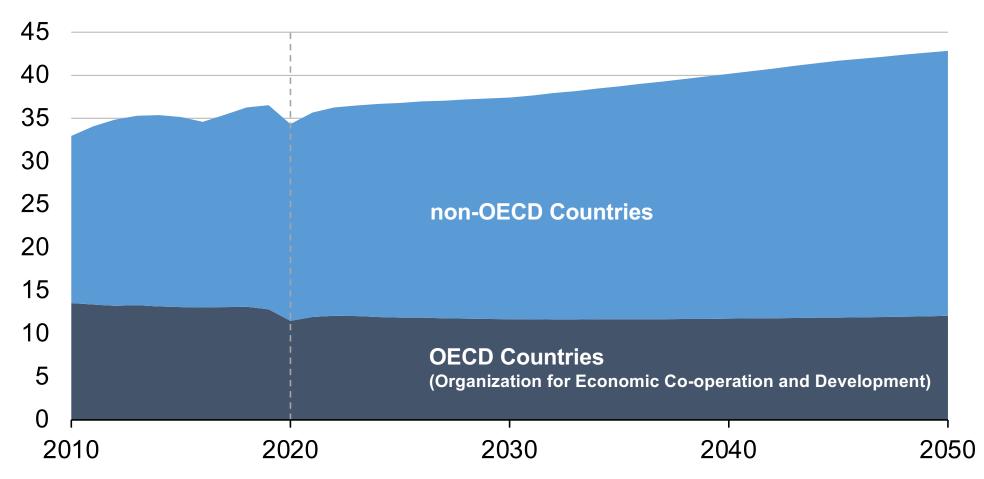
Source:

The U.S. Energy Information Administration. 2021. *International Energy Outlook 2021.* (www.eia.gov/outlooks/ieo/introduction/sub-topic-01.php)

If current policy and technology trends continue...

Energy-related CO₂ emissions

billion metric tons



To follow a 1.5°C-consistent pathway, the world will need to decrease fossil fuel production by 6% per year between 2020 and 2030.

Countries are instead planning and projecting an average annual increase of 2%.

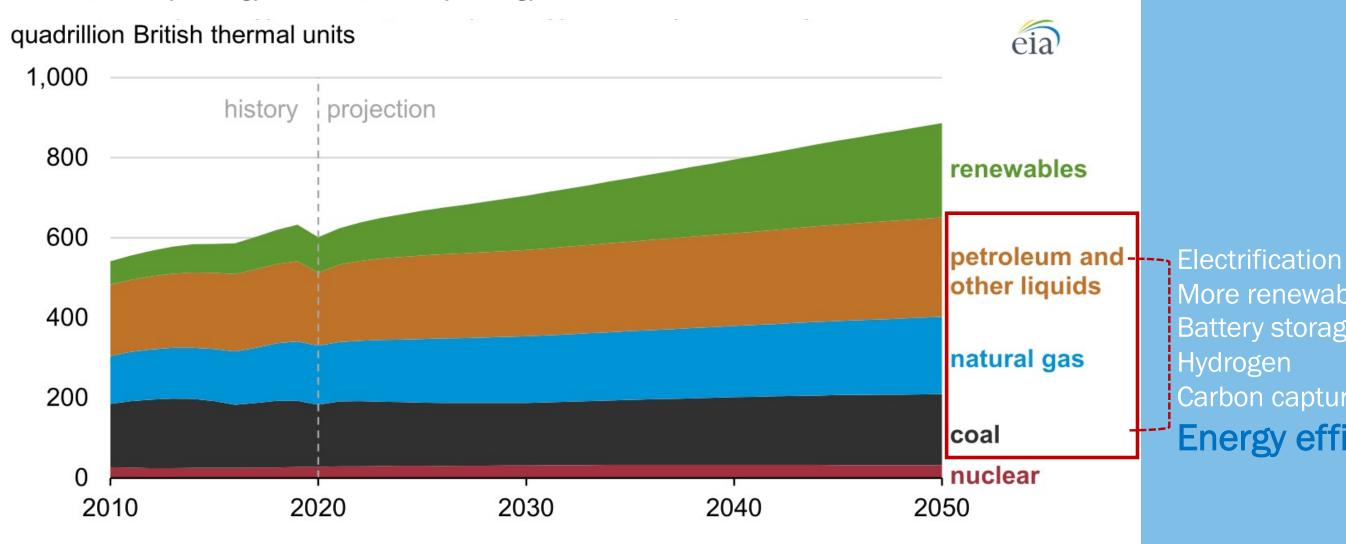


Source:

The U.S. Energy Information Administration. 2021. *International Energy Outlook 2021.* (www.eia.gov/outlooks/ieo/introduction/sub-topic-01.php)
United Nation. 20201. *Climate Action Fast Facts.* (www.un.org/en/climatechange/science/key-findings)

What is THE solution?

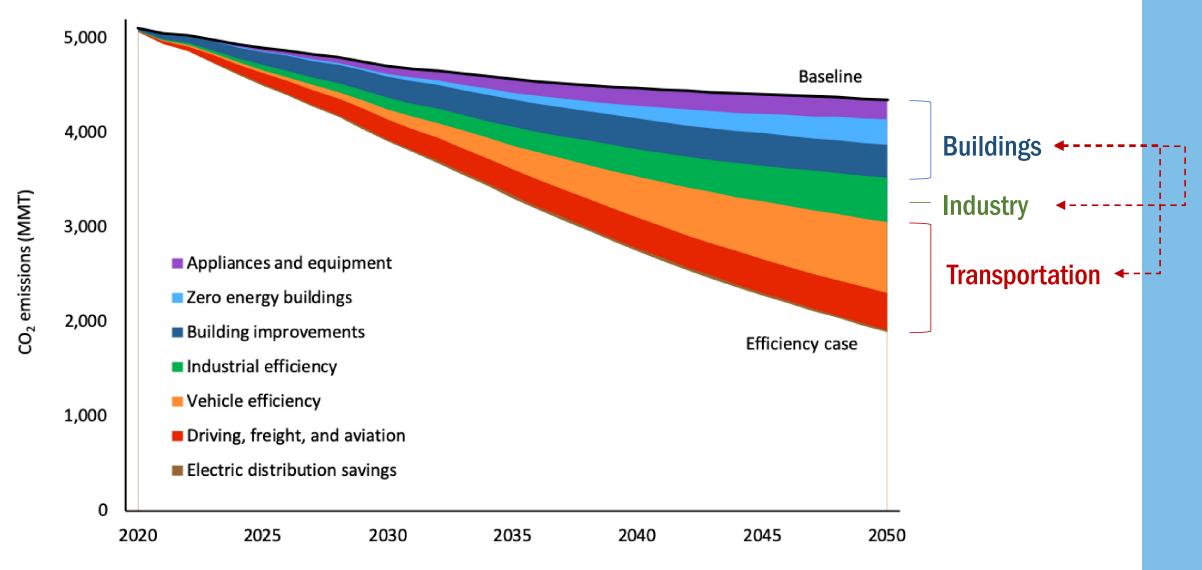
Global primary energy consumption by energy source



More renewables Battery storage Hydrogen Carbon capture & storage **Energy efficiency**



Efficiency can slash U.S. GHG emissions by half



Buildings create market pulls for industrial products and services.

Buildings affect transportation patterns.

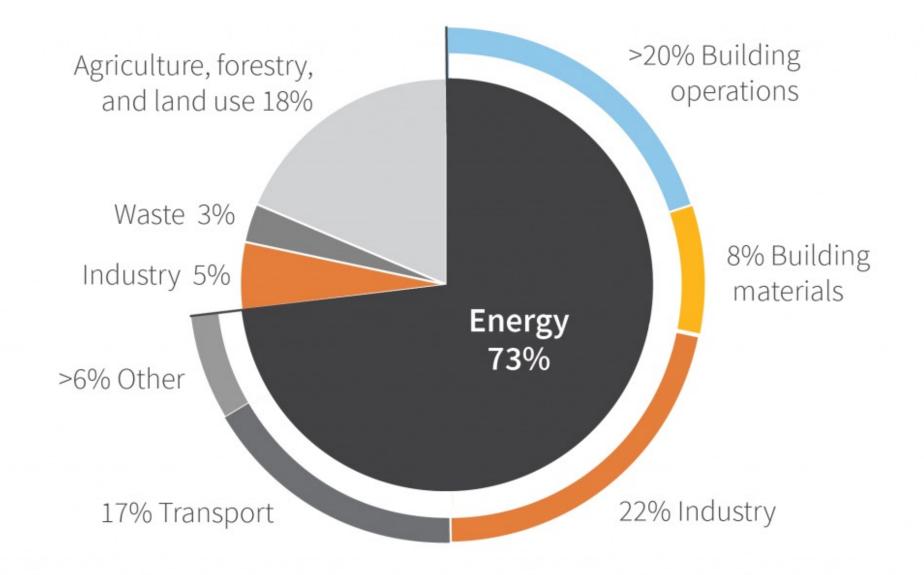
Buildings influence community-level solutions and shape behaviors.



Source: Nadel, S., & Ungar, L. (2019) Halfway There: Energy Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050. ACEEE. (www.aceee.org/research-report/u1907)

Approximately 30% of all global carbon emissions are attributed to the building sector, with at least 8% resulting from the manufacturing of construction materials

Source: https://carbonleadershipforum.org/embodied-carbon-101/



Global CO₂ emissions by sector. Adapted from the UNEP 2019 Global Status Report and OurWorldInData.org, based on data from Climate Watch and the World Resources Institute.

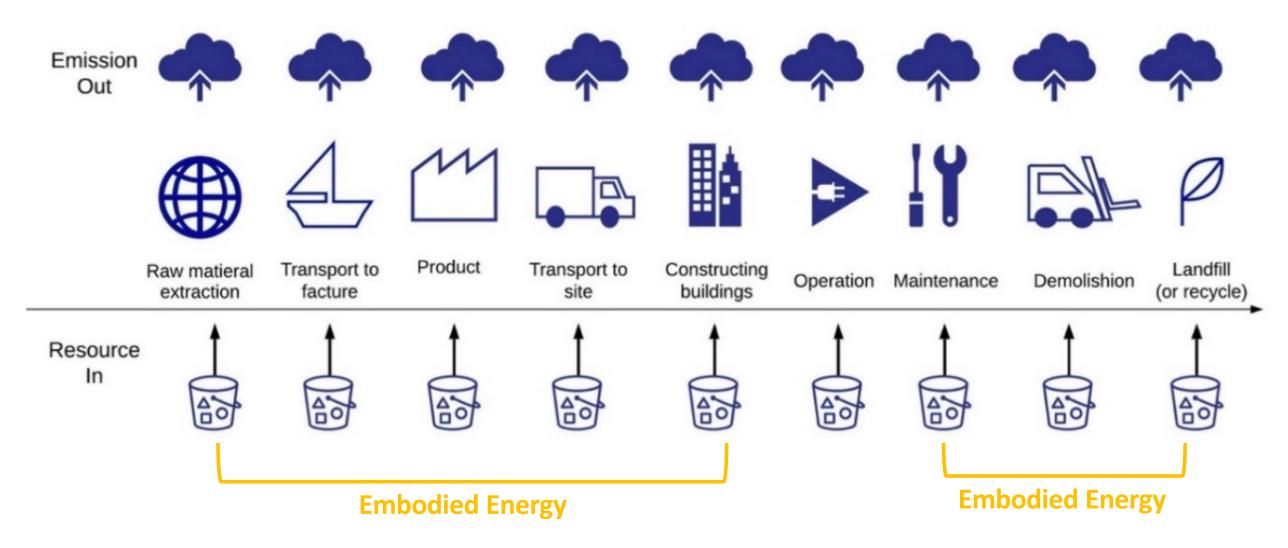


Scope 1: Direct emissions from a company's owned or controlled sources.

Scope 2: Indirect emissions from the generation of purchased energy.

Scope 3: All other indirect emissions that occur from upstream and downstream.

Scope 4: Avoided emissions.





Source:

Hu, Ming. 2020. "A Building Life-Cycle Embodied Performance Index—The Relationship between Embodied Energy, Embodied Carbon and Environmental Impact" *Energies* 13, no. 8: 1905. https://doi.org/10.3390/en13081905

Scope 4: do we need a new category of emissions to better address corporate climate action? Available at www.cdsb.net/corporate-reporting/1005/scope-4-do-we-need-new-category-emissions-better-address-corporate-climate

How to build a sustainable, low-carbon economy?





How to lose weight?

How to lose weight fast?

How to lose weight forever?



How to lose weight?

How to lose weight fast?

Fast

Exercise excessively

Hire a nutritionist and a trainer





How to build a sustainable, low carbon economy?

How to get short-term results?

Fast

Exercise excessively

Hire a nutritionist and a trainer

Develop stringent standards/policies and enact a carbon tax

Change human behavior

Install onsite renewables, purchase carbon offsets, obtain a LEED platinum



How to lose weight?



How to lose weight forever?

Eat a balanced, healthy diet

Shift to an active lifestyle

Build support and change environment





How to build a sustainable, low carbon economy?

How to get long-term results?

Eat a balanced, healthy diet

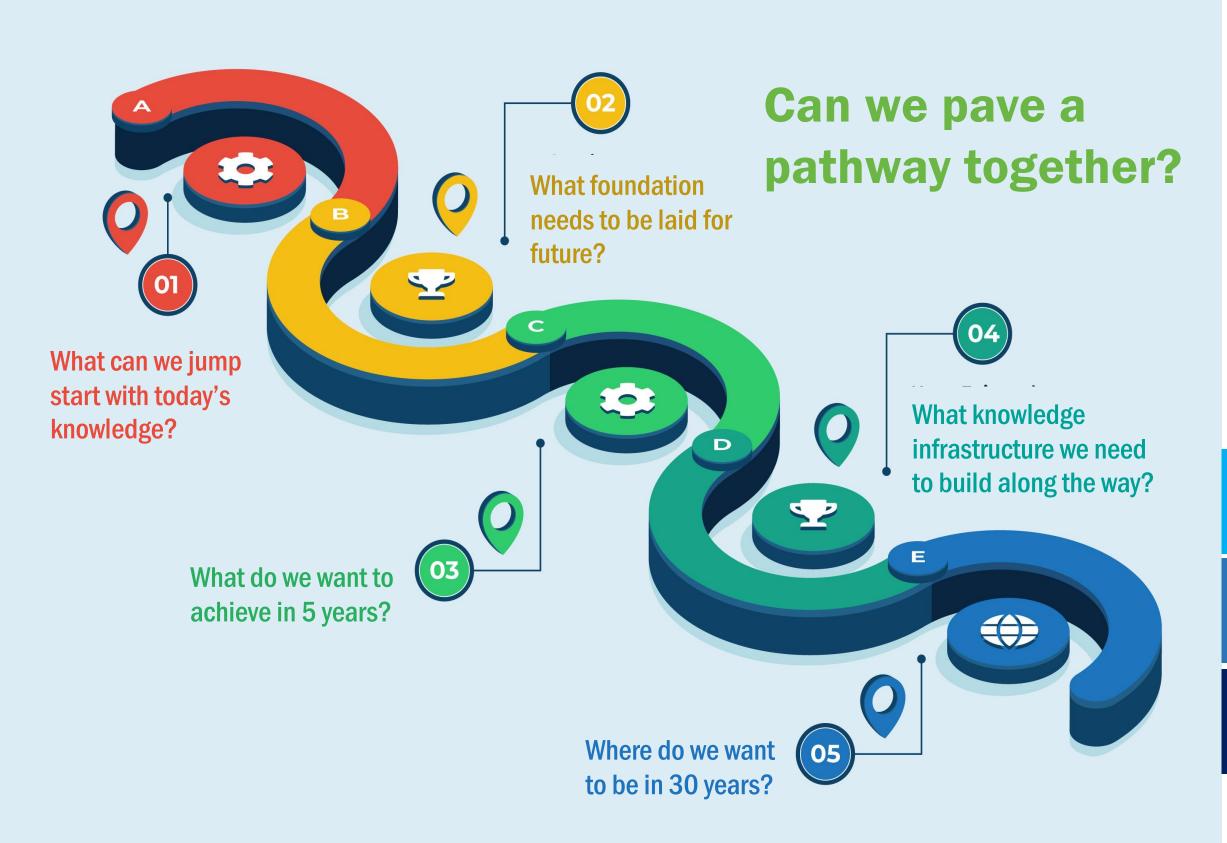
Shift to an active lifestyle

Build support and change environment

Optimize system performance and improve energy productivity

Build knowledge infrastructure and market demand for low-carbon products

Commercialize transformative technologies and deploy at scale



Optimize system performance and improve energy productivity

Build knowledge infrastructure and market demand for low-carbon products

Commercialize transformative technologies and deploy at scale

Are we ready for embodied carbon building codes?

Building specifications, standards and codes can be an effective policy approach to accelerate the shift to low-embodied-carbon buildings by influencing the general practice in the building industry and increasing market demand.

Benchmark Market Data **Demand**

No consensus exists on how to baseline or benchmark the life-cycle embodied carbon of a building.

> Guidelines are needed to evaluate the trade-offs between embodied carbon and operational carbon.

> > Existing data and policies are primarily at the material level and focus on the manufacturing process.

The lack of information on product durability may also introduce conflicts between resilience and embodied carbon.

Business cases need to be developed for manufacturers to integrate building decarbonization with industrial decarbonization. **Business Capacity** Case

Manufacturers, construction companies, and trades need to build their capacity to participate in data collection and reporting.





Thank you!

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Upcoming ACEEE Conferences

Hot Water Forum	March 21-23, 2022	Atlanta, GA
Energy Efficiency Finance Forum	May 23-25, 2022	White Plains, NY
Summer Study on Energy Efficiency in Buildings	August 20-26, 2022	Pacific Grove, CA
Behavior, Energy, and Climate Change	November 13-16, 2022	Washington, DC

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