



Environment • Climate Crisis

Rich Americans Emit up to 15 Times As Much Carbon As Their Poorer Neighbors

A new study confirms the obvious: big houses have bigger footprints. But wait, there's more.

By Lloyd Alter Updated July 21, 2020



Suburban houses in a field.
Getty Images



The conclusion of a new study – [The carbon footprint of household energy use in the United States](#)

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issue gets more complex and more discouraging. Lead author Benjamin Goldstein summarizes in a press release:

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Although houses are becoming more energy-efficient, U.S. household energy use and related greenhouse gas emissions are not shrinking, and this lack of progress undermines the substantial emissions reductions needed to mitigate climate change.

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Household energy use is increasing as houses continue to get bigger and also due to

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This lack of progress undermines the substantial emission reductions needed to mitigate climate change. The average lifespan of an American home is about 40 y, which poses challenges given the need to rapidly decarbonize. **This makes decisions during design and construction, such as size, heating systems, building materials, and housing type, crucial.** In the United States, a confluence of post-World War 2 policies helped move a majority of the population into sprawling, suburban households with energy consumption and attendant GHGs well above the global average. **Without decisive action, there will be a “carbon lock-in” for these homes for decades to come.**

Carbon lock-in is a problem that has been discussed in the green building community for some time; it's the reason that incremental improvements in building efficiency are short-sighted and why we have to electrify everything right now. If you build a marginally better house and heat it with gas, you are locking that gas consumption and carbon footprint for the life of the house. But if you build to a much higher standard, say Passive House levels of efficiency, a little electric air-source heat pump can heat and cool. But there is no incentive to change when gas is so cheap, so every home built today locks in those carbon emissions. As the study authors note, this requires attacks on all fronts.



Residential energy emissions arise from a combination of economic, urban design, and infrastructural forces. Our exploratory scenario-based models indicate that meaningful reductions to residential emissions will require concurrent grid decarbonization, energy retrofits, and reduced in-home fuel use. Scenarios also suggest that making new construction low-carbon will require smaller homes, which can be promoted through denser settlement patterns. These results have implications for both the United States and other nations.



The study used tax assessment data to estimate the greenhouse gas emissions of 93 million houses, about 78% of the US housing stock, and found that the average home consumed 147 kilowatt-hours per square meter (kWh/m²). Not surprisingly, rich people had more square meters, more floor area per capita, and more emissions; "Despite variations in climates, grid mixes, and building characteristics across our sample, income positively correlates with both per capita residential energy use and related GHGs." Extremely wealthy and sprawly neighborhoods approached 15 times the emissions per capita than denser urban areas.

Just a Few Practical Interventions Needed

The "practical interventions" needed to reduce emissions are "1) reducing fossil use in homes and in electricity generation (decarbonization) and 2) using home retrofits to cut energy demand and in-home fuel use." The study authors call for more renewable energy and less coal, and "deep" energy retrofits to reduce heating, cooling, and lighting loads.

The authors get into controversial territory with their discussion of floor area per capita (FAC), calling for a reduction in the size of homes. "Meeting the 2050 Paris target also requires fundamental changes to the built form of communities. New homes will need to be smaller." Housing also has to be denser and zoning rules have to change.

Increasing population density places downward pressure on FAC due to space constraints, land prices, and other factors. Zoning for denser settlement patterns better incentivizes smaller homes with reduced energy demands than single-family homes on large lots.

Low-Carbon Homes do not Necessarily Make for Low-Carbon Communities



A typical well-built American McMansion. Getty Images

The authors call for a Goldilocks, or missing middle density, of about 5,000 people per square kilometer. "If built using small plots and high building footprint ratio, this density is achievable through a mix of small apartment buildings and modest single-family homes." They note also that even this density is at the low end of what is required to support public transit. "Thus, low-carbon homes do not necessarily make for low-carbon communities. Higher densities (and mixed-use development) are likely needed to confer appreciable spillover effects, such as increased low-carbon transport and related economic, health, and social benefits."

In fact, the shopping list of changes necessary to build low carbon communities is extensive:

- Decarbonize the electricity supply.

- Tax incentives and preferential lending mechanisms for deep energy retrofits.

- Update zoning bylaws that favor suburban development.

- Use greenbelts to limit suburban sprawl. And,

"Planners should exploit natural synergies between density, public transport, and energy infrastructure (e.g., district heating) when building these communities."

But hey, this is no big deal:

All these measures need to happen in concert. Although ambitious, the form of the current US housing stock is not only the outcome of consumer preferences, but also policies enacted since the 1950s that led to coordinated action across sectors (e.g., financial, construction, transport) and scales (individual, municipal, state, and national) Similarly, a burst of large-scale projects by the Public Works Association (e.g., Hoover Dam) as part of the New Deal in the 1930s and 1940s fundamentally shaped the structure of US power

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All we have to do to solve this is to have a New-Deal-meets-The-Manhattan-Project scale reinvention of the entire urban planning and development sector along with the entire housing industry. And we have to do it tomorrow because every housing unit we build now that isn't an apartment built to Passive House standards is just adding to the carbon lock-in problem. Not a big deal at all!

Everyone writing about this study has concentrated on the finding that rich people's houses have bigger emissions, which really shouldn't be a surprise to anyone. Nobody seems to be talking much about the prescription the authors suggest for solving the problem, because they would have to face the fact that Benjamin Goldstein and his co-authors are correct:

We have to electrify everything, we have to fix everything we've already built, everything we build new has to be better and denser, and we have to do it all right now.

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