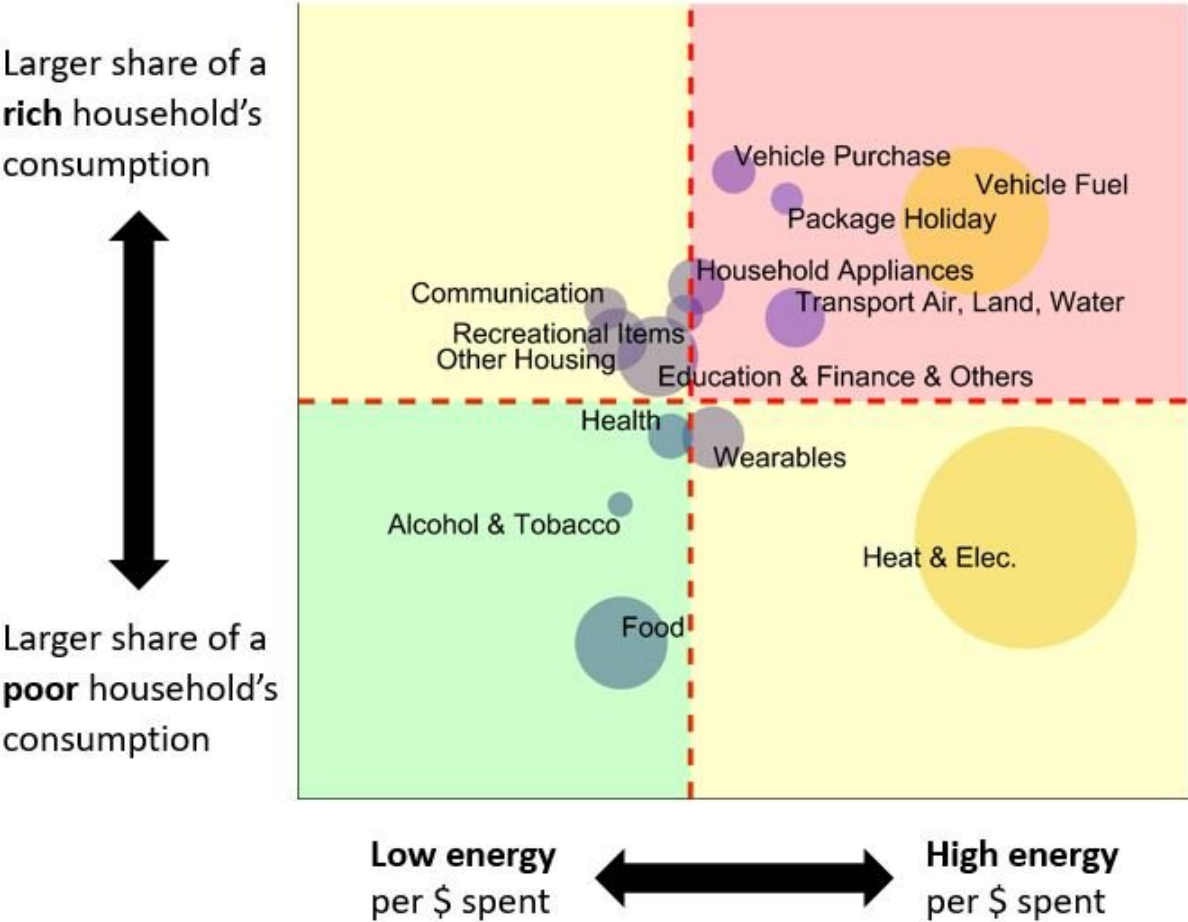


Shining a light on international energy inequality

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As income increases households/individuals are more likely to spend money on energy intensive goods and services, such as air travel or buying a large car that consumes a lot of fuel (products in the pink shaded quadrant). Heating and electricity is the only very energy intensive category consumed frequently by households of all income classes, since it is an unavoidable expense for most. Credit: University of Leeds

A new study examines energy inequality for income classes across 86 countries, from highly industrialised to developing ones, revealing extreme disparity in energy footprints, both within nations and globally.

In the first study of its kind, University of Leeds researchers combined European Union and World Bank data to calculate the distribution of energy footprints, as well as what energy-intensive goods and services different income groups tend to spend their money on.

Their study, published today in *Nature Energy*, shows that energy footprints grow with expenditure, and, as a consequence, are unequally distributed. Among all the countries and income classes in the study, the top 10% consume roughly 20 times more energy than the bottom 10%.

Additionally, as income increases, people spend more of their money on energy-intensive goods, such as package holidays or cars, leading to high energy inequality. Indeed, the researchers found that 187 times more vehicle fuel energy is used by the top 10% consumers relative to the bottom 10%.

Extreme energy inequality in transport

Transport showed some of the greatest inequality, with the top 10% of consumers using more than half of the energy related to mobility—the vast majority of it fossil-fuel based. In contrast, residential fuels, such as those used in cooking and heating, and electricity are much more equitably distributed, with the top 10% of consumers consuming roughly one third of the total.

The findings expose how varied goods and services are in terms of distribution and energy requirements. The researchers also identify key

areas where consumption should be cut.

Lead author Yannick Oswald, Ph.D. researcher in the School of Earth and Environment at Leeds, said: "We found that none of the energy categories are free from energy inequality or benefit populations to an equal degree.

"Transport-related consumption categories are among the least equal. Without reducing the energy demand of these services, either through frequent-flyer levies, promoting public transport and limiting private vehicle use, or alternative technology such as electric vehicles, the study suggests that as incomes and wealth improve, our fossil fuel consumption in transport will skyrocket."

Energy inequality between countries

The study highlights the unequal distribution of energy footprints between countries, with 20% of UK citizens belonging in the top 5% of energy consumers, along with 40% of German citizens and 100% of Luxembourg's population.

Meanwhile only 2% of China's population are in the top 5% of energy consumers, and merely 0.02% of the Indian population.

The poorest 20% of the UK's population still consumes more than five times as much energy per person as the bottom 84% in India, a group numbering roughly a billion people.

Study co-author Dr. Anne Owen, also from the School of Earth and Environment at Leeds, said: "Our results demonstrate that we can measure the energy footprints of all kinds of goods and services, across the world, in a comparable way. This kind of research is very promising for modelling future distributional implications of climate and energy

policies.

"Growth and increased consumption continue to be core goals of today's politics and economics. The transition to zero carbon energy will be made easier by reduction in demand, which means that top consumers will play an important role in lowering their excess energy consumption."

The authors warn that without reductions in consumption and significant policy interventions, by 2050 energy footprints could double from what they were in 2011, even if energy efficiency improves.

Considering the consumption categories examined, there could be a 31% increase attributed to vehicle fuel alone, and another 33% to heating and electricity. If transport continues to rely on fossil fuels, this increase would be disastrous for the climate.

However, the study suggests that persisting inequality can be prevented through appropriate intervention. Different categories require different forms of action: energy intensive consumption, such as flying and driving, which mostly occurs at high-incomes, could be regulated through energy taxes, for instance, while the energy footprint of heating and electricity can be reduced by massive-scale public investment programmes in housing retrofit.

Study co-author Julia Steinberger, leader of the Living Well Within Limits project and Professor of Social Ecology and Ecological Economics at Leeds, said: "There needs to be serious consideration to how to change the vastly unequal distribution of global [energy consumption](#) to cope with the dilemma of providing a decent life for everyone while protecting climate and ecosystems."

More information: Large inequality in international and intranational energy footprints between income groups and across consumption

categories, *Nature Energy* (2020). [DOI: 10.1038/s41560-020-0579-8](https://doi.org/10.1038/s41560-020-0579-8) ,
[nature.com/articles/s41560-020-0579-8](https://www.nature.com/articles/s41560-020-0579-8)

Provided by University of Leeds

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