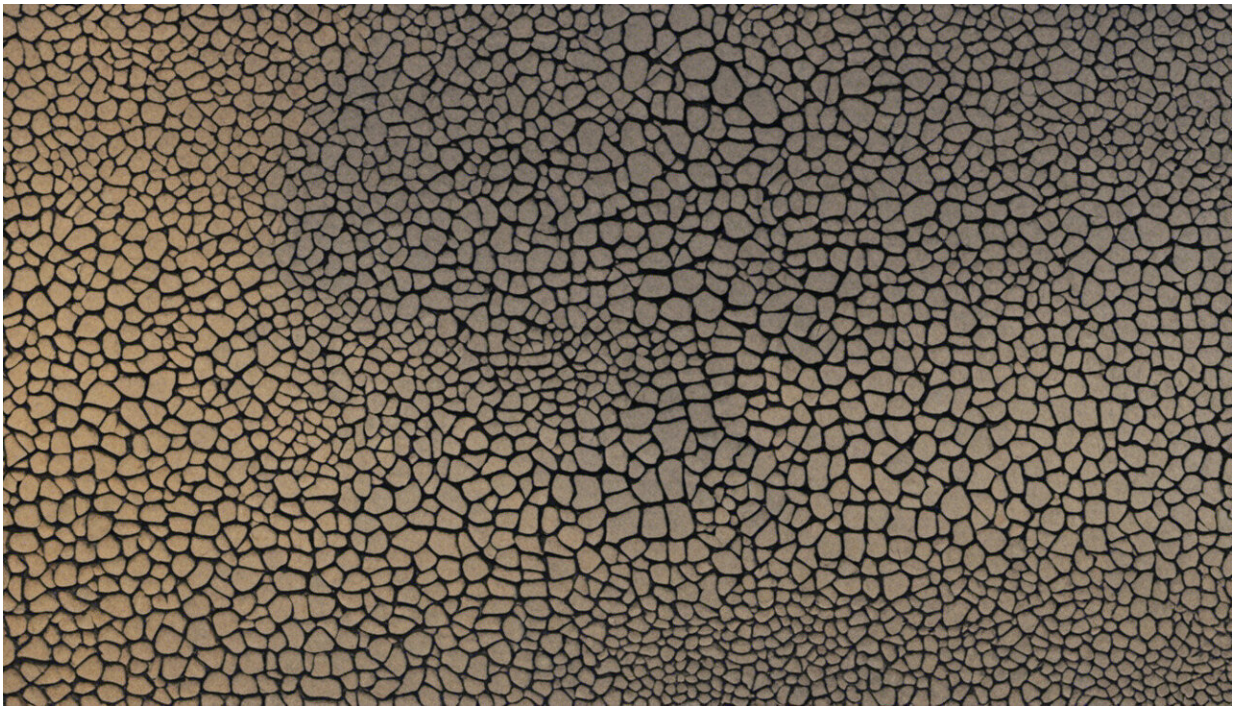
Why it's so hard to trace the patterns of unsustainable fossil fuel use

March 27 2019, by Simon Pirani



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Our future depends on a transition away from fossil fuels. To map out a path, we need to get to grips with how, and why, the use of coal, gas and oil has risen to unsustainable levels.

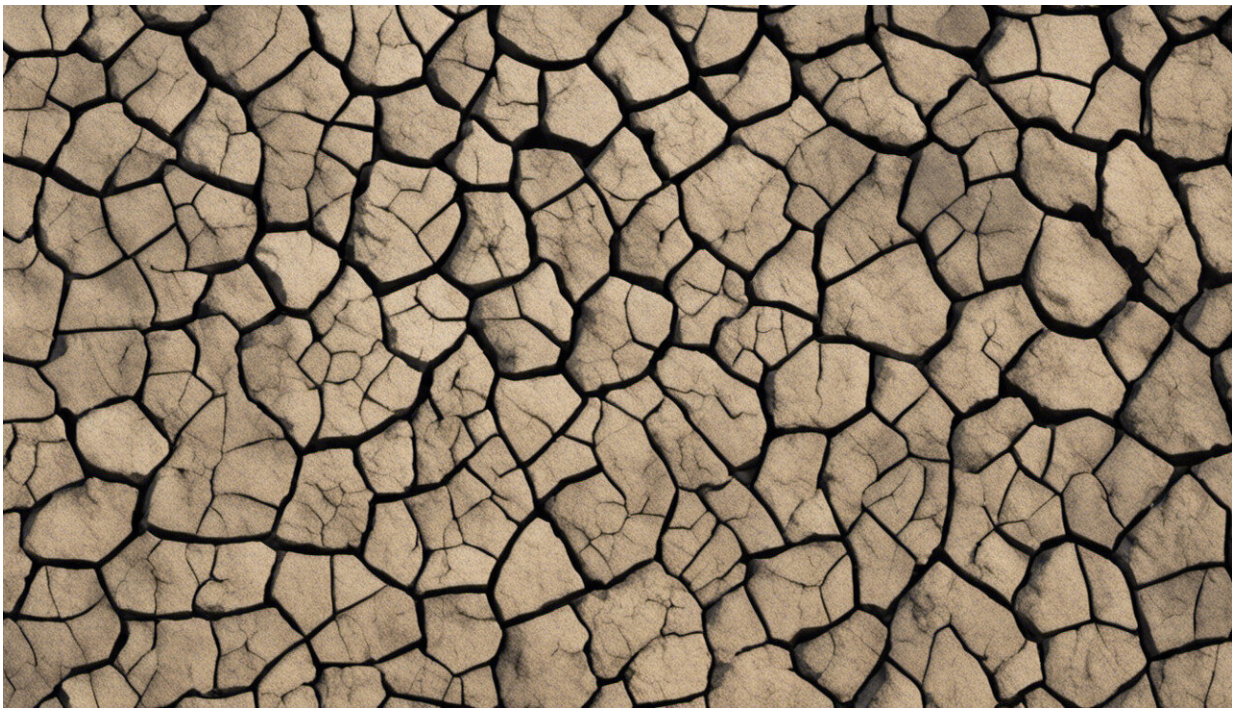
Most fossil fuels are consumed not by individuals, but by and through

large technological systems, such as electricity networks, urban transport systems, built environments, and industrial and agricultural systems. While the media offers plenty of advice on how individuals can cut consumption, how to transform or supersede these technological systems is much less obvious.

These unsustainable systems are deeply embedded in day-to-day life. For example, fossil-fuel-driven power stations on average use roughly three units of energy to produce one unit as electricity, while further energy is lost in transmission networks. Steel and cement are also produced in energy-inefficient ways, and used to construct heat-hungry buildings. To engineers, these are all huge opportunities for energy conservation.

Car-based urban transport systems could hardly be more fuel-inefficient. That is why Atlanta in the US, a spread-out city dominated by suburban housing and car transport (including many SUVs), has 11 times the greenhouse gas emissions per head of Barcelona, Spain, which has a similar number of people, with similar income levels, but is more compact, with better public transport and a relatively car-free centre.

The best way to interpret the growth in fuel consumption is by starting with the evolution of these technological systems, and the way they are embedded in social and economic systems. As I argued in my recent book Burning Up: A Global History of Fossil Fuel Consumption, such an approach can help us through a dizzying array of statistics, which themselves reflect a range of political views of consumption. Here is a guide to the most often-used ones:



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National consumption per head

Consumption-per-head statistics measure a country's total energy use, and divide it by the number of people in the country. Developing nations use these figures at international climate talks, to underline the historic inequality of consumption. For example, in 2014 the US consumed 31 times more energy products per head than Bangladesh; three decades earlier in 1984, it was 71 times more.

But no US citizen consumes those quantities of energy products directly. His or her share is mostly swallowed by the technological systems. Even those car drivers in Atlanta do not control their own consumption: it's difficult to live there without a car, except in hardship.

These numbers also hide inequality within nations, such as between an extravagant SUV driver and an unemployed cyclist. The prominent economist Thomas Piketty and his colleague Lucas Chancel tried to correct for that anomaly. Using wealth statistics, they estimated individuals' fuel use, from the super-rich to the poorest, and found even more eye-watering contrasts. But such approaches still do not account for the technological systems that consume most fuels.

Including 'outsourced' emissions

Consumption-based emissions statistics filter out the effect of one aspect of international inequality. They count greenhouse gases emitted in manufacture according to the countries where products are used, instead of where they are made. So emissions "embedded" in a steel bar, produced in a carbon dioxide-belching coal-fired furnace in China and exported to the US, are counted as American. These numbers underline that, even today, the vast bulk of fossil fuel use is in, or for, the global north.

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What about big corporations?

Attributing emissions to fuel-producing companies helps to highlight the role of corporations. The Climate Accountability Institute's brilliant research shows that nearly two thirds of carbon dioxide emitted since the 1750s can be traced to the outputs of the 90 largest fossil fuel and cement producers.

Some headlines proclaim that these corporations are therefore "responsible" for climate change. But that's only half the story. They produce fuel, others consume it. A list of the companies that do so – electricity producers, metals and engineering consortia, car makers, construction companies, petrochemicals and agriculture giants – would be longer and more complex, because fossil fuel use is so integral to all

types of economic activity.

So we need sector-by-sector breakdowns, and the International Energy Agency (IEA) publishes those. Flow charts can help visualise things, and materials flow researchers, such as the authors of Sustainable Materials With Both Eyes Open, do those. Then the numbers need interpreting; the bulky Global Energy Assessment had a shot at that.

Companies and governments may be hiding things of course. There are tell-tale signs in IEA statistics: more than three times the amount of fuel used for global aviation is used on "other energy industry own use and losses" – that is, fuel the energy companies have either lost, or lost track of. And IEA reports on energy efficiency, which rely on companies to detail improvements, are full of complaints that crucial information is withheld.

Military use is largely hidden. The US Department of Defense was in the 2000s the world's biggest single consumer of commercial energy, wolfing down more than Nigeria. And at least we have that information: many countries simply don't report military fuel use.

Tracing fossil fuel use is not simple. The focus needs to shift from individual consumption to the big technological systems by and through which most fossil fuels are used, and the social and economic factors that make them work the way they do. A harsh light needs to shine on companies that consume the fuels, as well as the producers.

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