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UCSB professor tapped to co-author the seventh IPCC assessment report on climate change mitigation

We need to reduce consumption: That was one of the strongest recommendations to come out of the Intergovernmental Panel on Climate Change's Sixth Assessment Report on climate change (AR6).

"Reducing societal demand for energy and materials could mitigate up to around half of the emissions that we're currently dealing with, without installing one additional solar panel or wind turbine," said co-author Eric Masanet, a professor at UC Santa Barbara's Bren School of Environmental Science & Management. "This finding ended up being one of the key messages of the Sixth Assessment Report."

For over three decades, the UN's Intergovernmental Panel on Climate Change (IPCC) has produced the authoritative reports on climate change science and mitigation. Now embarking on its seventh assessment cycle, the IPCC has invited Masanet to return to co-author a key chapter on cutting emissions through reduced consumption.

Doing more with less

Human wellbeing requires goods and services: food, housing, transportation, healthcare, technology, and so forth. And all of these require energy and materials

to carry out. But meeting these needs doesn't require the amount of energy and materials currently devoted to this end, as Masanet and his co-authors pointed out in AR6. "We found that, if we could reduce demand for energy and materials in the first place, we can get nearly halfway to net zero by mid-century just by eliminating waste while still providing wellbeing for everyone," he said.

Unfortunately, the current global economy runs largely on overconsumption, and many powerful businesses and institutions are invested in maintaining this state of affairs. By driving up production, overconsumption reduces marginal costs. The result is greater accessibility and affordability. It also creates jobs for a population that is 35% larger in 2025 than when the IPCC's First Assessment Report came out in 1990.

But overconsumption is depleting our resources, poisoning our air and water, and driving conflict and inequality around the globe. And it is a major contributor to the existential threat that is climate change.

Fortunately, we can maintain a high standard of living with a fraction of the energy and resources currently consumed by developed nations. For example, Masanet's own research has concluded that more materials-efficient building designs can simply cut demand for concrete — one of the world's most emissions-intensive materials — by up to 25%.

Reducing consumption will require shifting cultural norms, business incentives, policies and behaviors, Masanet acknowledged, but this comes with plenty of economic opportunities. "In order to consume less stuff, we need to get smarter in a lot of ways that could create new jobs and new industries," he said. For example, the waste-disposal sector could transition to a product and materials recovery, refurbishment and remanufacturing sector.

That said, Masanet warns that we can't simply incentivize beneficial activities, such as solar energy. We also need to disincentivize harmful activities, like coal-fired power plants. Otherwise, society may simply end up with more of both.

A first look at demand reduction

Rigorous research into large-scale demand reductions was just emerging when Masanet and his colleagues first looked into this while putting together AR6. Since then, there's been a lot of work on the design and implementation of low-demand pathways to climate change mitigation.

Masanet summarized three main takeaways from the AR6 demand chapter as "avoid, shift and improve." First, society needs to avoid demand in the first place. Using lighting as an example, installing skylights and windows can help avoid the need for artificial lighting during much of the day. Second, when artificial lighting is still needed, we have to shift toward the most efficient technologies, such as using LED lighting in place of incandescent, and even compact fluorescent, bulbs. Finally, we must continue improving these technologies and processes. For example, automatic lighting controls can now adjust or even turn off illumination based on available daylight or room occupancy.

Masanet and his co-authors had also discovered that not all emerging solutions were straightforward wins. For instance, while digitalization has long been contributing to gains in energy efficiency, this balance has recently begun to shift due to the rise of AI-dedicated data centers. Masanet co-authored a recent U.S. national data center report with colleagues at Lawrence Berkeley National Laboratory. The team estimated that U.S. data center energy demand may grow sharply, up from around 2% of U.S. electricity use in 2018 to 6-12% of U.S. electricity use by 2028. This sharp growth is driven by the proliferation of AI data centers, which can consume 10 to 20 times more power than traditional large data centers.

A key goal of the AR7 demand and services chapter is to review whether AI will ultimately save society more energy and emissions than its data centers require, Masanet said. This will require evaluating how AI can be applied to efficiency improvements, systems optimization, materials discovery and other climate goals, as well as ways to mitigate the negative impacts of the AI boom on power grids, emissions, and water resources.

While many proponents claim that AI will save more energy than it uses in the long run, evidence is currently limited because adoption of the technology is still relatively new. Making the most of developments like AI will require policymakers to get ahead of emerging technologies, set regulations and standards, and steer them toward outcomes that will actually reduce emissions, Masanet said.

Building upon initial insights

The IPCC is embarking on their seventh assessment report with perhaps the most balanced team of experts yet. The upcoming report includes nearly the same number of male and female authors, and more than half of the authors hail from developing countries and countries with economies in transition. “We are proud that the new author teams reflect increased diversity,” said IPCC Chair Jim Skea.

The U.S. federal government has mostly retreated from this international effort. But as the third largest nation in the world — and longstanding leader in climate science and innovation — America still has a large role to play in research, mitigation and adaptation.

Aside from the political climate, the biggest shift Masanet sees between AR6 and AR7 is the growing urgency of taking action. The sixth report was the first to come out after the Paris Climate Accords in 2015. At that time, a sense of common purpose prevailed and atmospheric CO_2 was still below 400 parts per million. A decade later, the impacts of climate change are strikingly clear: Unprecedented floods, hurricanes, droughts and fires now occur regularly. Atmospheric CO_2 has eclipsed 425 ppm, and we have only 4 years of emissions (at our current rate) if we hope to keep warming below 1.5° Celsius by the end of the century. Reducing demand is an immediate, cost-effective way for society to cut our ballooning emissions in this critical time.

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