

The clean-energy challenge redux

For a publication that covers a field so important to energy-conversion technologies, I find it interesting that the recent conversations about “clean energy” in *PHYSICS TODAY* seemed focused on whether we can produce enough of it. That issue came to my attention while reading David Kramer’s “Electrification of cars and trucks likely won’t disrupt the grid” (*PHYSICS TODAY*, April 2022, page 22) and the subsequent discussion in the April 2023 issue (page 11). Kramer substantiates the assertion in his headline with a quote from National Renewable Energy Laboratory research team leader Matteo Muratori: “Utilities are excited. Selling more electricity is their business. . . . We build new industrial facilities, new hospitals, and new schools, and they make sure the electricity is there to support those needs.”

A missing piece in the discussion has been a proposal to use less energy.

Generally speaking, traveling by rail is less energy intensive than by car or airplane. I live out in the country and have an electric car. But 100 meters from my doorstep lies an abandoned train platform that was active 60 years ago, and the train could have taken me to the city in less time than I can drive there now. And while my recent flight to a conference in Chicago took only three and a half hours in the air, when I factored in time spent heading to the airport, going through security, waiting for the flight, taxiing on both ends, and grabbing a shuttle into town, the trip consumed a bit over 10 hours in total. Had I taken a high-speed train traveling at 300 kilometers per hour, it would have taken nearly the



same amount of time from city center to city center—and I would have been able to work, eat, and sleep at my leisure.

Europe understands that, and consequently many of its countries have constructed thousands of kilometers of high-speed rail throughout the landscape. Meanwhile, the US lacks even one fully high-speed line—currently the Amtrak Acela, between Boston and Washington, DC, is the one train that can reach high speeds, but only on parts of its route. Nonetheless, people buying vehicles have the option to choose among many “all-electric” SUVs, pickups, and other types of cars—some of which have more than a thousand kilograms of batteries, along with synthesized motor sounds you can turn on should you miss the rumble of an internal combustion engine.

It’s time to include the principles of energy conservation into the discussions about decarbonizing our economy.

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In their letters in the April 2023 issue of *PHYSICS TODAY* (page 11), Mike Tamor and Arthur Williams raise valid points about the difficulties of meeting the energy needs of a future world trying to wean itself off carbon-based fuels. As good physicists do, they see a problem and soberly evaluate potential solutions.

But figuring out how to meet energy needs in a future carbon-free economy is not the same as solving a classic physics problem. In classic physics problems, we accept that we cannot do anything about

the laws of nature; we can at best try to understand those laws and benefit from that knowledge. When it comes to meeting the energy needs of a future and hopefully better world, we aren’t dealing only with the laws of nature—we are also dealing with human behavior.

We physicists should not only concern ourselves with finding ways to satisfy the difficult-to-meet needs of a future economy on the basis of current trends of human-population growth and energy consumption. We should also advocate for different ways of living that require far less resource consumption and promote greater equity between the richest and poorest nations.

Julia Steinberger is a trained physicist and currently an ecological economist whose outlook on such matters is one that the physics community should consider when discussing the transition to a carbon-free economy. She has argued that countries that have decent living standards can and should greatly reduce their consumption of energy. She and her colleagues have shown that the countries using the highest amounts of energy can accomplish such reductions while still meeting the needs of citizens.¹

Wealthy countries should create space for developing nations to grow their economies while ensuring that the global economy operates within parameters that are consistent with ecological sustainability.

Reference

1. J. Vogel et al., *Glob. Environ. Change* **69**, 102287 (2021).

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