FUSION ENERGY AND THE ILLUSIONS OF POWER

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COMMENTARY

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This spring, powerful politicians joined U.S. Department of Energy officials and nuclear scientists to celebrate the dedication of the National Ignition Facility (NIF), the world's most powerful laser. The dedication was part of a well-orchestrated PR campaign aimed at sustaining support in hard economic times for the huge laser fusion project. California Governor Arnold Schwarzenegger hailed the multi-billion dollar project as having "the potential to revolutionize our energy future," opening the way to new nuclear plants that can "generate an endless amount of megawatts of carbon-free power." Thomas Friedman of the New York Times flacked the NIF in a column headlined "The next really cool thing," describing it as a possible "holy cow game-changer."

Despite the hoopla over this century's version of "energy too cheap to meter," the NIF is located at the Lawrence Livermore National Laboratory—a nuclear weapons design lab. NIF's main purpose is to conduct nuclear weapons-related experiments. A 2000 Government Accountability Office study estimated that 85 percent of NIF's experiments would be for nuclear weapons physics. NIF's role in weapons work is controversial, with many independent experts believing it to have little relevance for maintaining the well-understood designs of weapons in a nuclear arsenal that the United States is legally obligated to eliminate under the terms of the Nuclear Nonproliferation Treaty. NIF's advocates mainly are those who believe that the United States will need to keep nuclear weapons for decades to come.

Viewed as an energy project, NIF is a monument to a vision of the future that is firmly rooted in the past. It conjures images from science-fiction magazine covers of the 1950's, of monolithic nuclear plants dominating a rectilinear landscape of factory-farmed fields, with transmission lines marching off to high-rise cities built without regard to the costs or effects of the energy they consume. But wait—that future looks a lot like our present—and it isn't working. The pursuit of unlimited growth powered by unlimited energy has resulted in a society that is ecologically unsustainable, armed to the teeth, and that has levels of economic inequality that resemble those of 19th century robber-baron-style capitalism. Fission nuclear energy has proved far more technologically challenging, risky, and expensive than anticipated, and remains linked to the capacity to make nuclear weapons. Fusion too was viewed optimistically in the 1950's, with some leading scientists then predicting controlled fusion energy within two decades. But the physics, engineering, and economic challenges of fusion energy dwarf those posed by fission power.

A half century later, fusion power remains a distant, and very expensive, dream. Even if it proves workable, commercial deployment is at best many decades away, and hence unlikely to provide a significant contribution to solving problems posed by diminishing fossil fuel supplies and climate change caused by burning them. And despite being sold as a more "proliferation resistant" nuclear energy technology because it does not require uranium or plutonium fuel, any country that is capable of building and operating inertial confinement fusion-based power facilities likely will have the know-how to build and deploy hydrogen bombs. By any stretch of the imagination, it will be a capital-intensive, high-risk energy path, requiring as well extensive—and expensive—environmental controls and security throughout its fuel, power, and waste cycle.

Rather than gambling on a future powered by unknown physics and unproven technologies, we should be investing in what we already know about physics and technology. It will cost tens of billions of dollars to find out if fusion electricity generation will work, and hundreds of billions more to deploy it in significant quantities. Our energy dilemmas can be solved more quickly and safely by reducing the work that energy does—moving people and things less far, less frequently, in larger capacity vehicles, designing our buildings so they can be heated and cooled more easily, and growing our food closer to where it is eaten, in ways that stay within nature's energy cycles rather than depending on industrial inputs from afar. At the same time, we can pursue renewable energy technologies like wind and solar power that can be deployed in smaller increments, crafted to fit this less fragile and more sustainable development path.

Ultimately, our goal must be to end the endless pursuit of more, to build a society where we no longer chase bigger homes stuffed with more toys, but instead value a life lived in balance with the world we all share. Doing so is the only path to fairly sharing the risks of the difficult energy and economic transitions humanity now faces. With global tensions driven by economic inequality and resource competition on the rise, it also is central to the task of ridding ourselves of the world-destroying weapons that both NIF and the pursuit of endless power help sustain.

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