

CHALLENGING THE CLEAN ENERGY DEPLOYMENT CONSENSUS

EXECUTIVE SUMMARY

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Most clean energy advocates believe that the world has all the low-carbon technologies needed to effectively address climate change. In their view, we don't need technology breakthroughs; we need political breakthroughs that will establish regulatory mandates, subsidies for clean energy, and taxes on "dirty energy" that will drive widespread deployment of clean energy technologies. Unfortunately, this widely held "Deployment Consensus" is largely misguided: existing technologies still cost more, often substantially more, than fossil fuels, while exhibiting sub-optimal performance. Only when clean energy is cheaper than fossil fuels will it be massively deployed globally because countries, companies, and individuals will want to adopt it—not out of civic mindedness, but out of self-interest. And the only way for that to happen is through a robust global clean energy innovation strategy.

The Deployment Consensus is pervasive among environmentalists and climate advocates who contend that the urgency of climate change necessitates rapid deployment of existing renewable energy technologies. Citing a number of studies projecting the necessary scale-up of renewable energy capacity nationally and globally, supporters of the Deployment Consensus claim to have evidence that existing clean energy technologies can in fact meet total energy demand within the next 20 to 40 years. In fact, a careful analysis of these studies identifies four key problems with the Deployment Consensus interpretation of the literature:

While Deployment Consensus advocates are correct to that we need urgent action on climate change, the idea that the world has all the clean energy technologies it needs is fundamentally wrong.

- The Deployment Consensus downplays significant and possibly infeasible renewable power generation capacity scale-up in order to meet projected energy demand, often ignoring the high costs of infrastructure and systems changes the studies claim are needed.
- The Deployment Consensus overlooks or misrepresents persistent storage and integration challenges that will pose significant costs to consumers at high levels of renewables penetration.
- Some of the reviewed studies limit the technology options of a renewable future to wind, solar, and water resources, instead of incorporating other low- and zero-carbon solutions into the projections to maximize cost-effectiveness.
- The Deployment Consensus interpretation of the studies generally assumes that regulations and incentives are appropriate policy tools for encouraging the adoption of renewable energy technologies, and that these policies will likely induce the innovation necessary for a renewable future over time.

While Deployment Consensus advocates are correct to assume climate change is one of the most significant challenges of this century and action is needed now, the suggested costly—and in many cases infeasible—approaches to quickly mitigating the problem will not be effective in the short or long term for the simple reason that the world will not widely adopt more expensive energy sources or the policies needed to implement them, regardless of how loud the climate alarm bells are.

Rather, the key to mitigating climate change is to make clean energy cheap enough to replace conventional energy without mandates, subsidies, or carbon taxes. And the key to making this ideal a reality is to strategically invest in a comprehensive clean energy innovation ecosystem in the United States and internationally.

Unfortunately, most governments, including the United States, have prioritized policies supporting regulation and subsidies over clean energy innovation policies. Indeed, energy innovation policy—basic science, research and development, demonstration, prototyping, and “smart” deployment—is weakly supported in most nations, including in the United States. One key reason for this is that the dominant Deployment Consensus neglects the need for innovation and innovation policy at worst, or pays lip service for innovation at best. To the extent that the Deployment Consensus acknowledges the need for better technology, it emphasizes support for deployment alone as an innovation strategy; deploying more, they claim, will be enough to get clean energy cheaper than fossil fuel. But this assumption ignores the complexities of clean energy innovation. While deployment policies can incrementally lower costs of existing technologies, obtaining the dramatic cost declines necessary to make clean energy as cheap as fossil fuels requires an innovation strategy that invests throughout the innovation ecosystem, with a particular focus on significantly more funding for applied clean energy research. Policies supporting deployment can help support innovation, particularly if these policies tie the deployment of next-generation, breakthrough technologies to cost and performance improvements, called “smart” deployment. In short, advancing globally cost-competitive clean energy solutions to climate change requires a shift from a Deployment Consensus to an Innovation Consensus.

Building a new innovation consensus for climate and energy policy will not be simple, but it will be significantly easier than convincing nations to spend trillions of dollars more on high-cost clean energy than they would otherwise on “dirty” energy, if for no other reasons than nations want to build competitive clean energy industries. This goal would be even more accessible if environmental and climate advocates put their considerable political weight behind an innovation agenda. The report concludes with a number of recommendations for creating an innovation-driven energy policy strategy aimed at making a clean energy future a reality, including:

- Increase public investments in research, development, and demonstration globally. In the United States this would mean tripling existing investment to \$15 billion annually.
- Create dedicated revenue streams to support public investment in energy innovation, such as through a carbon tax and/or re-directing revenue from oil and gas drilling on federal lands.
- Reform national laboratory systems to better support clean energy innovation. In the United States the Department of Energy National Laboratory system needs to better link federally funded research to the market to accelerate commercialization.

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- Enact policies that address the “valleys of death” by strengthening regional energy innovation ecosystems and improving government clean energy demonstration and prototyping programs.
 - Increase government procurement of next-generation clean energy technologies. In the United States this can be done through agencies such as the Department of Defense and the General Services Administration.
 - Reform deployment incentives so that cost reductions and performance improvements are a prerequisite for obtaining incentives.