

Renewable technology prices and decarbonization

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The great advantage of fossil fuels over renewable energy is that the sun doesn't always shine and the wind doesn't always blow and these "intermittent" sources of energy may not be reliable enough to power our economy. This missing link is energy storage and the good news is that

the price of batteries is coming down. So too are the prices of solar and wind power. According to a report by [BloombergNEF](#) on March 26, 2019:

"The latest analysis by research company BloombergNEF (BNEF) shows that the benchmark levelized cost of electricity, or LCOE, for lithium-ion batteries has fallen 35 percent to \$187 per megawatt-hour since the first half of 2018. Meanwhile, the benchmark LCOE for offshore wind has tumbled by 24 percent. Onshore wind and photovoltaic solar have also gotten cheaper, their respective benchmark LCOE reaching \$50 and \$57 per megawatt-hour for projects starting construction in early 2019, down 10 percent and 18 percent on the equivalent figures of a year ago."

As a student of public policy, I have long believed that the only practical approach to [climate policy](#) is to encourage the rapid development and implementation of renewable [energy](#) technology. Energy use is too imbedded in our daily economic life to reduce its use beyond the considerable gains we could achieve via energy efficiency. But as the world economy develops the use of energy will continue to rise. Everyone wants smart phones, refrigerators, [climate control](#), personal transportation, computers and the internet. The use of fossil fuels will only be reduced by something that is as cheap, convenient and reliable. Fortunately for the planet, renewable energy is poised to drive fossil fuels from the market.

But the transition will take time and won't be smooth. This past year the [world economy](#), emitted more greenhouse gasses than we did in 2017, after several years of slow reductions of greenhouse gasses. Our investment in fossil fuel infrastructure and the political power of those who own the infrastructure guarantees a slow transition.

Nevertheless, anyone paying attention to recent economic history knows that the power of disruptive technological change can be slowed, but

cannot be stopped. There are simply too many ingenious minds and talented teams working on energy technologies around the world to stop this trend. Energy itself is too important to ignore.

The urgency of the world's climate problem and the willful ignorance of the American President and his cronies is paradoxically serving as a motivating force- possibly compensating for the reduced role played by the U.S. federal government. No one is waiting for the Trump Administration to act on climate change. People realize if we are to address this existential issue, we can't rely on Washington. As a result, American state and local governments, corporations, universities and hospitals are all developing plans to mitigate and adapt to climate change. The U.S. military, too operationally intelligent and important to live in an ideological dream world is spending billions of dollars to adapt to climate change, save energy and utilize renewables. Nations outside the U.S. are moving ahead without us, and there is reason to believe that we may soon see progress.

The way I envision large scale decarbonization is that it may well follow some of the patterns seen as we adopted smartphones, cable TV and then the internet in our homes. There are already companies that you can pay to make sure that your share of use of electricity on the grid has been generated by renewables. But what I think will happen will more closely resemble people dropping landlines and cable TV and replacing them with cell service and the internet. The technology will be some type of home solar array and battery. You would either purchase it or lease it. The lure is that it will cut your electric bill by enough money to be worth the inconvenience. While regulators may not allow homes to sell their excess energy, the home system can save money without that efficiency.

People are getting used to replacing old technologies with new technologies in their homes. Where once a new type of appliance or a light bulb would be seen as revolutionary, now they are expected. People

are adding computing power to many aspects of their home life: security systems, personal assistants, and a wide variety of appliances. Over the past fifty years new types of cooking devices like microwave ovens and personal coffee brewers have been easily incorporated into daily life. There is no reason to believe that the electrical grid's monopoly over our power supply is immune to the forces of technology.

The massive investment in current energy infrastructure from refineries and pipelines to power plants and electric transmission lines has made the current energy system seem permanent. The exercise of political power by those with wealth in America has become institutionalized through the use of unregulated political cash and endless mass and social media. These powerful forces are arrayed against decarbonization and will continue to slow its progress. But I have to admit I am a technological determinist. I don't always like it, but in my lifetime I have seen the nearly irresistible force of new technologies and the difficulty of stopping them. For every supersonic transport regulated out of the economy there are a thousand other technologies that are put into everyday use. Typically, technology drives economic and social change. Think about how the smart phone has changed the way you communicate with your friends and family.

In the case of fossil fuels and the power grid, it is not simply that the current energy system damages the environment and contributes to climate change, it is that the system is ripe for modernization. Centralized power generation and distribution is vulnerable to interruption from extreme weather, terrorism, or computer hacking. It is capital intensive and as a regulated monopoly open to political influence. Distributed, decentralized energy is less vulnerable to mass failure, potentially less damaging to the environment, and as technology develops likely to come down in price.

Even without transformative technological breakthroughs, incremental

innovations and expanding markets are driving down battery and solar array prices. In those parts of the world that have not yet developed an electric grid or are less influenced by fossil fuel interests, there is an opportunity to leapfrog current technologies. Unfortunately there is also an opportunity for developed nations modernizing their energy systems to unload old and polluting technologies on the developing world. China is building coal powered power plants in Africa and all those used internal combustion engines could provide years of cheap transportation to developing nations before they reach the junkyard.

While climate impacts may be more subtle than [water pollution](#), toxics, and other more obvious environmental insults, people are beginning to understand their scope and what was once a model of the future has not become empirical reality. We've learned over the past half century that the best way to combat the environmental damage caused by technology is to develop better technology that accomplishes the same goal with less environmental impact. It is obvious that this is now happening as [renewable energy](#) becomes a cost effective alternative to fossil fuels. The issue remaining is the speed of decarbonization. But it's a question of when, not if.

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