Innovation
THE JOURNAL OF TECHNOLOGY COMMERCIALIZATION

The Economic and Climate Case for Clean Energy Innovation

By Rob Atkinson

Many have hailed COP 21, the Paris climate conference, as an historic "turning point" in global climate change policy. Indeed, delegates congratulated themselves with a standing ovation after they signed a deal supposedly to keep global warming below 2C. This congratulatory view seems to be based on the notion that all that is needed is the will to emit fewer greenhouse gases. Christiana Figueres, executive secretary of the United Nations Framework Convention on Climate Change, sums up the view: "We have most of the technology that we need. We have the capital. We're moving on the policy."

But in reality, we have none of the three, even after COP 21. And without the first, technology, we won't get the other two. The reason is simple: virtually no nation wants to bear the costs of committing to aggressive, binding greenhouse gas reduction targets, since without better technology it would mean higher energy prices and reduced competitiveness.

The reality is that, outside of niche markets, clean energy is still more costly than fossil fuels. According to the International Energy Agency (IEA), "Promising renewable energy technologies… still face technology and cost challenges." A recent study by the Department of Energy and the Electric Power Research Institute calculates that costs of renewable energy storage systems needed to deal with the intermittency of wind and solar are more than $200 per megawatt hour—three times more expensive than electricity from natural gas. In other words, while solar and wind energy prices have fallen, they still depend on government subsidies. And storing this intermittent power for later use remains far too costly.

That is why, given current technology, transitioning by 2030 to a world that is fully supported by renewable energy will cost as much as $100 trillion, or 8 percent of global GDP per year for the next 20 years. As things stand, clean energy remains a luxury good with only the elites and committed environmentalists willing to pay that $100 trillion.

This means that even after nations made commitments in Paris to reduce their carbon emissions, there is a very good chance they won't actually have the political will to sign the checks to meet their pledges. Who wants to go home and tell voters that they will have to pay more to drive, to heat their homes and to run their businesses? In short, as long as clean energy costs more than dirty energy, most countries will simply set less ambitious goals, change the goals when new governments come to power, or ignore the goals outright when it comes time to raise energy prices on consumers who vote.

Given this reality is it any surprise that so much of the talk is about feel-good things like how clean energy is actually good for economic well-being? Some, like futurist Jeremy Rifken, even go so far to

argue that green tech represents the next big industrial revolution and is the next "general purpose technology" to replace today's information technology system. The European Commission seems to have bought into this view, making the "circular economy" one of its key economic goals, despite lagging productivity growth and declining competitiveness, which will not be addressed by having a more circular economy.

But clean energy is not a "general-purpose technology;" it's a single-purpose technology. Clean energy technology will not do anything different than dirty energy, other than emit fewer pollutants. There will still be a light in my home and some kind of propulsion system in my car. As a result, the best we can hope for with clean energy, assuming all goes well with innovation, is not an economic revolution, but some modest savings in energy costs, which in itself accounts for a relatively modest share of GDP in most economies. In other words, from an economic perspective going green is, at best, about eking out some modest savings in a few areas of the economy and only if we get much cheaper clean energy production and storage. In short, clean energy is not the next general purpose technology the way biotechnology, robotics, or artificial intelligence promise to be.

So does that mean that a strong government policy for clean energy is not needed? No. On the contrary, the only way to meet climate goals in the near to mid-future will be with coherent and well-funded clean energy innovation strategy. That is why the Information Technology Innovation Foundation launched the $100 Billion Campaign that advocates that increased public investments in clean energy innovation must be a key pillar of global climate policy. Climate change is a technology challenge at its most fundamental level—deep decarbonization of the global economy requires zero-carbon technologies that are cost-competitive with fossil fuels. Unfortunately the world is grossly underinvesting in the advancement of the very technologies needed to break fossil fuels' grip on the global economy—solar, wind, carbon capture, bioenergy, nuclear, energy efficiency and energy storage. The request is straightforward: all developed and emerging economies should commit to increasing public investments in clean energy innovation to at least 0.15 percent of GDP annually, which would amount to $100 billion a year collectively. Indeed, the IEA calculates that the global public investment gap in clean energy RD&D is as great as $70 billion per year. In other words, investment needs to increase by three to four times to solve critical technological challenges and lower costs. Successfully meeting the $100 billion goal is the equivalent of a global moon-shot— the mass stimulation of the world's best scientists, engineers, entrepreneurs and thinkers to advance clean energy faster than any energy technology in human history. It will be in laboratories that climate change is solved.

If we can adequately innovate in clean energy, it will be possible to transform the planet's energy supply system away from dirty energy to clean at no added cost or economic drag. But to reiterate: that won't happen without innovation. And while the direct economic benefits of doing this will not be significant (leaving aside, of course, the economic benefits from less climate change), the indirect benefits could be significant. Getting better and cheaper clean energy will require better science and technology in a host of areas, including materials, computing, and others, and research discoveries in these areas will benefit not only clean energy innovation, but many other areas.

Unfortunately, most environmentalists ignore the need for better technology, partly because they believe that acknowledging just how inadequate current clean energy technology is will give governments an excuse to not impose carbon regulations. Better to pretend we "have all the technology we need" as Al Gore stated a decade ago in *An Inconvenient Truth* (the inconvenient truth was actually that we didn't and don't) and hope for the best. This is because they mistakenly believe that regulation is the surer path to decarbonization than is innovation. It's not because not even rich countries have the political will to impose regulations raise the price of energy. Whereas when clean energy becomes cheaper than dirty energy people and companies will voluntarily want to shift.

But won't the "market" get us the clean energy innovation we need? In a word, no, or at least not in the time scale we need. As we pointed out in *Inducing Innovation: What a Carbon Price Can and Can't Do*, there is no evidence for this magic talisman trust in prices, at least when it comes to breakthrough innovation. In fact, over the past century, in major innovation after major innovation, it was the pursuit of research and public support for early-stage technology and markets, and not price signals, drove breakthrough innovations like jet aircraft, semiconductors, and biotechnology. There is no reason to believe it will be any different for future clean energy innovation.

But this doesn't mean that there is no role for a price on carbon. As ITIF argued in *An Innovation Carbon Price*, putting a price on carbon and dedicating a portion of the revenues to a clean energy innovation trust fund to support for scientific and engineering research on clean technology will provide a slight incentive for more commercial innovation, but it's real benefit would be to provide a funding stream for the level of government-supported R&D that is necessary.

In short, we don't just need carbon targets or prices to save the planet; we need much more sustained funding for clean energy research and development.

Rob Atkinson is president of the Information Technology and Innovation Foundation.

ABOUT THAT COP

The international political response to climate change began at the Rio Earth Summit in 1992, where the 'Rio Convention' included the adoption of the UN Framework on Climate Change (UNFCCC). This convention set out a framework for action aimed at stabilising atmospheric concentrations of greenhouse gases (GHGs) to avoid "dangerous anthropogenic interference with the climate system." The UNFCCC, which entered into force in March 1994, now has a near-universal membership of 195 parties.

The main objective of the annual Conference of Parties, known as COP, is to review the Convention's implementation. The first COP took place in Berlin in 1995 and significant meetings since then have included COP3 where the Kyoto Protocol was adopted, COP11 where the Montreal Action Plan was produced, COP15 in Copenhagen where an agreement to success Kyoto Protocol was not realized and COP17 in Durban where the Green Climate Fund was created. COP21, also known as the 2015 Paris Climate Conference for the first time in over 20 years of UN negotiations, achieved a legally binding and universal agreement on climate, with the aim of keeping global warming below 2°C.