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Five things Bill Gates gets right on energy

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And one I'm not so sure about.

There's a saying that where you stand depends on where you sit. When it comes to energy, that holds true. For example, while I am an energy guy in general, I have spent much of my time in oil and gas. That colors how I see the future (and the present, for that matter). People who are deep into solar almost certainly have a different perspective. A mother in Africa cooking over a wood-burning stove might have a third. And a coal miner in West Virginia yet another.

Finding a consensus about what to do next and how, then, becomes difficult. And that is one reason why I find Bill Gates an interesting voice on energy issues. Having spent his life in IT and philanthropy, his views do not fit into a single box—and are all the more refreshing for that. He does have skin in the game. In 2015, he founded a \$1 billion clean-energy fund, the Breakthrough Energy Coalition, which is devoted to research and development on clean energy. He also has been active on issues related to climate change and nuclear power.

If I were to sit down with Gates over a latte in Redmond, we probably wouldn't agree on everything. But I think he asks the right questions, in the right way. Here are a few comments Gates has made over the years on energy that I found particularly interesting, and my responses to them.

1. 'Some people argue that deploying today's technology and developing new ideas are competitors in a zero-sum game—that doing one means you can't do the other. I disagree.'

So do I. In a sense, it's not even a choice. The world has a huge investment in the current energy infrastructure, and it is simply not going to write it off. The idea that there could be a "moon shot" to go all renewable in ten years is not going to happen. I also agree with Gates that today's technology needs to include nuclear. It is the only low-emissions, 24/7 technology now available, and its safety record is astonishingly good compared with conventional fuels (even without including pollution-related premature deaths). And yes, that includes Fukushima, which was poorly designed and sited. New nuclear plants are much better; Gates himself is an investor in a new nuclear technology.

2. 'If you wanted to use [a lithium ion battery] to store enough electricity to run everything in your house for a week, you would need a huge battery—and it would triple your electric bill.'

No question: energy storage is fascinating and important. Reliable and efficient storage is the missing link for renewables, such as wind and solar, that can only supply power

intermittently. But that has not happened and does not appear imminent. My McKinsey colleagues, for example, have been tracking storage for years, and the McKinsey Global Institute sees a promising future. But that future is not nigh. In 2015, a record 221 megawatts of storage capacity was installed in the United States, more than three times as much as in 2014 (65 megawatts), which was itself a big jump over the previous years. But more than 160 megawatts of the 2015 total was deployed by a single regional transmission organization, the PJM Interconnection market. And 221 megawatts is not much in the context of the total US generation capacity of more than a million megawatts. That battery Gates mentioned would weigh more than a ton. So think evolution, not revolution—and remember that we need to keep the lights on in the meantime.

3. ‘The one thing you can never say about CCS is that it will make energy cheaper than it is today.’

Right now, coal is the single largest source of global power and accounts for a third of US generation. The advantage of coal is that it is cheap and reliable. The downside is that it is dirty, generating more greenhouse-gas emissions than any other fossil fuel and contributing to smog and air pollution. The hope is that carbon capture and storage (CCS) could clean up coal, capturing up to 90 percent of emissions, while still allowing it to be used. The problem, though, is that doing so has proved very expensive, and the process just hasn’t worked as well as hoped, despite billions of dollars in investment. There are CCS plants in operation, and more are in different stages of development. At some point, CCS could well play an important role. But not anytime soon, and the costs could be high—in a world in desperate need of affordable energy.

4. ‘When you say to India, “Hey, don’t use your coal, use something that is substantially more expensive,” you’re asking them to make a trade-off against uplifting those lives to have the things that we take for granted. If they develop with coal, they still will have emitted less per person by a factor of four than we have over the last 100 years.’

Energy policy is not just about jobs, or pollution, or gas prices, or climate change. It affects all these things, of course, but fundamentally the use of energy is about improving the quality of daily life. Consider: the World Health Organization estimates that three billion people cook and heat their homes using wood or dung. This is not just inconvenient; it’s deadly, accounting for more than four million premature deaths a year. Compared to that, in many places, more coal would quite literally be a lifesaver. That is part of the reason India’s prime minister, Narendra Modi, plans to triple coal production to 1.5 billion tons a year. India also has ambitious renewable plans, but Modi has explicitly stated that his country (and others) needs “room to grow.” It’s a conundrum, and an important one. India is already the world’s third-largest nation in terms of greenhouse-gas emissions (although per capita emissions are low), and it is home to four of the ten most polluted cities. Plus, conditions in its coal industry can be dire (see some images here). But India is also home to 595 million people who lack any toilet facilities and many more who still cook using wood or dung. The country does indeed need room to grow; low-cost energy is essential. Figuring out the right pathway, and the mix of new and conventional fuels to use, will be an enormous challenge. The solutions, as Gates suggests, are not obvious.

5. ‘Right now, the world spends only a few billion dollars a year on researching early-stage ideas for zero-carbon energy. It should be investing two or three times that much. Why should governments fund basic research? For the same reason that companies tend not to: because it is a public good.’

Whatever the question, when it comes to energy, innovation is the answer. Instead, as Gates has also pointed out in other contexts, the bulk of spending comes in one way or another in the form of subsidies, both to consumers and producers. The problem with that is it is economically wasteful; moreover, by their nature, subsidies go only to existing technologies. The breakthroughs that will make the biggest difference may not even have been thought of yet. As I noted in a previous post, publicly funded R&D on energy accounts for only 4 percent of research budgets, and renewables are only half of that. The International Energy Agency found that public spending on energy research actually declined between 2011 and 2014. And private spending is not great either—much lower, for example, than on consumer electronics. This cannot possibly make sense.

And here’s the one I’m not so sure about.

‘To work at scale, current wind and solar technologies need backup energy sources—which means fossil fuels—for windless days, long periods of cloudy weather, and nighttime. They also require much more space; for example, to provide as much power as a coal-fired plant, a wind farm needs more than ten times as much land. These are solvable problems.’

On this one, I think Gates is a little breezy, assuming that these problems can be solved. His point on storage (see number 2) speaks to one issue—that wind and solar need 24/7 backup power, which today can only come in the form of the coal, gas, or nuclear. The other issue is that it takes a lot more land to create power using wind and solar than conventional alternatives. The world’s biggest solar farm, for example, in California’s Mojave Desert, can serve about 140,000 homes during the day; it occupies five square miles and requires about 9.4 acres of land to generate a single megawatt (wind takes even more). A natural-gas plant can do that all night, too, on a few dozen acres. Yes, the efficiency of solar and wind has been improving, but slowly. David MacKay, Britain’s former chief climate scientist (see postscript below) estimated that if the United Kingdom’s windiest 10 percent of land, including much of the coast, were covered with wind farms, it would produce less than 20 percent of the country’s needs. That’s a ton of acreage for comparatively little energy, and probably more than the people of Britain, who value the aesthetics of their green and pleasant land, would ever support. Indeed, there is already backlash. Vermont, too, is having second thoughts, for similar reasons; in 2013, the legislature passed a three-year moratorium on new wind projects, in large part to evaluate effects on the Green Mountain State’s landscape. Maybe the question of land is solvable, as Bill Gates says. But when? And at what cost? The fact is, fossil fuels are much more energy intensive than renewables. Oil, for example, moves big stuff with incredible efficiency. There’s a long way to go before wind-powered batteries or biofuels can push an airplane across the ocean.



Most of all, though, I agree with Gates on his essentially optimistic view of the future. Yes, there are difficult problems out there—but that has always been the case. Not only are we still here, but more people are living lives of promise than ever before. As Gates put it, “I believe that every life is valuable. That we can make things better. That innovation is the key to a bright future. That we’re just getting started.” I agree. □

PS: Gates also offered this appreciation of David MacKay, Britain’s former chief scientific adviser on climate, who died in April at age 48. MacKay, a physicist, was the author of Sustainable Energy—Without the Hot Air (UIT, 2008), a smart, rigorous, and often witty discussion of renewables. His TED talk on the subject gives a good idea of the book and introduces MacKay, who by all accounts was warm and well liked. His voice will be missed.

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