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A Call for Energy Realism: The fossil-fuel economy won't disappear anytime soon.

Duncan Currie, August 2, 2010

In the summer of 2008, at a time of widespread anger over historically high oil prices, Al Gore challenged his countrymen "to commit to producing 100 percent of our electricity from renewable energy and truly clean carbon-free sources within ten years." This wildly ambitious goal recalled Richard Nixon's proclamation, issued amid the 1973 global oil shock, that the United States would aim to become fully energy independent by 1980. It also brought to mind Jimmy Carter's pledge, made during his famous 1979 "malaise" speech, that America would "never use more foreign oil than we did in 1977," and would seek to cut its reliance on imported oil in half by 1990. For those keeping score, foreign oil accounted for 35 percent of U.S. consumption in 1973 — and 63 percent in 2009.

As University of Manitoba professor Vaclav Smil writes in his new book, *Energy Myths and Realities*, the various targets proposed by Nixon, Carter, and Gore collided with the harsh reality that "energy transitions are inherently prolonged affairs lasting decades, not years." It was probably not until the late 1890s, he notes, that fossil fuels provided half of all global energy. While we commonly think of the 1900s as the "oil century," oil did not become the world's largest primary energy supplier until 1965; and during the 20th century as a whole, it contributed slightly *less* energy than coal did.

"In global terms," says Smil, "1800–1900 was still a part of the millennia-long wooden era, and 1900–2000 was (albeit by a small margin) the coal century." Commercial oil production started in the 1860s, but it took roughly eight decades for the black stuff to gain even a quarter of the global primary energy market. As for the U.S. market, coal became America's biggest primary energy supplier in 1885, Robert Bryce writes in *Power Hungry*, and it held that crown for 65 years. In the early 20th century, its domestic market share reached as high as 90 percent. Oil did not surpass coal as the top U.S. supplier until 1950; its rise was driven largely by the automobile revolution and military needs during World War II.

By 1958, natural gas had eclipsed coal to become America's second-largest primary energy source, says Bryce, managing editor of the online journal *Energy Tribune* and a Manhattan Institute senior fellow. But then, regulatory interventions hindered its growth and gave new life to the U.S. coal industry. In recent years, coal demand has been soaring in China, India, and other developing countries. Smil points out that coal's portion of the global primary energy market was higher in 2008 than it was in 1973. Over the next 20 years, those hoping for a decline in worldwide coal consumption will almost certainly be disappointed.

Just look at the International Energy Agency projections. In its latest "World Energy Outlook," released in November 2009, the IEA estimated that, if government policies stayed constant,

global demand for coal would increase by 53 percent between 2007 and 2030. Over the same period, coal's share of global electricity generation would swell from 42 percent to 44 percent, while that of renewable fuels would go from 18 percent to 22 percent. Total energy-related carbon-dioxide emissions would jump by 40 percent, with coal-power emissions growing by 60 percent. Coal would still be "the dominant fuel of the power sector," and fossil fuels generally would still be "the dominant sources of energy worldwide."

They will also remain the dominant sources in America. The U.S. Energy Information Administration reckons that, based on current government policies, fossil fuels will account for 78 percent of overall U.S. energy use in 2035, compared with 84 percent in 2008. Coal will provide 44 percent of U.S. electricity generation (down from 48 percent in 2008), and renewables will provide 17 percent (up from 9 percent in 2008). To be sure, the extension of certain tax subsidies and the establishment of muscular greenhouse-gas regulations by the Environmental Protection Agency could boost the market share of renewable technologies and further reduce America's dependence on fossil fuels. But even if the U.S. launches an aggressive renewable-energy drive, its reliance on oil and coal will persist well into the future.

Indeed, the promise of renewables has consistently been oversold by the political class. Solar and wind energy both suffer from major structural deficiencies. As Bryce observes, they are "incurably intermittent" and very difficult to store, and have low power density. Because of their low density, solar and wind "require huge swaths of land — which often becomes unusable for other purposes." Smil offers a balanced assessment of wind power: "Conversion of wind's kinetic energy by large turbines can become an important contributor to the overall electricity supply, but, except for relatively small regions, it cannot become the single largest source, even less so the dominant mode of generation."

Compared with solar and wind, nuclear and natural-gas energy boast much higher power density and can deliver far greater capacity. Bryce argues that they are the true "fuels of the future," though he concedes that nuclear plants are extremely costly to build and take a long time to become operational. Therefore, he urges a short-term expansion of natural-gas production and a long-term transition to nuclear. While Smil predicts that "an early and substantial nuclear comeback is unlikely either in North America or in Europe" — partly for economic reasons, and partly because of perennial concerns over plant safety and the disposal of radioactive waste — he affirms that "nuclear generation is the only low-carbon-footprint option that is readily available on a gigawatt-level scale."

Even if previous energy transitions moved at a slow, incremental pace, might we be able to accelerate them in the years ahead? Smil acknowledges that we now "possess incomparably more powerful technical means to effect faster energy transitions than we did a century or a half century ago." But there is a crucial caveat: "We also face an incomparably greater scale-up challenge. While the shares of new energies in the global or the U.S. market remain negligible, the absolute quantities needed to capture a significant portion of the total supply are huge because the scale of the coming global energy transition is of an unprecedented magnitude."

Over the next few decades, he explains, replacing half of all fossil-fuel energies with renewable energies would mean replacing the equivalent of approximately 4.5 billion tons of oil. This

would effectively require “creating *de novo* an industry whose energy output would surpass that of the entire world oil industry that took more than a century to build.” Smil also addresses the ten-year plan laid out by Al Gore: Even if America had the necessary high-voltage transmission interconnections, it would entail the construction of 1,740 gigawatts of new wind- and solar-power capacity — in other words, “1.75 times as much as [America] built during *the past fifty or more years*.”

Our current national energy debate is heavy on passion and hyperbole; it could use a sizable dose of historical perspective and empirical reality. In that sense, Smil and Bryce have done a valuable service. Their new books should be mandatory reading for U.S. policymakers.

– *Duncan Currie is deputy managing editor of* National Review Online.

EDITOR’S NOTE: This article has been amended since its initial posting.