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NONFICTION

A Sensible Climate Change Solution, Borrowed From Sweden

By Richard Rhodes

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A BRIGHT FUTURE

How Some Countries Have Solved Climate Change and the Rest Can Follow

By Joshua S. Goldstein and Staffan A. Qvist

Some years ago, while studying how societies transitioned from one energy source to another over the past 200 years, the Italian physicist Cesare Marchetti and his colleagues discovered a hard truth: It takes almost a century for a new source of primary energy — coal, petroleum, natural gas, nuclear power — to command half the world market. Just to grow to 10 percent from 1 percent takes almost 50 years.

You would expect suppliers to switch quickly to a better (more abundant, cheaper, cleaner) source. But infrastructure has to catch up: In America, natural gas needed long-distance pipelines to go national; electric cars need still-scarce charging stations. People have to adapt: Elizabethan preachers condemned coal as literally the Devil's excrement; some Victorian homeowners comfortable with gaslight thought Edison's light bulbs too bright. Competition from heavily invested older sources has to be overcome, as with fossil fuels today. These and other changes take time.

Today, with global temperatures rising, time is running short. That's the starting point of Joshua Goldstein and Staffan Qvist's smart new study of how we can move away from fossil fuels. A double burden compounds the problem. We have to limit any further increase in greenhouse gas production, as the 2018 Paris Agreement specifies. But this isn't enough.

"Decarbonization," the authors write, "requires both replacing existing fossil fuels and meeting new demand from carbon-free sources." That second challenge has hardly yet been addressed. It must be, especially given the increasing prosperity of the developing regions — China, India, Africa — which the authors correctly say both "want more energy" and "have a moral right to it." As a consequence, worldwide energy consumption 30 years from now is projected to be about 50 percent higher than it is today. If that number sounds exaggerated, think of four billion Asians installing air-conditioning.

For Goldstein (an emeritus professor of international relations) and Qvist (a Swedish engineer), the only possible solution to this double dilemma is a rapid, worldwide expansion of nuclear power. No other source or collection of sources of energy, they argue, is positioned to meet these challenges in time. Without growth in nuclear power, replacing fossil fuels with renewables simply decarbonizes the existing supply. It doesn't deal with the increased demand coming from the developing world.

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One of the countries that have “solved climate change,” as the book’s subtitle has it, is Sweden, Qvist’s homeland. Much as France did before it, Sweden achieved this by expanding its electrical supply with nuclear power rather than fossil fuels. Its concern at the time, in the 1970s, wasn’t global warming but reliability: Further hydropower development was environmentally undesirable, and the oil crises of that decade made petroleum an unpredictable source.

Between 1970 and 1990, Sweden built a dozen nuclear power plants on four sites, eight of which continue to operate today. They supply 40 percent of Sweden’s electricity, equal to its hydropower. Wind and biofuels supply the rest. As a result, electricity in Sweden is cheap, clean and reliable. Serendipitously, the authors point out, “Sweden became the most successful country in history at expanding low-carbon electricity generation and leading the way in addressing climate change.”

“THE MOST IMPORTANT BOOK ABOUT
CLIMATE CHANGE SINCE AN INCONVENIENT TRUTH.”
—from the foreword by STEVEN PINKER

A B R I G H T F U T U R E



How Some Countries
Have *Solved Climate Change*
and the Rest Can Follow

JOSHUA S. GOLDSTEIN
STAFFAN A. QVIST

Goldstein and Qvist contrast Sweden's experience with Germany's. That country decided to switch to renewables, mostly wind and solar, while eliminating nuclear power. By doubling renewables while cutting nuclear, "it just substituted one carbon-free source for another, and CO₂ emissions did not really decrease at all." Today, 40 percent of Germany's energy comes from dirty brown coal; six of Europe's 10 most polluting power plants are German.

After this initial view of two contrasting European programs, "A Bright Future" is largely devoted to debunking the many attacks nuclear power has weathered over the years. "The antinuclear movement has progressed through reasons to oppose nuclear power," the authors write, "one after another." It was too dangerous. Then it would lead to weapons proliferation. Then it was uneconomical, an argument still made, one the authors debunk when it comes to countries like Sweden and South Korea that haven't experienced the strangulating effect of heavy government regulation and antinuclear litigation.

Then it was unnecessary because it was argued that renewables could do the job. "But in every case where nuclear power was shut down, renewables have not filled the gap and CO₂ emissions have gone up, whereas in places such as Ontario that expanded nuclear power, emissions went down."

A final claim, that nuclear power is politically infeasible, "is just a self-fulfilling prophecy, and we should not be so quick to write off the most practical solution for humanity's most serious problem. ... Politics have a way of catching up with necessity."

I happen to be in sympathy with these authors' view that nuclear power must be a major part of the worldwide campaign to limit and reverse global warming. Their discussion omits an important historical component, however, one that has subverted logical argument.

Historically, the antinuclear movement didn't emerge from environmental concerns, which is why arguments for nuclear's environmental advantages often fall on deaf ears. The movement originated out of a panic among European and American intellectuals in the 1950s and '60s about overpopulation, expressed most luridly in such popular books as the entomologist Paul Ehrlich's 1969 "The Population Bomb." They believed more power plants would exacerbate human density and urban growth. But nuclear power champions like Alvin Weinberg, the longtime director of America's Oak Ridge National Laboratory, countered that nuclear could supply energy enough to forestall the social collapse the neo-Malthusians feared. In the end, the green revolution and the demographic transition that followed third-world economic development met food needs and limited population growth, now predicted to level off at 10 billion by 2100. But by then nuclear power was anathema to the Democratic Party and American and European Greens, a tragic misalignment of liberal values.

The tide may be turning. Politics may catch up with necessity. But the "Green New Deal" recently championed in Congress includes even existing nuclear power production only grudgingly, and promotes the notion that "A Bright Future" disputes — that 100 percent renewables can save the

day. Nuclear has stalled in America and in Western Europe, largely for political reasons, partly because of the boom in fracked natural gas. (Natural gas releases fully half as much CO₂ as coal. But except for the manufacture of its construction materials and fuel, nuclear releases none.)

Momentum has shifted to China and Russia, which are building advanced reactors for domestic use as well as for sale in Asia, Europe and the Middle East. Both, however, are increasing nuclear power production at home in order to sell their fossil fuels abroad, with little net gain against global warming. Whether all these oppositions will converge in time to spare us from global disaster remains to be seen.

Their eyes on Sweden, Goldstein and Qvist are hopeful. I would like to be, but Cesare Marchetti's evidence of the inertia inherent in energy transitions haunts me. As a harbinger of what's coming if we don't hurry, the Iranian city of Bandar Mahshahr in August 2015 suffered a heat index — combining temperature and humidity — of 165 degrees Fahrenheit. That's the proper internal temperature of a cooked chicken.

Richard Rhodes is the author, most recently, of "Energy: A Human History."

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