



Carbon-Constrained Energy Policy

James J. Hoecker

One year from now, irrespective of the turn of intervening political events, a new administration in Washington will begin devising a new energy strategy for the nation. If we take at face value the legislative records and campaign oratory of Senators McCain, Clinton, Obama, and their previous cocandidates for the White House, that policy formulation will take shape in clear contemplation of a world where emissions of carbon will be disfavored and increasingly costly.

Since World War II, US energy policy (to the extent one can say there was a systematically formulated policy) has been primarily based on meeting the needs of a growing economy for more electricity, gasoline, and related fuel stocks and infrastructure without regard to the external costs. At bottom, we have assumed carbon was free, to be emitted freely, and that economic growth and increased energy usage simply created wealth. Regulators and other policymakers worked to ensure adequate supplies of basic fuels, to keep consumer prices “least cost,” and to resolve distributional issues associated with access to monopoly facilities. Likewise, legislators opined most loudly about the need for energy independence when internal market deficiencies or external forces have threatened to interrupt the supply chain or cause economic dislocation. Professor Richard Pierce is justifiably dismissive of this canard: “I know of no expert on

energy policy who thinks that the pursuit of energy independence makes any more sense than pursuit of automobile independence, tomato independence, or underwear independence.”

Although energy policy must unquestionably address traditional energy supply objectives, that policy is now poised to take on no less an objective than saving the planet. In an effort to assign a price to carbon so as to stabilize and eventually reduce the emission of carbon dioxide and other greenhouse gases (GHGs) and their effects on global warming, the coming legislative and regulatory (and hopefully diplomatic) effort portends a reshuffling of our national energy priorities. Only time will tell whether financial resources (including the consumer’s pocketbook) and political determination will be available in sufficient quantity to address a problem of this dimension or whether the prognostications of science will be sustained.

In any event, the path to a leaner, cleaner energy economy must in short order produce important changes in consumer behavior, dramatic improvements in technology, and resolution of a good deal of public policy trial and error in order to achieve results. The US energy independence that emerges from the new energy economy will not be (at least entirely) based just on more thorough exploitation of North American fossil resources. It will instead involve squeezing the most Btu’s and kWh’s out of Mother Nature with the fewest long-term ecological consequences as well as the fewest foreign entanglements.

The climate-change issue has passed the tipping point. Cast about as you might for alternative hypotheses or the anti-Gore, the cultural, political, and scientific momentum for coming to grips with

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global warming is evident. Most GHGs derive from energy consumption, even though CO₂ emissions occur in nature. Forty percent of GHGs in the United States come from electric generation, and 80 percent of that amount is from burning coal. In the United States, coal-based generation accounts for over 50 percent of our power supply, and, in the absence of carbon regulation, coal is still king.

If, as expected, the 111th Congress creates a mechanism that assigns a price to CO₂ and its equivalents so as to price such emissions out of existence in the long term, it will do so by establishing a cap on emissions and a method of trading “allowances”—in other words, defined rights to emit that become more scarce over time. The alternative approach to achieving the same ends is a carbon tax, which is thought to be vastly less complicated in implementation and to produce better price signals, less price volatility, and less potential for manipulation. A tax is widely considered a political nonstarter, however, because its economic impacts are more readily apparent.

There will be another half to any such plan. As we work to reduce emissions, new resources must be employed to preserve our electric standard of living and avoid a maldistribution of the benefits of the new energy economy. New electric generation, storage, and end-use technologies are vital to the clean energy revolution. Nevertheless, the patent inadequacy of our investment in advanced energy technologies is demonstrable—more is spent in Iraq each day than is spent nationally on developing energy-saving technologies each year.

The recognition that carbon has an implicit cost and that the geophysical and public health toll it takes must now be made explicit to companies that produce and those who consume energy, especially electricity and transportation fuels, will lead to winners and losers among resources in the domestic fuel mix. I know of no one who is not an advocate of fuel diversity or who credibly believes that a “silver bullet” exists that answers the energy challenge.

MOST FREQUENTLY CONSIDERED SOLUTIONS

A reordering of our investment priorities is clearly called for. What are they likely to look like?

Energy Efficiency

Saving energy by increasing the efficiency of appliances, new and existing buildings (the green

building movement), transportation vehicles (corporate average fuel economy, or CAFE, standards), and industrial process improvements and upgrades is what experts call the easiest and often the least-expensive option to exploit. Strong policy support and financial stimuli have not always been available, but Congress devoted substantial ink in its 2005 and 2007 enactments to the goal of capturing energy savings from efficiency. So-called smart grid technology that allows consumers to monitor and regulate electricity usage, distributed sources of generation such as solar roof installations, and plug-in hybrid automobile innovation could pay enormous potential dividends.

However, whether efficiency will in fact become a major energy resource or simply a contribution to curbing the anticipated increases in energy demand will depend on changes in consumption patterns and the rate of technological innovation and deployment.

Renewable Energy

Most forward-thinking climate legislation provides for dramatic increases in the use of wind, solar, biomass, geothermal, and other forms of renewable electric generation, as well as development of biofuel technology. Some 23 states have adopted renewable portfolio standards (RPSs), which require their domestic utilities to procure a large percentage of their energy from such resources by a certain date.

Congress is likely to follow that leadership, just as it is likely to take many lessons from California and northeastern states with respect to setting up GHG regulatory schemes. The current Congress nevertheless failed to adopt a national RPS and instead moved ahead with CAFE. However, when (not if) the next Congress returns to alternative energy issues, it will need to decide how to overcome the distance between our considerable domestic wind resources, not to mention the remote location of clean coal generation located near carbon sequestration sites and away from and most electricity consumers. In other words, the aging condition and other limitations of the transmission grid stand as an obstacle between renewable resources and a more substantial contribution to the energy mix.

Coal

Our dependence on coal poses a national dilemma. Whenever the climate is discussed, coal-

based generation is the principal target. Absent concerted action to curb them, carbon emissions from coal generation are expected to increase as much as 35 percent by 2030. Consequently, the *New York Times* recently noted that “an increasingly vocal, potent, and widespread anti-coal movement is developing” nationally. California has effectively banned new imports of power derived from coal. Recent cancellations of several planned coal generation projects and the abandonment by the Department of Energy of funding for FutureGen, a major cutting-edge clean coal station planned for development in Illinois, augurs poorly for that sector. Additionally, our ability to permanently sequester large amounts of CO₂ is still subject to question.

Nevertheless, the North American Electric Reliability Council counsels that the United States cannot afford to have coal generation become an endangered species. With significantly less of it, the short-term outlook for reliable electric service and reasonable prices is also questionable. The dilemma of coal also points out the complications of reducing carbon intensity in the power sector, where capital intensity, long lead times for construction, regulatory bottlenecks, and shortages of materials, equipment, and engineering skills are already challenges facing new infrastructure.

Natural Gas

In the last half-decade, the high price of natural gas took the bloom off the massive investment in gas turbines that occurred in the 1990s. While highly efficient, more easily permitted, covering a small footprint, having a short construction time, and emitting half the GHG per Btu of output as coal, gas-fired generation plants rely on a dwindling fuel resource, the price of which has relegated natural gas power generation to peaking purposes.

However, climate change has improved the fortunes of natural gas, which is now touted as the bridge fuel that will get the United States to a point, perhaps two or three decades down the road, where new cleaner technologies can play as large a role in the energy economy as fossil fuels play today. This is an expensive forecast.

Nuclear Energy

The virtues of emissions-free nuclear power generation are widely understood as an attractive way to address climate change. The existing fleet

now performs at a very high load factor and with increasing reliability.

Notwithstanding problems with perceptions of safety, the hazards of spent fuel storage, and capital costs per megawatt-hour higher than other generation, nuclear generation is likely to increase its market share of electrical production to some degree. New reactor applications are being formulated, but the most optimistic predictions are for approved new capacity in ten to fifteen years at best. In the meantime, our fleet of reactors is aging. Because the last generation of nuclear plants were plagued by cost overruns, long construction cycles, and strong local opposition, nothing is clear about this sector's future.

LESSONS TO LEARN

Energy policy is now climate-change policy. This means more extensive regulation of the planning, construction, and use of energy resources, even though wholesale power markets and interstate natural gas markets will remain increasingly competitive.

Markets may in fact accelerate solutions to global warming. Green energy has been called “the greatest investment opportunity since the Internet.” We must nevertheless recognize the realities associated with this departure from sheer supply-and-demand energy policy. First, there is little doubt in Washington that Congress will act on this critical issue in the next two or three years. The Lieberman-Warner cap-and-trade bill, already voted out of the Senate Committee on Environment and Public Works, is the odds-on favorite to pass, but there is a long way to go. Second, a national RPS is also a distinct probability. The target set for renewable energy projects will nevertheless raise new challenges to the infrastructure. Third, we must tackle this challenge while maintaining a growing and energy-intensive domestic economy. Finally, curbing global warming is likely to be expensive—perhaps as much as an additional \$2,000 a year per family by 2030.

It is always easier to say that price signals will produce less profligate energy consumption and encourage new technologies than it is to face the music and make the hard decisions in the interim before those fruits are realized. However, the high costs of a carbon constrained energy supply may be a small price to pay for saving the planet and making our economy more secure. An entire new generation of state and federal leaders will have a chance to cut their teeth on this proposition. 