

Facts vs Ideas in the World of Energy

Michael J. Economides

Few issues in modern history have generated more ideology-driven misinformation than energy. While most would agree that energy is crucial to the world economy, very little public discourse seems based on the intractability of certain facts.

The problem: the huge gap between the theoretical and the practical, the latter affected by logistical and economic considerations. For certain people, the achievement of their desired course of action, based on their preferred world-view, is often confronted with abysmally small odds. It should not be acceptable for governments and non-governmental groups to avoid disclosing the required path and costs for achieving their goals. Many imply that the government and/or taxes should provide the funds, but even then the magnitude of such costs is rarely revealed.

Much of the rhetoric involves issues such as conservation, the environment, and “energy independence.” Exacerbating the situation is the recent clamor about anthropogenic global warming, and the expressed desire to either reduce carbon dioxide emissions (by using non-fossil fuels) or to sequester them.

Let’s examine the big picture of world energy supplies between 2004 (the latest year for which full information is available) and the forecast for 2030. According to the Energy Information Administration:

- In 2004, world energy demand was 446 quads (quadrillion British thermal units). By 2030, demand is expected to be 721.6 quads, a 62-percent increase.
- In 2004, fossil fuel demand was (in barrels of oil equivalent): oil, 30.1 billion; natural gas, 18.5 billion; and coal, 20.4 billion.
- In 2004, those three sources accounted for 86 percent of total global energy use.
- By 2030, expected fossil fuel use will be (again, in barrels of oil equivalent): oil, 42.7 billion (a 42-percent increase over 2004); natural gas, 33.9 billion (an 84-percent increase); and coal, 43.9 billion (a 71-percent increase).

- By 2030, fossil fuels will account for a business-as-usual 86.5 percent of the total energy mix. That's despite all the rhetoric about alternatives and despite the fact that the total energy demand will increase by 62 percent.

Wind and solar energies, the two most touted non-fossil sources, will not amount to more than one percent, a fraction of total energy demand. The reason: wind-generated electricity is at least twice the break-even cost of natural gas, and even larger than that for coal. Solar, even with speculated and currently non-existent technology, is at least ten times as costly.

The sequestration of carbon dioxide is even more problematic. According to EIA projections, the oil and gas used for transportation and power generation, plus the amount for coal combustion, will result in an increase in world carbon dioxide emissions, from 25.55 billion metric tons in 2004, to 43.68 billion metric tons in 2030, a 71-percent increase.

If only the incremental carbon dioxide above that emitted in 2004 is sequestered, the operating costs would be \$180 billion to \$540 billion per year (at \$10 to \$30 per ton, a figure from an August 2003 report by the MIT Laboratory of Energy and the Environment).

If the sequestered carbon dioxide is injected at what is considered a very good rate per well, 10,000 tons per year (a figure from a 2004 report by the National Energy Technology Laboratory), then that would require 1.8 million new wells. That's about the same number of wells now in production worldwide. At an average drilling cost of \$2 million per well, those new wells will cost \$3.6 trillion. The ancillary infrastructure for those wells could push the cost to \$7.2 trillion – about 60 times the current annual budget for well construction in the industry, estimated at \$120 billion.

This is why the anthropogenic global warming issue is so critical. For a country such as the United States, “energy independence” would mean reducing the use of foreign oil and natural gas. It would mean electrifying transportation (at a huge cost in new infrastructure), and using a lot more nuclear and a lot more coal, with far increased emissions to be sequestered.

The path from idea to reality is lined with staggering costs.

Economides is a professor at the Cullen College of Engineering, University of Houston and Editor-in-Chief of the Energy Tribune