



EDITORIAL

How to Cook a Frog

WE HAVE ALWAYS BELIEVED THAT ENGINEERS seek the truth because they have been taught since their college years that this is how they can best serve the public. Concerning the environment, the emerging truth is that fluorocarbons and gases such as carbon dioxide, methane, and nitrous oxide from engineered-product emissions and processes have affected the stratospheric ozone layer and seem to be a—if not *the*—major contributor to the documented rise in world temperatures during recent decades.

We have personally observed on various continents the retreating glaciers in the Rocky Mountains of Canada and Colorado, on Cotopaxi and Chimborazo in Ecuador, and on Kilimanjaro in Tanzania. Elsewhere, scientists are carefully quantifying the melting ice and permafrost covering Antarctica, the Arctic, and Greenland that is already affecting the Inuit. Although some engineers are repulsed by the political posturing about the situation, the global scientific community, less a few diehards, has reached a consensus of “*very high confidence* that the globally averaged net effect of human activities since 1750 has been one of warming.”

As oceans continue to rise, the real challenge may be the survival of a few billion of our fellow world residents who live near seashores and who struggle for a dry place to sleep each night and a little food each day.

It might be more to the liking of conservative engineers if there were a clear *engineering consensus* and a *corporate consensus* that greenhouse-gas emissions must be reduced. That is already happening through the U.S. Climate Action Partnership, which includes familiar firms like Alcoa, DuPont, and GE. Furthermore, in 2001, the U.S. National Research Council endorsed the theory that the primary cause of recent climate changes is human activities, with natural variability being only a comparatively minor factor.

In 2005, the U.S. National Academy of Science agreed with the national science academies of the other G8 nations, Brazil, China, and India that the threat of climate change is clear and increasing. They also agreed that the engineering community needs to mobilize, demonstrate leadership, and develop innovative solutions. That sounds like a call to concerned engineers who are risk takers and are ready, willing, and able to demonstrate leadership on this issue.

If you are skeptical or unconvinced, we urge you to seek the truth, find it, and then convince the rest of us.

There are many opportunities for engineers to mitigate climate-change issues—including some contained in this very issue. Trudy E. Bell’s featured article beginning on page 12 addresses carbon-abatement solutions that require serious engineering. There are also great opportunities for hybrid vehicles—especially plug-in hybrids (see “Using Plug-in Hybrid Vehicles to Drastically Reduce Petroleum-Based Fuel Consumption and Emissions,” *THE BENT*, Spring 2005, available at www.tbp.org).

Other opportunities appear obvious, but would require political, personal, and national willingness. Nuclear-power plants produce no carbon emissions while currently supplying 17 percent of the electric power in the U.S. Meanwhile, France produces 78 percent of its power from 56 nuclear plants using American pressurized-water reactors designed by Westinghouse. Independent French citizens are also managing to first recycle and then to stock their nuclear waste at a handful of research laboratories. (See “Will Changing Times Require a Second Look at Nuclear Power?,” *THE BENT*, Spring 2006.) The U.S. propensity to burn natural gas and fuel oil to produce electricity at inefficient power plants seems extravagantly wasteful, when these hydrocarbons could otherwise be used much more efficiently to heat individual homes.

It appears that the combination of scientifically sound conversion of electrical power-generating plants away from fossil fuels to nuclear-power monitored by concerned citizens, careful containment and protection of the dangerous waste products of nuclear power, a major transportation switch to plug-in electric vehicles, and vastly improving the efficiency of transportation and power generation could reduce carbon emissions and stabilize the concentration of carbon dioxide in the atmosphere. You readers must have even better ideas. The challenges are great, the opportunities seem endless, and the time for great engineering is now!

By the way, how do you cook a live frog? In a pot of cool water, warming it one degree at a time so the frog doesn’t notice. Meanwhile, the Columbia Glacier continues to retreat, one day at a time. If we do not choose to pay attention, we ourselves might not notice.

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