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Renewables: The Final Frontier

Why historian Vaclav Smil thinks there are no easy solutions to our energy problems

Randy Udall | OPINION | Jun 26, 2009 | *From the print edition*

Back in the 1960s, when NBC was first developing the Star Trek series, a producer fretted that "Spock, the guy with the pointed ears, would scare the crap out of every kid in America." Spock, played by Leonard Nimoy, was an aloof humanoid from the planet Vulcan, the chief science officer aboard the U.S.S. Enterprise.

Every seven years, Vulcans experience an overpowering mating urge (think Bill Clinton). The rest of the time they forswear all human sentiment in favor of pure, bloodless rationality. Vulcans are what we humans would call hard-hearted. They don't believe in fairy tales and pixie dust, that Dorothy can click her heels and go home again.

When it comes to energy, the scientist who best exemplifies Vulcan logic is Vaclav Smil. The world's foremost energy historian, he began a recent essay with this blunt statement: "Our transition away from fossil fuels will take decades -- if it happens at all."

The author of dozens of books, Smil is a brainy polymath. A distinguished professor at the University of Manitoba, he finds most American energy discussions naive, simplistic, cliched, innumerate, and, ultimately, maddening. He does not believe that our cars will soon be powered by fuel cells or pyrolyzed turkey guts, that clean coal can solve the climate problem, or that venture capital will discover an energy analogue to the cellular phone.

Al Gore's proposal to re-power America with renewable energy in a decade is "delusional," Smil writes. "Gore has succumbed to Moore's curse, the belief that performance improvement in energy systems can model that of computer processing power."

Energy systems are not virtual, they are heavy metal -- copper and steel and megatons of concrete. Their operating systems don't change; 60 hertz never goes obsolete. Upgrading power plants is generally unnecessary, except where pollution controls are concerned, and replacing them is expensive, which is why there are hundreds of 40-year-old coal plants. In short, you can throw your laptop out every few years and order a new one, but Hoover Dam will still be plugging the Colorado River centuries from now.

Given climate realities, we desperately need a rapid energy transformation, but wishing can't make it so. As a Vulcan might say, what is desirable is not necessarily probable. Change takes time. James Watt's steam engine revolutionized the mining and transportation of coal, but it still took a century for coal to displace wood. Solar photovoltaic cells were invented 55 years ago, and yet today in the U.S. they produce less electricity than Glen Canyon Dam. Eight years after its introduction, the ingenious Prius has yet to become 1 percent of the automotive fleet.

Like it or not, Smil believes we are captive to past investments, to the multi-trillion-dollar energy networks we have already created, and, above all, to the scale of our energy appetites. Only the last of those factors seems amenable to rapid change, and thus his advice to President Obama: "Explain to the nation that Americans, who consume twice as much energy per capita as rich Europeans (and have nothing to show for it), should try to live within some sensible limits, which means using less fuel not more."

In his books, Smil explains how prehistoric cultures harvested the energy from sunlight, plants and firewood. In the Southwest, energy shortages were generally caused by drought and expressed as famine. When the Anasazi ran short of protein, they began eating each other: "man corn." We have much larger appetites

today. Melanie Moses, a biologist at the University of New Mexico, calculates that a typical North American consumes energy at a rate sufficient to sustain a 66,000-pound primate.

That's a very big ape, and Smil is not the only one asking whether it's realistic to meet his gargantuan appetite with wind and solar, dilute flows of power that today provide less than 1 percent of U.S. energy. Unlike oil shale -- the thermodynamically doomed effort to turn chicken manure into chicken salad -- wind, solar and geothermal have high energy returns and a bright future. Nonetheless, it will take many doublings before they will meet a significant percentage of our needs.

Smil can envision running a lightly populated state such as Montana or Wyoming on renewables once its fossil fuels run out. Urban areas present a more difficult problem. By abusing a calculator and common sense, one can sketch out a renewable blueprint for a city like Phoenix, but after awhile the numbers begin to seem like so much Hohokam. Phoenix long ago exceeded its carrying capacity and is likely to remain dependent on imported oil, gas and nuclear power, for as long as such things last.

In his personal life, Smil is an avid conservationist, proud of his super-efficient house and frugal Honda. In his recent work, there is a hint of frustration with what he sees as the cannibalization of our host planet. Contemplating our journey to the future, where no man has gone before, he writes, "I am always trying to imagine what would be the verdict of a sapient extraterrestrial informed about the behavior of affluent Earthlings."

Unless saving energy quickly becomes the nation's focus, we already have the answer: "Beam me up, Scotty, there's no intelligent life down here."

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