LETTERS

Wind Generators and the Oil Reserve

The U.S. national program to store 10^9 barrels (bbl) of imported oil underground by 1985 is progressing. A different "reserve," which would be, in a certain sense, equivalent can be obtained at the same cost by using large wind generators. In 10 years wind generators could save a total of more than 10^9 bbl of oil that otherwise would be burned to make electricity. If oil were imported at the same rate as it would be in the absence of a wind generator program, domestic oil fields would, after 10 years, contain 10^9 bbl more petroleum than they otherwise would have. Moreover, the wind generators, which have an expected life much greater than 10 years, would be delivering energy at a rate equivalent to 175×10^6 bbl of oil per year.

This calculation is based on the availability of large wind generators at an installed cost of $500 per kilowatt (*1*). They would operate at an average plant capacity factor of 0.30 (*2*). It is assumed that construction of the underground storage facility to be used to store the oil will cost, when completed, $\$3.5 \times 10^9$ (*3*). This would be filled with crude imported petroleum costing $15 per barrel or $\$15 \times 10^9$ for the entire inventory (*4*). To simplify the calculation it is assumed that the construction would be completed before any oil were purchased for storage, and that all 10^9 bbl would then be purchased and stored at one time, at the beginning of year 1.

The alternative to constructing the oil storage facility would be to buy wind generators. At the beginning of year 1 the sum of $\$3.5 \times 10^9$ (the construction cost of the storage facility) would be available to buy 700 megawatts of wind generator capacity. These would operate for 1 year, producing 18.4×10^6 megawatt-hours. At the end of year 1 the stock of wind machines would be augmented by an amount corresponding to the interest (at 10 percent) on the full petroleum inventory for 1 year. Thus $\$15 \times 10^8$ would become available. At the end of the second year another $\$15 \times 10^8$ would become available, and so on. The wind generators, grid-connected, would save oil in power stations at an assumed average heat rate of 10,000 Btu's per kilowatt-hour or 554 kilowatt-hours of wind electricity would save 1 bbl of oil. At the end of 10 years the wind capacity in place would total 37,000 megawatts, the annual oil savings would be 175×10^6 bbl/year, and the cumulative oil savings would be 1.15×10^9 bbl.

The wind generators in place at the end of 10 years could be expected to go on producing for several more decades, at least, although they would already have been "paid for." More wind capacity could be added every year, using the money that would have been spent to finance the oil reserve.

The above is, of course, drastically simplified. However, the assumed and calculated numbers are reasonable. Wind has substantial environmental advantages as compared to oil. Perhaps we should be studying the replacement of at least a part of the oil reserve with wind generation capacity.

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References and Notes

1. Prices of large wind generators are not well defined at the present time; much depends on the scale of production and existing machines are all prototypes. Several studies sponsored by the Department of Energy have developed costs, based on present designs, in the $500 per kilowatt range for rated wind speeds consistent with a plant capacity factor of 0.30.
2. Plant capacity factor is the factor by which the number of hours per year and the kilowatt rating of the generator must be multiplied to yield the number of kilowatt-hours generated in a year.
3. According to press reports (*Wall Street Journal*, 11 January 1979, p. 22) the cost of constructing facilities to store the oil seems likely to exceed $3.50 per barrel.
4. If one considers that most of the crude petroleum is likely to be purchased at some future, higher price, the number $15 per barrel is conservative.

Biological "Strategies"

The term "strategy" has become common currency among biologists of various persuasions from the molecular to the population level. We read of biochemical strategies exhibited by marine invertebrates and reproductive strategies of birds, not to speak of osmotic strategies in desert plants!

The term "strategy" implies that a rational choice has been made and has its origin in ancient military parlance. While I will concede that some higher mammals, such as a pride of hunting lions, may employ a decision-making process which borders on strategy, can you imagine a group of barnacles convening a meeting to decide on which set of isoenzymes to use so that their metabolism could become temperature-independent? The term is therefore semantically quite incorrect but, far more important, it is philosophically grossly misleading, as it implies that a process has occurred which is the very antithesis of the evolutionary concept of chance and necessity.

Let us therefore agree on the strategy to expunge this nasty little word from our biological vocabulary and, while we are about it, let us also exclude its kid brother or congener the "trade-off principle," which is philosophically equally misleading.

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Carcinogen Report to the Public?

Luther J. Carter's article (News and Comment, 9 Feb., p. 525) on the amendment to the National Cancer Act requiring the Department of Health, Education, and Welfare (HEW) to issue a report each year on carcinogens suggests to me that, in addition to preparing this type of report, HEW should make a presentation to the general public concerning the dangers of various substances. This presentation could be sent to newspapers throughout this country, informing readers about what substances might increase their chances of contracting cancer. The report could also inform the public as to where these substances occur, that is, in gasoline, solvents, adhesives, paint, and so forth. With this knowledge the public would not only be aware of the dangerous substances but could carry out a surveillance action of its own, informing the proper regulatory agency of any possible overexposure to toxic substances. The reports should be in simple, nontechnical language; the use of brand names of particular products would be best, as it would put pressure on various companies to "clean up their act," so to speak.

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The Piltdown Hoax: Piltdown 2

The theory that Piltdown man was a joke, at least partially designed by W. J. Sollas (News and Comment, 8 Dec. 1978, p. 1062), does not fit the facts. Piltdown 1 and "associated fossils" were found over a number of years either by Charles Dawson or someone who was with Dawson at the time of the discoveries. The motivation appears to have been to prove that the eoliths were human-made by providing the maker, stone tools, and associated fossils for determining the age. The evidence pointing to Dawson has been carefully presented by