## LETTERS

### Energy Options

A. David Rossin's letter (7 Aug., p. 604) faults *Science* reporter Colin Norman for giving credence to my new book's findings that the costs of nuclear power plants are rising much faster than the costs of coal-fired plants (*1*). Rossin's criticisms of Norman's article and my book are misconstrued.

Rossin objects to my projection of a 75 percent differential between nuclear and coal capital costs by the late 1980's. He charges me with "select[ing] a proxy variable that projects the answer [I] want" to ensure that "the nuclear numbers project upward faster than those for coal." Yet the nuclear-coal capital cost differential has been widening rapidly, from just 5 percent in the early 1970's to more than 50 percent in the late 1970's (90 percent without coal-plant scrubbers). Extrapolating these rates of real cost increase would yield a nuclear-coal cost differential in the late 1980's of 155 percent—more than twice the differential I projected.

The proxy variable in my book—installed capacity of the nuclear or coal generating sectors—was chosen not because it paints a dark picture for nuclear power prospects, but because it appears to reflect more accurately than any other available quantitative measure the underlying forces that have driven coal and nuclear capital costs upward. As documented at great length in my book and elsewhere (*2*), expansion of nuclear and coal generation has led to increased regulatory stringency aimed at limiting the consequent health and accident risks to the public. Additionally, increased operating experience associated with growth in the nuclear sector has led to the detection of unanticipated safety and operational defects—correction of which has added further to nuclear costs. As measured by safety directives of the Nuclear Regulatory Commission, these defects are continuing to be discovered at near-record rates—assuring continued upward pressure on nuclear costs.

Rossin also asserts that I erred in my 1976 study (*3*) when I concluded that the new generation of large reactors would operate less reliably than earlier, smaller reactors. He provides no evidence or citation to support his assertion, merely stating that "a look at the data" shows my conclusion to be invalid. In fact, as Norman's article noted, the data show just the opposite. The cumulative capacity factor for reactors over 800 megawatts was 54 percent through mid-1980, matching my 55 percent projection, and falling far short of the industry's 70 to 80 percent target. Also, as I had predicted, reactors under 800 megawatts have performed significantly better, averaging 66 percent capacity factors.

Nor does Rossin's reference to his own utility's early low-cost reactors (installed from 1970 to 1974) bear upon costs of current or future plants. Rossin's argument may appear conservative when he doubles the early reactors' carrying charges and compares these to current costs for coal-generated electricity. But this doubling does not even account for the effects of overall inflation, let alone the increase in real reactor costs due to safety requirements and design changes. The capital costs cited by Rossin (averaging approximately $200 per kilowatt of capacity) would need to be multiplied by about five to account for both factors to date. Coal plant costs have risen as well, of course, but only by half as much—the critical historical finding in my book that Rossin ignores.

Finally, although real cost escalation in nuclear power increasingly bedevils ratepayers, utility commissioners, and investors, Rossin says only, "We will need more nuclear plants and more coal plants" and "Whatever we build will be very expensive." Yet many in the utility community have at least recognized the possibility that conservation, renewables, cogeneration, coal plants, and reactors may be following separate cost curves.

I endeavored in my book to measure empirical costs and, on that basis, to anticipate future costs, for the two last-mentioned alternatives. With or without Rossin's criticism, the painstaking, necessary work of charting actual costs of our energy options will continue.

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#### References

1. C. Komanoff, *Power Plant Cost Escalation* (Komanoff Energy Associates, New York, 1981).
2. ———, *Nucl. Saf.* **22**, 435 (1981).
3. ———, *Power Plant Performance* (Council on Economic Priorities, New York, 1976).

### Bites and Stings

David L. Vesely (Reports, 17 July, p. 359) citing Wallace (*1*), states that "Each year in the United States, nearly twice as many people die from hymenopterous insect bites (including bees, wasps, hornets, and yellow jackets) as from poisonous snake bites."

The *biting* behavior of hymenopterous insects is of little concern to humans. In fact, it is the *stinging* behavior of these insects which accounts for the interesting comparative statement quoted above.

The bites of lice, mosquitoes, bedbugs, and fleas cause considerable distress to humans. However, the scientific community should certainly recognize that the "business end" of bees, wasps, hornets, and yellow jackets is the abdomen, which is the site of the sting apparatus.

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#### References

1. F. J. Wallace, in *Harrison's Principles of Internal Medicine*, K. J. Isselbacher *et al.*, Eds. (McGraw-Hill, New York, ed. 9, 1980), vol. 1, p. 925.

### Wrong Huxley

In her editorial "In defense of elitism" (28 Aug., p. 955), Nancie L. Gonzalez quotes Huxley to take issue with him, and in so doing proves Huxley's point. It was T. H. Huxley, not Aldous, who in his essay "Technical education" (1877) asserted that "The great end of life is not knowledge but action." Either Huxley would probably agree that the action of publishing her ideas in a prestigious forum is worth more than the knowledge associated with a correct attribution.

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I compliment Dietz on his scholarship and want to reassure him that I do know the difference between Aldous and Thomas, and have even read Julian. My original draft, an address to the Honors Convocation at the University of Maryland, was correct; but somewhere in the many retypings necessary in the cut to 600 words, Thomas got changed to Aldous, and my eye never caught it. Mea culpa.

I presume the same thing happened to Dietz when his word processor inadvertently misspelled my name in his original letter to *Science*. I'm sure we both agree that accuracy is important in scholarship.

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