

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of mi-nority or conflicting points of view, rather than by pub-lishing only material on which a consensus has been reached. Accordingly, all articles published in *Science* – including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

1979: E. PETER GEIDUSCHEK, WARD GOODENOUGH, N. BRUCE HANNAY, MARTIN J. KLEIN, FRANKLIN A. LONG, NEAL E. MILLER, JEFFREY J. WINE 1980: RICHARD E. BALZHISER, WALLACE S. BROECK-ER, CLEMENT L. MARKERT, FRANK W. PUTNAM, BRY-ANT W. ROSSITER, VERA C. RUBIN, MAXINE F. SINGER, DUIL F. W.CCONER F. KADI WIL INPROCE

PAUL E. WAGGONER, F. KARL WILLENBROCK

Publisher

WILLIAM D. CAREY Editor

PHILIP H. ABELSON

Editorial Staff

Managing Editor ROBERT V. ORMES Assistant Managing Editor JOHN E. RINGLE

Business Manager Hans Nussbaum **Production Editor** ELLEN E. MURPHY

News Editor: BARBARA J. CULLITON News and Comment: WILLIAM J. BROAD, LUTHER J. CARTER, CONSTANCE HOLDEN, ELIOT MARSHALL, DEBORAH SHAPLEY, R. JEFFREY SMITH, NICHOLAS WADE, JOHN WALSH. Editorial Assistant, SCHERRAINE Маск

Research News: BEVERLY KARPLUS HARTLINE. RESERVENT REVEALS REVEALS RARFLOS HARLING, FREDERICK F. HARTLINE, RICHARD A. KERR, GINA BARI KOLATA, JEAN L. MARX, THOMAS H. MAUGH II, ARTHUR L. ROBINSON. *Editorial Assistant*, FANNIE GROOM

Consulting Editor: Allen L. Hammond Associate Editors: Eleanore Butz, Mary Dorf-man, Sylvia Eberhart, Judith Gottlieb, Ruth

KULSTAD Assistant Editors: CAITILIN GORDON, LOIS SCHMITT,

DIANE TURKIN Book Reviews: KATHERINE LIVINGSTON, Editor;

BOOK REVIEWS: NATHERINE LIVINGSTON, Editor; LINDA HEISERMAN, JANET KEGG Letters: CHRISTINE KARLIK Copy Editor: Isabella Bouldin Production: NANCY HARTNAGEL, JOHN BAKER; YA LI SWIGART, HOLLY BISHOP, ELEANOR WARNER; JEAN

ROCKWOOD, LEAH RYAN, SHARON RYAN Covers, Reprints, and Permissions: GRAYCE FINGER, Editor; CORRINE HARRIS, MARGARET LLOYD

Guide to Scientific Instruments: RICHARD SOMMER Assistant to the Editors: RICHARD SEMIKLOSE

Assistant to the Editors: RICHARD SEMIKLOSE Membership Recruitment: GWENDOLYN HUDDLE Member and Subscription Records: ANN RAGLAND EDITORIAL CORRESPONDENCE: 1515 Massachu-setts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Per-missione. 467, 4621. Becograd. Name. News and comment, 407-4430; Reprints and Per-missions, 467-4433; Research News, 467-4321. Cable: Advancesci, Washington. For "Instructions for Contrib-utors," write the editorial office or see page xi, *Science*, 29 September 1978. BUSINESS CORRESPONDENCE: Area Code 202.

Business Office, 467-4411; Circulation, 467-4417

Advertising Representatives

Director: EARL J. SCHERAGO Production Manager: MARGARET STERLING Advertising Sales Manager: RICHARD L. CHAF Marketing Manager: HERBERT L. BURKLUND

. CHARLES

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHI-CAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Mich-igan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581) ADVERTISING CORRESPONDENCE: Tenth floor, 1515 Broadway, New York, N.Y. 10036. Phone: 212-730-1050. Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515

Dependence on Imports of Oil

Since 1973 the world has had a series of lessons about imports of oil. Unfortunately, the people of the United States seem to be slow learners. Had they been attentive they would have noted that the United States and the other oil consuming nations behave as if they were helpless. They are so eager for oil that they will pay almost any price for it. In 1973 a curtailment in Free World production of about 10 percent for 3 months led to a quadrupling of the price. Recently, a shortfall of about 5 percent has resulted in increases of spot prices by 50 percent or more. It is clear that if production were permanently diminished somewhat further, the producing countries could at least double their take.

The Russians are self-sufficient with respect to oil, and they profit from price increases. For reasons of power politics they have found it attractive to try to stir up trouble and encourage greed in oil producing countries. Their policies, which are implemented by many willing tools, have met with success and will be continued. Russian clandestine activities will not be stopped by sending an aircraft carrier to the Middle East. They could be curtailed only by a very high-risk nuclear confrontation.

For the short term the probabilities are that drastic troubles will not materialize, but prudence would dictate efforts to lessen increasing dependence on imports of oil. Despite the contribution of Alaskan oil, U.S. imports have increased by about 50 percent since 1973, and their cost this year will exceed \$50 billion.

When one considers long-term potential costs, both military and economic, the government's proposed actions are shortsighted. The tentative 1980 budget calls for a reduction in energy research and development dollars which translates into an overall reduction of activity of about 10 percent. But the picture with respect to synthetic liquid is more dismal. Taking into account inflation, efforts to obtain clean liquids from coal and efforts to get liquids from oil shale are to be reduced even more.

In its current approaches to meeting the shortages created by the revolution in Iran, the Administration is proceeding cautiously. The word "conservation" has excellent connotations, and talk of fostering conservation is good politics, but actually to do something about it is another matter. The nub of the problem is gasoline, which is by far the largest petroleum product. The public is dependent on and infatuated with the automobile; use of gasoline continues to increase. The public will not gladly tolerate interference with supplies. A government that fails in this matter could find itself thrown out of office.

At the very least, shortages of liquid fuels or extremely high prices for them must lead to demands for action, including greater efforts to increase domestic supplies. Typically, little will be done until public opinion suddenly forces a major heedless, unplanned crash program, costing great environmental damage and hundreds of billions of dollars.

Such costs could be minimized by actions taken now. By building quickly and operating several full-scale plants, knowledge could be gained leading to improved designs and minimum damage to the environment.

Sufficient experience has been gained from intermediate-scale plants and pilot plants to establish the feasibility of production of shale oil or coal liguids. Cost estimates range from \$20 to \$35 a barrel. However, no full-scale plant will be built under present circumstances. There is too much uncertainty about government regulations related to the environment, prices for products, and interest rates. Principal components in the projected price of synthetic fuels are capital costs and interest charges arising from long delays. Estimated operating costs are about \$10 per barrel. The amounts of liquids that could be obtained from shale or coal are enormous in comparison with oil potentials. If the United States were to move decisively with even a few plants it would gain valuable experience, and the oil producing and exporting countries would perceive that there were limits to how far they could go in squeezing financial and political advantages from their oil.

-PHILIP H. ABELSON