

## 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 minority or conflicting points of view, rather than by publishing 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

1973

H. S. GUTOWSKY	GARDNER LINDZEY
ARTHUR D. HASLER	RAYMOND H. THOMPSON
RUDOLF KOMPFFNER	EDWARD O. WILSON
DANIEL E. KOSHLAND, JR.	

1974

ALFRED BROWN	FRANK W. PUTNAM
JAMES F. CROW	MAXINE SINGER
SEYMOUR S. KETY	GORDON WOLMAN
FRANK PRESS	

### Editorial Staff

#### Editor

PHILIP H. ABELSON

<i>Publisher</i>	<i>Business Manager</i>
WILLIAM BEVAN	HANS NUSSBAUM

*Managing Editor:* ROBERT V. ORMES

*Assistant Editors:* ELLEN E. MURPHY, JOHN E. RINGLE

*Assistant to the Editor:* NANCY TEIMOURIAN

*News and Comment:* JOHN WALSH, LUTHER J. CARTER, DEBORAH SHAPLEY, ROBERT GILLETTE, NICHOLAS WADE, CONSTANCE HOLDEN, BARBARA J. CULLITON, SCHERRAINE MACK

*Research News:* ALLEN L. HAMMOND, WILLIAM D. METZ, THOMAS H. MAUGH II, JEAN L. MARX, ARTHUR L. ROBINSON

*Book Reviews:* SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN SELTZ-PETRASH

*Cover Editor:* GRAYCE FINGER

*Editorial Assistants:* MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, ELEANORE BUTZ, MARY DORFMAN, JUDITH GIVELBER, CORRINE HARRIS, NANCY HARINAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, GINA BARI KOLATA, MARGARET LLOYD, JEAN ROCKWOOD, PATRICIA ROWE, LEAH RYAN, JOHN SCHAUER, LOIS SCHMITT, MICHAEL SCHWARTZ, RICHARD SEMIKLOSE, YA LI SWIGART

*Guide to Scientific Instruments:* RICHARD SOMMER

*Membership Recruitment:* GWENDOLYN HUDDLE;  
*Subscription Records and Member Records:* ANN RAGLAND

### Advertising Staff

<i>Director</i>	<i>Production Manager</i>
EARL J. SCHERAGO	MARGARET STERLING

*Advertising Sales Manager:* RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burkland, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: John P. Cahill, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 28 September 1973. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## Energy Independence

In his energy message of 7 November, President Nixon asked for a commitment to a new national endeavor called Project Independence. This would have as its goal "that, by the end of this decade, we will have developed the potential to meet our own energy needs without depending on any foreign . . . energy source."

In Washington, presidential messages come and go. Some lead to the enactment of legislation. Others are forgotten. This one could be decisive. Even before the new Middle East conflict, it was obvious that the United States would have to alter its energy policies. The Arab boycotts created the kind of political climate that makes drastic measures inevitable.

In a first reading, the President's goal seems clear. However, a little reflection uncovers questions. What forms of energy will we be using in 1980? Two or three decades from now, we may be able to depend on the sun, or on nuclear energy. However, if we are to function in 1980, we will be living much as we are today, depending on hydrocarbons for most of our energy. A second question has to do with the significance of "by the end of this decade, we will have developed the potential . . ." There is a long road between developing the potential to meet a need and actually meeting it. One would hope that the President intended to convey the idea that we would have productive plants in existence which could meet our needs if an emergency dictated. That is to say, that in 1980 we might be importing, for example, 20 percent of our hydrocarbons, but that we could live with a sudden curtailment. A third and perhaps necessary ambiguity is in the phrase "energy needs." Who knows what the public will demand in 1980? It is to be hoped that society will be willing to practice conservation and that we will be driving smaller automobiles and implementing a host of energy-saving measures. In addition, it should be possible to replace most oil currently being used in power plants by coal; by 1980, methods should be perfected for removing sulfur dioxide and other pollutants.

Until recently, we were importing 6 million barrels of oil a day. Given unchecked growth, that might have risen to 20 million barrels per day by 1980. Assuming energy conservation and moderate growth, we should be thinking in terms of developing an additional domestic production capacity of about 10 million barrels of oil a day. By tapping the continental shelves and bringing oil from the North Slope of Alaska, we might be able to increase production by 5 million barrels a day. Accordingly, a minimum goal should be the capacity to produce 5 million barrels of liquid hydrocarbons a day from coal or shale. That would involve an investment on the order of \$50 billion and the product would cost \$5 and more a barrel—about the same as imports now. But costs to foreign producers are as little as \$0.25 per barrel, and later they may well engage in price-cutting. If industry is to participate as it should in the development of liquid hydrocarbons from coal and shale, a guaranteed market and price must be provided, preferably after competitive bids.

Getting oil from shale and coal presents tremendous problems. It is easy to cook hydrocarbons out of shale by using retorts, but the environmental problem of disposing of the residue is dreadful. Multimillion-dollar research devoted to getting oil from coal has been promising, but it has essentially proved only one thing—the practical problems of maintaining the effectiveness of hydrogenation catalysts are frustrating.

If we are to achieve anything like energy independence by 1980, we must be prepared to back a number of competing and parallel approaches, and we must not underestimate the cost or the difficulties of the task.—PHILIP H. ABELSON