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The Center for Energy Studies is a  
multidisciplinary research center, the  
central liaison for energy research,  
education, and public service at The  
University of Texas at Austin. Dr.  
Steven P. Nichols is director.

Editor: Jennifer Evans



## UT scholars release review of Bush's energy strategy

*At Governor Ann Richards's re-quest, a committee of 20 UT Austin scholars has completed an analysis of President George Bush's National Energy Strategy and its likely impact on Texas. Below is the text of the white paper that summarizes the committee's main findings.*

### White Paper

#### UT Austin Committee to Assess the National Energy Strategy

#### The NES Objectives

As stated by President Bush, the  
objective of the National Energy  
Strategy (NES) is:

*achieving balance among our in-creasing need for energy at reason-able prices, our commitment to a safer, healthier environment, our determination to maintain an economy second to none, and our goal to reduce dependence by our-selves and our allies on potentially unreliable energy suppliers.*

The UT Committee to Assess the  
National Energy Strategy concurs on  
the importance and desirability of  
pursuing these objectives.

The NES presents specific objec-  
tives or projections for particular en-  
ergy resources. These include pro-  
duction forecasts for various energy  
resources, energy conservation tar-  
gets, transportation efficiency goals,  
and fuels use targets.

Of key interest to Texas are the  
(Continued on next page)

**Energy  
Studies  
newsletter  
suspended—  
see page 5**

## Center researchers receive \$502,000 in ARP, ATP grants

Center researchers won \$502,000  
for four research projects, the Texas  
Higher Education Coordinating  
Board announced October 24.

The four projects were among 169  
selected for funding from 3,000  
proposals submitted to the Texas  
Advanced Research Program and  
Advanced Technology Program:

- Liquid Fuel Burners using a Porous Inert Matrix for Combustion En-

hancement, Matthew J. Hall and  
John R. Howell, \$136,861

- Modeling of Solid-Fluid Separation in Supercritical Water Environ-ments, Earnest F. Gloyna, \$119,654
- Melting and Solidification of Porous Media, Theodore L. Bergman, \$102,020
- Development of a Laboratory for  
(Continued on next page)



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# Bush's energy plan

(continued from page 1)

domestic oil production projections presented in the NES . . . . The Department of Energy has estimated that the NES initiatives could increase domestic oil production by 1.8 million barrels per day above the levels currently projected for the year 2000 and 3.8 million barrels per day above 2010 projections. The NES states that much of this would be achieved through advanced oil recovery technology made possible by new investments in R&D and by greater access to potential reserves.

. . . . Of further interest to Texas [are] the natural gas use targets presented in the NES. Presently, natural gas provides more than one-fifth of all primary energy use in the United States, and Texas is a major supplier of natural gas. The NES initiatives are designed to increase natural gas consumption and help displace oil use. . . .

## Generally, the NES's Objectives are Achievable

The projections presented in the NES for energy efficiency savings and for domestic oil, natural gas, and coal production are technically attainable. Yet, these goals and others established by the NES in many areas are extremely ambitious. Success requires a serious national commitment to R&D, education, technology transfer, oil price stabilization, environmental protection, and improvements in energy pricing and

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# ARP, ATP grants

(continued from page 1)

Testing Residential and Light Commercial Thermal Energy Storage Systems, Jerold W. Jones, \$143,450

Seven other center-associated researchers were awarded \$1.12 million for projects to be administered outside the Center for Energy Studies. These researchers are David E. Daniel, W. Mack Grady, William J. Koros, Desmond F. Lawler, Raymond C. Loehr, Donald R. Paul, and William F. Weldon. ■

planning. One must recognize the direct linkage between energy production, utilization, wastes or residues produced, [and] impact on the environment, and the environmental costs that occur. Disregarding this linkage has contributed to much of the tremendous cost associated with environmental clean up.

## The NES Implementation Strategies Fall Short

While the NES's objectives are generally attainable, the proposed strategies are insufficient to ensure achievement of many of the specific objectives and targets in the report.

- The funding levels envisaged in the NES for energy R&D are grossly incompatible with the targets set for domestic energy production, energy efficiency, and the constraint of oil imports.
- It is unlikely that the objective of a "safer, healthier environment" can be advanced by the strategies suggested in the NES alone.
- There is a need: a) to seriously consider total energy cycle environmental impacts; b) to more clearly identify and evaluate the environmental risks and costs associated with the various options; and c) [to put] greater emphasis on ways to minimize wastes being generated in the first place.
- The incentives proposed to achieve NES's goals for alternative fuel use in the transportation sector are unlikely to be effective in overcoming the barriers to significant alternative fuel use.
- Promotion of integrated resource planning is unlikely to bring forth electrical energy savings of the magnitude assumed in the NES.

## The Need for Oil Price Stabilization

Fluctuations in world oil prices over the past twenty years have caused inflation, "booms and busts" in development, collapse of investment programs, bankruptcies, runaway speculation, and large fluctuations in government revenues. As a major consumer of oil, and yet a major producer with significant remaining resource potential, the United States has the ability to impact and stabilize oil prices to a meaningful degree. The United States presently accounts for roughly 26 percent of the world's oil consumption and 11 percent of world production.

Stabilization of oil prices and the establishment of an oil price floor would assist in accomplishing several of the NES objectives. It would:

- encourage domestic production;
- increase the fraction of natural domestic deposits which are economically recoverable;
- promote economic efficiency (to the extent that the difference between the floor price and the world oil price is set to reflect the external costs of imported oil);
- encourage energy efficiency; and
- provide incentives for R&D.

There are a number of methods at our nation's disposal to stabilize oil prices through the establishment of an oil price floor. Three possible means of implementation are:

- an import quota, set consistently with the floor price, to be auctioned periodically to would-be importers;
- a variable tariff equal to the difference between the floor price and the world price when the latter is lower; or
- direct payments, or other subsidy equivalents, to domestic producers equal to the above difference.

Of these three approaches, an import quota might be the most desirable. An auctioned import quota could be set at a certain number of barrels per period, equal to the difference between domestic supply and domestic demand at the selected floor price.

## The Relationship between Energy and the Environment

An important area where the NES is deficient is in the appreciation of certain environmental issues, and the direct linkage between energy production, consumption, waste, and the environment.

## Environmental Protection

Appropriate attention to the actual environmental consequences of energy production and utilization is required. In particular, the following policy options are highlighted:

- Emphasis should be on waste minimization, as opposed to "end-of-pipe" controls (as suggested in the NES).
- Environmental impact analyses should consider full costs and benefits through total fuel cycle cost analysis.
- Environmental risk associated with



untried technologies should be afforded appropriate consideration.

- Measures are needed to assist in the management of naturally occurring radioactive materials.
- To achieve environmental objectives, market-based approaches should be encouraged (as suggested in the NES).

### **Externalities and the Prices of Energy Resources**

Presently, external costs, such as the environmental, national security-related, and full economic costs of energy resources, are not properly represented in the prices of these resources in the marketplace. By better reflecting these external costs, more appropriate consumption decisions can be made, and a more economically efficient allocation of resources to various uses may result. One possible means of reflecting environmental-related external costs is through "pollution taxes" on the use of highly polluting fuels. The proceeds collected from such fees could be used to cover transitional costs, protect the environment, fund R&D, or for other purposes. While the Committee does not necessarily endorse this approach, we believe that it is worthy of further consideration.

### **A Greater Commitment to Research and Development and Education**

The NES relies upon advances in technology to meet many of its objectives. Indeed, increases in R&D are needed in virtually every area covered by the NES—to develop more cost-effective renewable energy sources, to protect environmental integrity, to develop a more efficient transportation system, to expand our knowledge of cost-effective conservation opportunities, to develop more successful advanced oil recovery techniques, to complete the development of a safer standardized nuclear power plant design, to strive toward fusion power, to advance clean coal technologies, and to promote electric utility-integrated resource planning.

The R&D funding envisaged in the NES is insufficient to ensure achievement of the administration's energy objectives. There should be an examination to determine whether re-

### **UT Austin Committee to Assess the National Energy Strategy**

Herbert H. Woodson (Chair)  
Steven P. Nichols (Cochair)  
Martin L. Baughman  
Robert E. Boyer  
David J. Eaton  
William L. Fisher  
John R. Howell  
Jerold W. Jones  
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James W. McKie  
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Walt W. Rostow  
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Nat Treadway  
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search presently planned to be conducted at national laboratories might be more effectively and efficiently performed at universities or in the private sector.

Science and engineering education must be advanced. More broadly, a strong emphasis on education must exist, not only to increase the talent pool necessary to address the nation's energy needs, but also to increase the understanding by the general population and decision makers of energy needs and the potential environmental impact of various technical options. One of the goals established by the 1989 Education Summit states, "By the year 2000, U.S. students will be first in the world in science and mathematics achievement." Statistics paint a different picture. The nation faces a significant challenge in addressing this goal when one considers that out of 16,000 high schools, "some 7,100 . . . did not offer a physics course in

1986." The NES discusses a number of programs to support pre-college education, but the Committee does not believe that the programs described will have significant success by themselves. Since technical literacy is not just an energy problem, the need can be met only with broad [cooperation among national, state, and local governments and] those with the ultimate responsibility for the success of educational programs: parents, teachers, and *students*. Scientists and engineering educators have become increasingly concerned about the growing communication gap between those who have pursued degrees in science and technical fields and those who have not. Traditionally, the approach to solving the problem has been to require additional course work for science and engineering students, thereby broadening their educational experiences. Unfortunately, this approach only addresses the relatively small number of students who pursue science and other technical fields. It does nothing to improve the understanding of science and engineering by the vast majority of students.

The NES reports, "About 10 percent of the Nation's 4 million scientists and engineers are involved in energy related activities." It also points out the significance of expected shortfalls in college graduates in the fields of science and engineering. This shortfall may be larger than previously thought when one considers that females, minority, and immigrant students traditionally have been underrepresented among engineering and science graduates, and that "By the year 2000, female, minority and immigrant students are expected to make up 85 percent of the new entrants in the labor force." [National Science Foundation studies have shown] the low number of students expressing interest in science and engineering among U.S. students. The indications are not promising.

The NES proposes continuation of programs such as fellowships, support in speciality fields, support of development of undergraduate curriculum, and undergraduate equipment support. The Committee believes the plan falls far short of the needs.

The NES understates the tremendous challenge facing the nation in



providing to all students a fundamental understanding of science and technology. More broadly, the Committee believes that the nation must increase the emphasis for education at all levels.

### **Effective Technology Transfer**

... America has generally been less successful at technology transfer than at R&D. Thus, many of America's technological advances have not been successfully exploited in this country.

Technological advances achieved in foreign countries should be more closely monitored.

The dissemination of advanced oil recovery technology is crucial if the United States is to meet the NES's domestic oil production targets. The federal Advanced Oil Recovery Program and similar efforts to promote advanced oil recovery R&D and technology transfer should be supported. State leadership should also become involved in facilitating advanced oil recovery technology transfer.

### **Electric Utility Issues**

... Amendment to PUHCA [Public Utility Holding Company Act of 1935] could lead to the introduction of independent power producers in Texas.

Promotion of integrated resource planning in Texas will require complementary state actions.

If the unique intrastate status of the Electric Reliability Council of Texas (ERCOT) is to be preserved, it is important that any legislation designed to implement the transmission access and integrated resource planning recommendations in the NES restrict the authority of the FERC to order wheeling between ERCOT and non-ERCOT utilities, or ensure that such a FERC order would not place the ERCOT utilities under FERC jurisdiction.

### **Impediments to Energy Efficiency in the Marketplace**

... There is an alarming discrepancy between estimates of possible efficiency-related energy savings reported in recent U.S. Department of Energy reports and the targets established in the NES.

The NES efficiency-related goals are laudable, yet few of the recommended strategies seem to be directed toward overcoming the market

barriers to energy efficiency. . . . Efforts should be devoted toward alleviating the following impediments to efficiency:

- the absence of credible energy information sources and analysis tools;
- the effects on building practices of the fragmented nature of the building industry;
- the effects on building practices of the numerous individual decisions and actions required to make a significant impact on building construction and operation, and the lack of user incentives;
- "first-cost bias" and limitations on capital available to invest in energy efficiency;
- difficulties in reflecting environmental costs in private financial decisions; and
- regulated energy prices that may not fully reflect the cost of energy supplied.

### **Transportation Energy Efficiency**

... To promote energy efficiency in the transportation sector, the following policy options are offered:

- Encourage R&D.
- Encourage high speed rail/magnetic levitation, intelligent vehicle highway systems, telecommuting, and air traffic control systems. However, they should not be relied upon to any great extent, since their energy benefits are unclear at this time.
- Oppose the vehicle scrappage recommendations in the NES.
- Evaluate the CAFE program in terms of impacts and interactions with safety and pollution regulations, the automotive industry, and consumers.
- Reflect in fuel prices the pollution and national security-related costs of various transportation fuels. Market forces, in addition to mandates for alternative fuel use in various transportation fleets, should be used to encourage the development of alternative transportation fuels.
- Pursue opportunities to use natural gas as an alternative transportation fuel.
- Encourage the development of electric vehicles.

### **Ensuring that Nuclear Power Remains a Viable Option**

The NES initiatives related to

nuclear power should be supported to ensure that nuclear power remains a viable option in the future:

- Reform the Nuclear Regulatory Commission licensing process and encourage "one-step licensing."
- Promote improved standardized plant design for light water reactors.
- Promote the development of safe reactor design.
- Ensure the establishment of interim and permanent nuclear spent fuel facilities.
- Encourage research into the exploration, extraction, and processing of domestic uranium and thorium resources.

### **Fusion**

While fusion power is unlikely to become a commercially viable energy option within the timeframe suggested in the NES, research should continue, particularly in the scientific study of fusion (as opposed to the development of reactor components). Potential environmental problems must be addressed as this technology advances.

### **Promoting Renewable Resources**

The following steps are suggested as possibilities for promoting the development of renewable resources:

- Provide incentives at the federal level for continued R&D into renewable energy.
- Continue the 10 percent investment tax credit for renewables.
- Revise the Public Utility Regulatory Policies Act of 1978 (PURPA) to permit renewable energy plants to increase their fossil fuel use to fifty percent (fossil fuel use is presently limited to 25 percent).
- Devote research to municipal waste-to-energy technologies to resolve problems related to emissions of greenhouse gases and heavy metals.
- Support research and possible tax credits for industrial conversion to energy of biomass waste products such as municipal and agricultural waste (peanut hulls, corn cobs, etc.).
- Enforce Texas laws requiring all new state buildings to incorporate cost-effective technologies for daylighting, passive solar heating, etc.
- Evaluate and minimize the adverse



environmental impacts of renewable resources.

### **The Strategic Petroleum Reserve**

The interests of Texas as well as the nation, would be served by maintaining a larger Strategic Petroleum Reserve. Further, the use of the Strategic Petroleum Reserve for storing resid [residual] oil should be explored.

### **The NES Natural Gas Deregulation Proposals**

. . . The natural gas deregulation proposals in the NES should be supported.

### **Coal**

. . . To promote the use of coal in an environmentally responsible manner, a firm financial commitment by the federal government is required, particularly for "clean coal" research and development, but also for conventional coal processing technologies.

### **Texas Has Abundant Energy Resources**

Energy issues are of vital importance to Texas. Oil and gas production contributes 15 percent of Texas's gross state product, and the state is home to a majority of the major oil companies. Texas generates and consumes more electric power than any other state. Consequently, it is incumbent upon Texas to play a leading role in the development of an effective national energy policy.

Texas has abundant energy resources, including ample oil, natural gas, and lignite. Further, the state has a large potential to reduce the demand for energy through conservation programs and equipment efficiency improvements. However, exploitation of these domestic resources has been hampered because domestic resources tend to be undervalued and thus underutilized. Presently, the national security-related costs associated with imported energy resources are not properly reflected in the prices of such resources.

### **Impacts of the NES on Texas**

If all NES goals were accomplished, they would have a very positive impact on Texas. Encouraging the use of domestic energy resources will have a positive eco-

nomical impact on Texas, a major supplier of oil, natural gas, and lignite. However, in a few areas the NES recommendations might have an adverse effect on Texas, including:

- The promotion of alcohol and coal as alternative transportation fuels might hinder the state's efforts to promote natural gas-fueled vehicles.
- The vehicle scrappage recommendations might have a disproportionately large impact on Texas.

Texas has positioned itself not only to make significant contributions to the nation's energy future, but also to profit from a national emphasis in energy education, research, and development.

Texas has made great strides in improving the pre-college education of its citizens. Recent legislative sessions have allocated additional funding to upgrade programs in grades K through 12. That funding lays a foundation for an educated work force. In order to provide the educational background necessary for Texas students to contribute to technical fields, or even to understand the relative importance of technical advancement, Texas must ensure that education at all levels includes strong scientific and technical content.

### **Complementary State Actions**

Because it is unlikely that federal actions alone will be sufficient to ensure that the NES objectives are satisfied, Texas must be prepared to take complementary actions. These actions might include the following measures:

- The state's financial commitment to advanced oil recovery R&D and technology transfer might be increased.
- State planning might attempt to promote the environmentally acceptable use of coal and lignite.
- Initiatives might be undertaken to improve the electricity pricing and planning in Texas, possibly including efforts toward:
  - better reflecting externalities in the resource planning process;
  - providing utilities with an opportunity to profit from resource alternatives to power plants;
  - streamlining planning-related regulatory requirements;

## **Energy Studies newsletter suspended**

The Texas Legislature eliminated the 1991-92 state appropriation of the UT Austin Center for Energy Studies. The center had requested \$478,000 a year from the Legislature, roughly 13 percent of its total funding.

Steven P. Nichols, director of the center, said the loss of funding "is difficult, but the center remains active, healthy, and successful. The loss in funding, however, will eliminate some services."

The center's newsletter, *Energy Studies*, will suspend publication until funds become available. Seven administrative positions have been eliminated, including that of newsletter editor Jennifer Evans. Four employees have taken other CES or other UT jobs.

Dr. Nichols said that the research programs of the center will not be affected directly, but administrative services to the programs will be reduced. ■

- promoting R&D on resource options; and
- encouraging better modeling of resource alternatives and their likely impact on utilities and their ratepayers.
- Efforts might be pursued to promote natural gas production in Texas. Some possible means include:
  - coordinating state natural gas regulation with federal deregulation actions;
  - providing for "statutory" unitization of reservoirs; and
  - continuing activities designed to demonstrate potential applications of natural gas.
- Actions might be initiated to identify current and future environmental risks associated with energy and industrial development, prioritize such risks, and develop approaches to reduce these risks.
- Measures might be developed to assist in the management of naturally occurring radioactive materials.
- Energy-related research might be expanded. ■



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**New direct phone lines  
installed at center's  
Balcones offices**

The center has installed a direct-line phone system in its offices at the Balcones Research Center in north Austin. To reach the individuals below in their *Balcones* offices, please dial the direct-line numbers given.

***Campus telephone numbers for these and the other 110 associated faculty, staff, and students will remain the same.***

Asterisks (\*) indicate those who often can also be reached at a campus office. Dial the UT operator, 471-3434, for campus phone numbers.

**Area code 512**

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