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ANALYSIS OF THE NATIONAL ENERGY PLAN

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INTRODUCTION

Three documents were utilized in preparation of this paper. They are:

- Office of the White House Press Secretary, The White House Detailed Fact Sheet, The President's Energy Program, April 20, 1977.
- Executive Office of the President, Energy Policy and Planning, The National Energy Plan, April 29, 1977.
- U.S. Congressional House. National Energy Act, 95th Congress, 1st sess., 1977, H.R. 8631.

As an organizational aid to the Office of Conservation, we treat the plan by end-use sectors, except for utilities and fuel prices which are presented as separate topics. First, the specific strategies and policies contained in the April 20th White House Fact Sheet and the April 29th publication entitled, The National Energy Plan (NEP) are itemized. Next, a further explanation of several of the policies is provided based on information in HR 8631. Finally, there is an analysis of some of the implications of the NEP. The analysis is oriented to aspects of the NEP that are pertinent to ERDA's conservation programs.

After an overview, the topics are treated in the following order:

- Industry
- Utilities
- Residences
- Buildings
- Transportation
- Energy prices and availability

1.0 OVERVIEW

1.1 SUPPLY VS. DEMAND

The President's energy proposal is an attempt to formulate the first comprehensive energy program for the U.S. The package will be comprehensive if it assures that adequate energy will be available to maintain economic health, and if it reduces our vulnerability to supply interruptions. The conservation package is designed to hold the rate of energy consumption to 2 percent per year, down from 3.9 percent. The supply package must then be designed to provide the needed fuel to support this growth rate. Preliminary analysis by Ralph Lapp has already been critical of the plan, claiming that it will result in a supply shortfall to 12 quads by 1985. Thus, without looking at the individual programs and their probable success, it seems that the package will have to be studied further in order to assure that supplies will equal the permitted demand. ERDA can assist the Administration in performing such analyses.

1.2 PREVIOUS ATTEMPTS

Several of the measures in the President's proposal have been written into bills and sent to Congress in the past, only to be rejected. The following proposals were among those submitted in 1975:

- Tax credits for business, residential insulation (H.R. 6860)
- Gasoline taxes (H.R. 6860)
- Insulation tax credits (deleted from H.R. 10612 and from Tax Reduction Act of 1975)

FEA has made several suggestions to previous administrations. The suggestions, taken from an ERC report published during the Carter Transition period, are as follows:

- Fuel economy standards for trucks and buses
- Revised CAB load factor standards
- Utility financing for insulation
- Financial incentives for cogeneration
- Utility rate reform

Thus, it can be seen that the present proposal involves a resurfacing of several ideas that the Congress has already rejected. In attempting to pass such measures for a second time, it will be important to advise the

administration in order to avoid previous pitfalls. ERDA could assist in gathering background information and advising the administration on its conservation package.

1.3 IMPACT ON ERDA-CONSERVATION

In general, the impact on ERDA-Conservation is that commercialization of energy efficient technologies should be made easier. Through tax incentives, the President's proposal, directly reduces the first cost of energy efficient technologies. This is especially favorable to new technologies where first costs are affected by lack of experience in the manufacturing of the technology.

Incentives are especially strong in the transportation area where cars that use less gasoline are to be given large rebates. ERDA's work on electric vehicles, batteries, methanol engines and Stirling engines will result in vehicles that use less gasoline.

The President's proposal will move new technologies into the marketplace at a faster rate than was previously possible. In particular, the Federal Government will set goals for itself that can only be met if it commercializes new technologies for its own use. Consider the following examples:

- Federal buildings will be forced to use, and thus commercialize, solar energy
- The federal fleet has been mandated to exceed the efficiency of the private fleet by 4 mpg. If ERDA technologies mature rapidly, the federal goal could be met via new engines and new car designs.
- The new standards for federal buildings could be met via standard technologies or, if the price is competitive, they could be met by incorporating district heating and new materials presently under development. Moreover, the Federal Government will commit itself to the use of lifecycle costing in the purchase of new buildings.
- District heating will have a forced demonstration in the use of waste heat from the Oak Ridge enrichment plant.

Again in the private sector, new regulations will provide the incentives needed to introduce new technologies.

- Split rates for utilities will speed the demand for energy storage systems and energy management systems.

- Industries could conceivably avoid switching to direct combustion of coal by installing low-Btu gasifiers or buying high-Btu gas before it is injected into the pipeline.

For ERDA the new energy proposal is the first statement of priorities as set by the new Administration. ERDA can respond by assessing its own programs in light of the administration's new directions. In several cases, ERDA will be forced either to affect the administration's priorities or to alter its programs.

The individual elements of the proposal are discussed in detail on the following pages.

1.4 PRINCIPLES

The principles involved in the NEP are as follows:

- a. The government must take responsibility for energy policy and the people must be willing to make sacrifices
- b. Healthy economic growth must continue
- c. We must continue to protect the environment
- d. We must reduce our vulnerability to an embargo
- e. Each sector will have to do its part
- f. We will emphasize conservation as the cheapest source of energy
- g. Prices must reflect replacement costs of energy
- h. Government policies must be predictable and certain
- i. We must conserve scarce fuels
- j. We must develop non-conventional sources

1.5 GOALS

The goals for the energy program are as follows:

Conservation	- Reduce growth to 2 percent
Imports	- Reduce imports to 6 million barrels per day (MMbbl/d)
Transportation	- Reduce gasoline consumption by 10 percent
Residential	- Insulate 90 percent of all residences
Use solar energy in 2.5 million homes
Supply	- Increase coal production by 400 million tons per year

2.0 INDUSTRY

2.1 FACT SHEET NEP

There are 15 measures in the plan that affect the industrial sector. Some of these appear in sections devoted to utilities or coal conversion and have been grouped here:

- a. Businesses will get a 10 percent tax credit for investment in conservation measures.
- b. Businesses will get a 10 percent investment tax credit for energy-saving industrial equipment for existing plants. This will include solar technologies.
- c. New HUD standards on buildings will be mandatory by 1980.
- d. Cogeneration will be encouraged via exemption for industry from utility regulations. Industries would be entitled to sell power to the grid and buy backup power. The FPC will assure fair rates for sale of cogenerated power and purchase of backup power. Industries would get 10 percent tax credit for purchase of cogeneration equipment. Those industries could be exempted from requirements to convert to coal.
- e. Declining block rates for electricity and gas will be phased out.
- f. Peak rate pricing would be instituted.
- g. The FPC will prescribe rules for interruptible rates, summer-winter differentials.
- h. Oil and gas consumption taxes will encourage industry to use these fuels efficiently.
- i. Oil and gas prices to industry will rise due to a number of taxes and regulations. (These are discussed in detail in another section.)
- j. Industry would get a 10 percent tax credit for conversion to coal.
- k. Industry would be prohibited from burning gas or oil in new boilers and possibly be prohibited from other uses of gas and oil.
- l. An industry forced to convert to coal would be allowed to sell its gas contract to provide adequate compensation.
- m. Industries would be required to use the best available environmental control technology.
- n. State Public Utility Commissions would prevent utilities from discriminating against users of alternate power sources.

2.2 H.R. 8631

2.2.1 Measures 1 and 2: Business Energy Credit

This proposal is a set of revisions and amendments to the Internal Revenue Code (IRC) of 1954. If passed, the investment credit for business energy property would be increased by the addition of 10 percentage points.

Business energy property includes the following:

- Cogeneration property
- Solar equipment
- Energy conserving equipment for heating and cooling
- Energy conserving equipment for manufacturing or production
- Coal-fired boilers, combustors, low-Btu gasifiers, plants using coal as a feedstock, coal handling equipment
- Boilers fired by waste materials
- Pollution control equipment

There is also a class of special business energy property that will receive less than the full tax credit, e.g., property with a very short business life, such as 3 years. The increases in the investment credit apply between April 20, 1977 and January 1, 1983.

2.2.2 Measure 4: Cogeneration

The Administrator will prescribe rules requiring electric utilities to cooperate with industry in cogeneration projects. The rules will assure fair rates and will include, where necessary, provisions to exempt qualified cogenerators from restrictive portions of any state or federal laws and regulations. Exemptions from mandated coal conversion may be granted if the benefits from cogeneration are unobtainable unless natural gas or petroleum is used.

2.2.3 Measures 10-13: Coal Conversion of Major Fuel Burning Installations (MFBIs)

The coal conversion package is provided as amendments to the Energy Supply and Coordination Act (ESECA) of 1974. The industrial coal conversion regulation applies to MFBIs that are boilers, combustors, gas turbines, combined cycle or internal combustion engines. The regulations apply to MFBIs that consume 100 MMBtu/hr or more (i.e., about 100,000 lb/hr steam); are a combination of plants where the aggregate can consume

250 MMBtu/hr or more; or are other installations that are deemed necessary by the Administrator.

The primary provisions of the amendments are itemized below.

2.2.3.1 New MFBIs

- a. No new MFBIs may use natural gas or oil.
- b. The Administrator will decide which non-boilers will be affected.
- c. Exceptions can be granted if:
 - (1) Coal is unavailable
 - (2) There are physical and environmental constraints
 - (3) It is impossible to use other than gas or oil
 - (4) It is impossible to substitute steam for direct heat
 - (5) The cost of using coal substantially exceeds the cost of using imported oil

2.2.3.2 Existing MFBIs

- Can rule that previous orders under ESECA still stand.
- May issue orders prohibiting the use of oil and/or gas in existing MFBIs that have the capability to burn coal.
- May issue orders to MFBIs limiting the amount of oil or gas mixed with coal.
- May prohibit natural gas use in MFBIs with no coal capability.
- May prevent a plant from switching to resistance heat.

2.2.3.3 Industrial Oil and Gas Conversion Rebate

Investment by industry in alternative energy property is subtracted directly from the oil and gas use taxes. If the investment exceeds the tax for any year, the excess may be carried over to the next year.

2.2.3.4 Other

There are several other parts of the Act that will significantly impact industry. These include all the proposals that will regulate or tax oil and gas prices and the proposals that require the implementation of time-of-day rates and the prohibition of declining block rates. These impacts are treated in the energy price and utility discussions.

2.3 ANALYSIS

The NEP has two general goals in the industrial sector: (1) to decrease the use of oil and gas in industry; and (2) to increase the efficiency of all energy use.

There are three distinct strategies in the Act whereby the NEP seeks to decrease the use of oil and gas. One strategy is to legislate laws prohibiting the specified uses of oil and gas. Thus, the amendments to ESECA are provided. Both of the other strategies discourage oil and gas use by altering the energy economics in the favor of other types of energy. Oil and gas prices are increased through taxes and regulation, and additional investment tax credits are provided for capital equipment which utilizes alternative energy forms (including coal).

The second goal of the NEP in the industrial sector is to encourage the efficiency of all energy use. There is some overlap of the strategies employed to accomplish this goal and those employed to discourage oil and gas use. Increased gas and oil prices will encourage the use of more energy efficient capital equipment which was uneconomical at lower oil and gas prices. Additionally, the NEP provides for tax credits for all capital equipment which is more efficient. This includes energy using equipment for space heating, cooling, and process needs.

Finally, the NEP promotes energy efficiency by encouraging cogeneration. To promote cogeneration, utilities will be required to offer a fair rate schedule for cogenerated electricity, and they will be required to purchase electric energy from cogeneration facilities. Laws or regulations which might restrict the use of cogeneration facilities will be waived. Cogeneration equipment will receive increased investment tax credits and, in some cases, cogeneration facilities can obtain exemptions from restrictions on the use of oil and gas. Finally, investment in cogeneration facilities which do not use oil and gas can be deducted from oil and gas user taxes.

There is no mention of district heating in the Act.

There is one notable difference between the Act and the NEP. NEP states that industry be required to use the "best available" environmental technology for coal-fired boilers. The Act states that any converted or new boilers merely conform to current environmental standards.

The coal conversion amendments to ESECA, in total, are a somewhat less severe version of S.#977, the Coal Utilization Act of 1977. Whereas, S.#977 prohibits gas use after January 1, 1979 and oil use after January 1, 1990, for existing MFBIs, the Act prohibits only gas use after January 1, 1990. This alteration answers one of the main criticisms of S.#977, i.e., that the time constraints were totally infeasible.

An important similarity between S.#977 and H.R.#8631 is that the burden of proof to qualify for exemptions is on the plant owner. Under ESECA, the burden of proof was on the Federal Government to examine costs, coal supply, reliability, etc., to determine qualification. This should relieve the federal work load considerably and provide for a quicker conversion schedule.

2.4 IMPLICATIONS FOR ERDA

There are at least four areas where ERDA can assist the administration in implementing its policy:

a. The promotion of oil and gas conservation through the price system.

A reevaluation of ERDA-funded technologies can be undertaken. Some technologies may no longer qualify for ERDA funding, while other new projects may now satisfy threshold criteria for ERDA funding.

b. The promotion of oil and gas conservation through tax credits for business property.

Industry will be eligible for tax credits for installing various qualified technologies. The definition of qualified technologies has yet to be established. ERDA is a logical agency to review and approve technologies for use in industry.

c. The promotion of cogeneration by price and tax incentives and by removing institutional impediments.

Much work needs to be done if cogeneration is to become standard practice among industries in the U.S.

ERDA is the logical agency to undertake an effort to transfer information to the private sector in an attempt to implement this new policy. ERDA can:

- (1) Perform sample economic calculations and distribute them to industry
- (2) Document case histories where cogeneration is presently installed
- (3) Assess reliability and other non-cost items of interest to industry
- (4) Provide industries with a list of companies that offer co-generation equipment

- (5) Run industry workshops to explain the concept and to disseminate information
- (6) Monitor the progress of cogeneration in the U.S. as an input to the Energy Management Information System
- d. The promotion of fuel switching from gas and oil to coal through the price and tax incentives and by mandating conversions

While implementation of the new policy will be straightforward in converting boilers to coal, the same is not true for non-boiler uses of gas and oil. The Administration will need technical assistance in deciding whether non-boiler MFBIs can be forced to use coal. ERDA can provide that assistance. In cases where such a switch is impeded by lack of technology, ERDA can perform the R&D necessary to demonstrate use of coal in non-conventional ways.

3.0 UTILITIES

3.1 FACT SHEET AND NEP

There are 21 measures that will affect the utilities industry:

- a. Electric cars will increase demand for electricity and affect load curves.
- b. Solar energy in residences will decrease base load but impact peak load depending on the details of implementation.
- c. Utilities will be required to offer conservation services, financing, and information and referral services to residential consumers.
- d. Cogeneration will impact load curves and will require utilities to buy excess power and supply backup power. Rates for this power would be set by FPC.
- e. Utilities will be required to consider district heating when locating new plants.
- f. Declining block rates for gas and electricity will be phased out.
- g. Peak pricing would be offered on a voluntary basis to customers willing to pay the cost of meters.
- h. Electricity customers would be offered interruptible rates.
- i. Master metering would be eliminated for new buildings.
- j. The FPC would prescribe new rates for gas utilities and the PUCs would implement those rates.
- k. Power wheeling would be required among non-contiguous utilities.
- l. New fuel prices would be imposed upon utilities due to various taxes and regulations on those fuels.
- m. Utilities will be prohibited from burning gas or oil in new boilers.
- n. Prohibitions for facilities other than boilers will be treated case by case.
- o. Utilities will be prohibited from using gas after 1990.
- p. Utilities burning coal will require permission to switch to oil or gas.
- q. Utilities burning gas would require permission to switch to oil.
- r. Utilities could sell their gas contracts.
- s. All new coal-fired plants would use the best available cleanup technology.
- t. Restrictions on siting plants will arise from environmental policy for coal.
- u. Utilities will be prevented from discriminating against users of alternative power sources, including solar.

3.2 H.R. 8631

3.2.1 Measure 3: Utility-Administered Residential Energy Conservation Plans

Gas and electric utilities would be required to administer a program which seeks to promote implementation of residential energy conservation measures. Basically, utilities would have to inspect residences, compute savings achievable through the implementation of each measure, and then either install the measure or provide comprehensive listings of alternative suppliers and contractors. Additionally, the utilities would have to offer to finance the improvements and allow the payments to be incorporated into the monthly gas or electric bill. Again, the utility must provide a comprehensive listing of alternative places to receive financing. (More discussion of this program is in Section 4.0.)

3.2.2 Measures 4-11: Public Utility Regulatory Policies

The Act provides for a broadening of federal powers into the regulation of the utility industry, which has for the most part been historically regulated at the state level. With regards to electric utilities, the provisions of the Act are directed at rate design, interconnection, and cogeneration. The Act also would affect rate design for gas utilities.

The Act requires electric rate design which reflects, to the maximum extent practicable, time-of-use costs, both daily and seasonal. Also, declining block rates are prohibited, interruptible rates must be offered to large customers, and master metering is no longer allowed.

One additional provision provides for more flexibility with regards to time-of-day rates, i.e., it is the customer's option to accept it, contingent on his willingness to pay metering costs. Utilities are also required to offer special rates for customers with load management systems.

For gas utilities, the Act would require:

- Summer-winter rate differentials
- Rates for interruptible service
- Master metering

The Act gives the Federal Government the power to order electric utilities to take the following actions:

- To interconnect with other electric utilities or cogenerators
- To sell, deliver or exchange electricity with another utility
- To engage in pooling, wheeling or any other coordination deemed appropriate

3.2.3 Measures 12-19: Coal Conversion

The coal conversion package is provided as amendments to ESECA. The amendments apply to all fossil fuel-fired electric generating units that exceed specified sizes, including gas turbine and combined cycle units. The regulations that apply to MFBIs discussed previously also apply here.

3.2.4 New Electric Power Plants

The rules that apply to MFBIs also apply to new electric power plants, will also be made if:

- a. The plant is a peak load plant
- b. The plant, if not oil, will impair the reliability of service

3.2.5 Existing Electric Power Plants

- a. After January 1, 1990, no existing power plant may use natural gas.
- b. After April 20, 1977, no existing power plant using solely petroleum may use natural gas.
- c. No existing power plant may use natural gas as an energy source in greater proportions than it did from 1974 to 1976.
- d. The Administrator:
 - (1) Can rule previous orders under ESECA still stand
 - (2) Can prohibit existing plants with a coal capability from using oil or gas contingent on availability of coal, financial feasibility, and reliability considerations.
 - (3) Can rule on the proportions of fuels used where the plant has in the past used mixtures.
 - (4) Can by rule require units using coal or gas to obtain permits to use petroleum.
- e. Five-year exceptions or exemptions may be granted if:
 - (1) The plant is a peak load plant
 - (2) The plant, if not fired, will impair the reliability of service
 - (3) The plant will be using synthetic gas from coal
 - (4) It is technically infeasible to convert to coal
 - (5) The electricity generated from the plant is a substantial portion of the total generating capacity of the applicant.

3.2.6 Utility Oil and Gas Conversion Rebate

Investment by utilities in equipment which uses fuels other than oil and gas and which replaces oil and gas equipment can be subtracted directly from oil and gas users' taxes.

3.3 ANALYSIS

There are three main areas in the utilities sector: rate reform; the efficiency of the electrical generating system; and fuel use in the electric utility industry.

If the Act is passed, gas and electric rates would no longer be promotional in the sense that incremental consumption can no longer be associated with decreasing average kilowatt hour costs. Also, cost-of-service analysis must in the future consider seasonal and time-of-day (TOD) variations. While seasonal rates are mandatory, the Act does not require TOD rates for all customers. The Act leaves the choice up to the customer contingent on his willingness to pay metering costs. However, if the customer wants TOD rates, the utility must provide such a rate schedule.

In the past few years, TOD rates have received increasing attention at the federal and state levels and within the electric utility industry. Some utilities, e.g., Long Island Lighting, Wisconsin Power and Light, and Pacific Gas and Electric, have already implemented TOD rates that are mandatory for large customers. Fourteen utilities have participated in providing TOD rates to residential customers under an FEA program. While TOD rates recognize cost of service aspects that historically have not been treated, the magnitude of the benefits attributed to TOD rates is still not clear. These benefits arise because TOD rates will level the load, thus providing for larger amounts of energy being supplied by coal and nuclear base load plants. Less generating capacity will then be required and less power will be provided by peaking units which are typically oil or gas fired.

A number of provisions of the Act seek to improve the overall operating efficiency of the electrical generating system. Interruptible rates can decrease peaks and thus increase the system load factor; the prohibition of master metering will do away with a device that has promoted waste; and mandatory interconnection and power wheeling can reap benefits from economics of scale and capture the benefits of load diversity. Additionally, cogeneration offers advantages to both industry and utilities.

The NEP seeks to discourage the use of oil and gas in the electric utility industry by law. These laws also encourage the conversion of oil and gas capacity to coal. As discussed in Section 2.0, the coal conversion provisions are somewhat less severe than those in S.#977. Thus far, the FEA, via ESECA, has issued prohibition orders to about 22 GWe of oil and gas plants. These plants are those most amenable to conversion. It is doubtful there are any more with coal capability that can feasibly be converted.

None of the NEP provisions pertaining to the environment are in the Act, neither is there mention of district heating.

There is a clear State's Rights issue in extending FPC control to utilities that operate only intrastate.

There are presently no new oil- or gas-fired boilers on order. A measure to prohibit new oil and gas boilers will have no effect on the utilities industry.

3.4 IMPLICATIONS FOR ERDA

As far as present programs are concerned, the demonstration at St. Charles, funded by HUD, could be deemed incompatible with the new policy. It is a government-sponsored project to build a new oil-fired base load plant which also provides district heating.

The President's plan applies to new plants and new communities. The question arises as to the range of sizes of communities that could be economically serviced by such a coal plant. It is possible that it is uneconomical. This would be valuable information if the program is to preserve its commitment to pursue only economical technologies. ERDA could perform analyses to:

- a. Plot cost of service and amount of heat and electricity available with coal-fired boilers of various sizes.
- b. Match quantities available to sizes of communities to be served.
- c. Compare costs for each of those communities with present costs of service.
- d. Explore restrictions on land use and emission standards to determine which sizes would be acceptable for various size communities.

If TOD rates are installed, a concomitant need for technologies will arise, allowing for the maximum usage of off-peak rates. An examination of all energy usage by sector can be undertaken to determine how much load can be deferred to off-peak periods. This analysis would reveal areas where load deferral technology exists, and areas where technology development could yield further potential for off-peak usage of energy.

The President's policy toward utilities and industry is to promote cogeneration where benefits are to be gained by both parties.

In addition to cogeneration, there are many gains to be made through the coordinated siting of electric utility generating plants and industrial plants. These gains include:

- Coordinated bidding for coal contracts
- Larger coal volumes mean lower shipping costs
- Sharing of coal handling equipment
- Waste heat utilization
- Low transmission costs for electricity usage
- Sharing of peaking units and/or diesels used for start up.

There is currently no mechanism by which utilities and industry can coordinate planning. ERDA could examine the benefits of such coordination and then provide a service through which such information could be exchanged. Alternatively, ERDA could prepare a package for state governments, showing them the benefits of such coordination. Such planning could then be promoted by the states to attract industry.

4.0 RESIDENTIAL

4.1 FACT SHEET AND NEP

There are 17 measures that will affect residential consumers directly:

- a. Homeowners will get tax credits for approved conservation measures (25 percent of first \$800, 15 percent of next \$1400).
- b. Utilities will provide financing for conservation investments, with work performed by utilities. This is referred to as a "turnkey conservation service" in the NEP.
- c. Utilities will provide information on alternative financing and on alternate supplies of materials and labor.
- d. Loans are to be made available through the Federal Home Loan Mortgage Corporation and Federal National Mortgage Association.
- e. Funding for weatherization programs will be \$130 million in FY 78, and \$200 million in FY 79 and FY 80.
- f. CETA trainees will provide labor for conservation measures.
- g. Utility financing and weatherization will include Rural Electric Cooperatives.
- h. Possible mandatory measures will be enacted where the above are insufficient. An example would be that all homes must be insulated before they are sold.
- i. HUD standards will be available by 1980. Funds would be available to the States, although use of these funds is unclear in the Fact Sheet.
- j. Appliance standards will be mandatory.
- k. District heating program will affect residential electricity customers.
- l. Electricity and gas rate structures will be changed and the expectation is that residential rates will be lower.
- m. Peak rate pricing will be offered on a voluntary basis with customers paying the metering costs.
- n. Master metering will be discontinued.
- o. Tax credit will be available for installation of qualified solar technologies.
- p. A major R&D effort will be undertaken in small-scale technologies to provide decentralized energy systems.

4.2 H.R. 8631

4.2.1 Measures 2, 3, 9: Energy Conservation Programs for Existing Residential Buildings

Gas and electric utilities will administer programs through which homeowners may install energy conservation measures. The Administrator and HUD will determine what measures apply, by region, and establish necessary standards.

The base set of measures, which can be expanded by the Administrator include:

- a. Caulking and weatherstripping of all exterior doors and windows
- b. Furnace efficiency modifications limited to:
 - (1) Replacement burners designed to reduce the firing rate or to achieve a reduction in the amount of fuel consumed as a result of increased combustion efficiency
 - (2) Devices for modifying flue openings which will increase the efficiency of the heating system
 - (3) Electrical or mechanical furnace ignition systems which replace standing gas pilot lights
- c. Clock thermostats
- d. Ceiling, attic, wall, and floor insulation
- e. Hot water heater insulation
- f. Storm windows

4.2.2 Measure 4: Low Interest Loans for Conservation Equipment

By amendments to the National Housing Act, Federal Home Loan Mortgage Corporation Act, and the Federal National Mortgage Association Charter Act, coverage is extended to include low interest loans for solar or any measure which reduces home energy requirements. Additionally, by amendments to the EPCA, \$585 million is allocated to weatherization of the homes of low income persons.

4.2.3 Measure 10: Energy Efficiency Standards for Consumer Products

The Administrator will prescribe energy efficiency standards for appliances. The standards must be technologically feasible and economically justified.

4.2.4 Measures 1, 15: Residential Energy Tax Credit

By amendment to the 1954 Internal Revenue Code, tax credits will be

allowed for investments in solar or qualified energy conservation expenditures. The tax credits expire January 1, 1985, and there are provisions to obtain credits for prior expenditures. The credits are only extended for the principal residence of the taxpayer and the home must have been in existence on April 20, 1977. The credits decrease every three years for solar expenditures.

4.3 ANALYSIS

The residential provisions contained in the Act constitute a comprehensive program for promoting conservation in homes. The program provides for low interest loans for solar and conservation measures in new houses along with tax credits and low interest loans for retrofitting old homes. Additionally, through the utility program, a mechanism will be created whereby each homeowner will be shown the cost advantages of implementing various conservation measures.

The utility program fills a void which has frequently been criticized, i.e., there is no mechanism whereby homeowners can be shown the economic advantage of installing conservation measures. The Act mandates that utilities, by January 1, 1980, provide conservation information to all homeowners who have not installed the suggested measures. This information includes:

- Suggested measures
- Savings in costs resulting from the measures
- Availability of arrangements for financing and installing the measures.

The Act contains provisions which will greatly affect fuel prices for most sectors. However, the residential sector will probably be faced with oil, gas, and electricity prices that are lower than if there was no NEP. (This will be discussed in more detail in Section 7.0.)

The tax credits and loans made available for the installation of solar equipment could lead to widespread purchase of such equipment. Currently, there is no standardized mechanism for testing and certifying solar equipment. With over 300 companies in the solar heating field, some type of certification is needed to prevent the infusion of sub-standard equipment.

4.4 IMPLICATIONS FOR ERDA CONSERVATION

Following are implications for ERDA Conservation:

- a. The distributed energy technologies are currently unavailable at competitive prices. ERDA can review the possibilities and prepare program plans as a preparation for DOE.
- b. ERDA can establish itself as the agency that qualifies technologies for the purpose of tax credits.
- c. ERDA can undertake training programs for CETA personnel who will implement the residential conservation measures.
- d. ERDA can participate in HUD's development of standards for residences.
- e. ERDA can run district heating demonstrations.
- f. In cooperation with a utility, ERDA could run the first demonstration of a turnkey conservation program for residential consumers, so that potential problems and helpful procedures are made available to all utilities.
- g. ERDA could develop procedures and possibly prepare a manual for energy audits of homes and buildings. Such inspections could utilize devices such as infrared cameras, and devices to measure infiltration.
- h. ERDA can establish certification procedures for solar equipment.
- i. ERDA can establish a solar extension service to promote "do-it-yourself" retrofitting of homes, possibly as part of the energy extension service.

5.0 BUILDINGS

5.1 FACT SHEET AND NEP

There are eight measures that affect the buildings' sector.

- Businesses will receive a 10 percent tax credit for investment in conservation measures.
- Federal grants will be made available for public and non-profit schools and hospitals, funded at \$300 million per year for 3 years.
- New HUD building standards will be in effect by 1980.
- Existing federal buildings will decrease their energy consumption 20 percent by 1985. New federal buildings would be required to be 45 percent more energy efficient. This program will only use cost-effective conservation measures.
- Federal buildings will become the test bed for commercialization of solar hot water and space heat. The program will be funded at \$100 million.
- Mandatory efficiency standards for appliances will be extended to furnaces, air conditioners, and hot water heaters.
- Master metering will not be allowed in new buildings.
- The buildings' construction industry, as well as the operation of new buildings, will be affected by plans for district heating.

5.2 H.R. 8631

The Act would amend EPCA to require the Administrator to specify mandatory energy efficiency standards for major appliances including refrigerators, water heaters, room and central air conditioners and furnaces. He would also be required to provide uniform test procedures for determining the efficiency ratings of these pieces of equipment. Intermediate standards can be used to phase in the equipment. The standards will be subject to certain exemptions and, after a time, the standards will be reevaluated.

In school and hospitals, federal grants will be made to upgrade insulation, windows and HVAC systems. Funds will also be available for automatic controls and for installation of solar water heaters. The federal share in the cost of these projects will be limited to 40 percent.

States will become eligible for the funds by submitting proposals to the Federal Government. The proposals will include descriptions of the projects to be undertaken, estimates of energy to be saved, and financial assistance required.

The funding, \$300 million for 1978, 1979, and 1980, will be allocated among the states via a formula to be determined by the FEA.

5.3 ANALYSIS

The bill includes the proposal for discontinuing master metering in its section on utilities. As outlined in the President's fact sheet, under this proposal all new buildings will be required to have individual meters. The value of this idea has been demonstrated in DoD housing, where the installation of individual meters resulted in 30 percent reduction in electricity consumption.

Office buildings typically have heating, cooling and hot water services that are provided centrally. Where this is the case, individual meters would only affect the lighting. Lighting is responsible for about 30 percent of commercial energy usage and decreased lighting in individual offices could save about 15 percent of that component. Thus, individual meters could have a maximum effect of about 4.5 percent in energy savings. Besides being a low-leverage measure, this amount of savings will automatically occur if HUD building standards are designed to require reduced lighting levels.

The adverse impact of such a measure would be that it could remove the lights from the control of the building manager. This would prevent him from incorporating lighting into a building-wide energy management system. Thus, it is uncertain whether such a measure for commercial buildings would have the desired effect of reducing energy consumption.

5.4 IMPLICATIONS FOR ERDA CONSERVATION

The Division of Buildings and Community Systems could perform the analysis necessary to provide the Administration with guidance in the area of master metering. It could be that the proposal needs to specify the type of buildings where such a measure is advisable.

The President's proposal does not consider the possibility of coal conversion in buildings as well as industry. If it is economical and environmentally acceptable for industry to convert, then it should be acceptable for commercial buildings. In the industrial sector, the President has already eliminated the possibility that customers could switch to electric heat instead of coal. In buildings, PG&E and AGA have already shown that use of SNG is cheaper than electricity for major building applications. Thus, there could be an initiative within the Administration to extend coal conversion to commercial buildings through use of SNL.

With the prices of oil maintained at a low level for residences, it is probable that coal conversion through gasification will not be economical for residences.

In any event, ERDA could perform the analysis necessary for the Administration to initiate a coal conversion program for buildings. Alternative technologies to accomplish such a conversion would be small scrubbers, small fluidized bed reactors, or low-Btu gasification facilities. Any of these local sources of SNG would compete with central high-Btu plants to provide gas to commercial buildings. Such analysis could also provide new directions for ERDA's research efforts in buildings and community systems.

6.0 TRANSPORTATION

6.1 FACT SHEET AND NEP

There are 10 measures to be taken in the transportation sector:

- a. The gas guzzler tax and rebate would be a graduated tax on inefficient autos and light trucks, and a graduated rebate on efficient autos and light trucks. Electric cars will get the maximum rebate. Cars built in the U.S. and Canada will qualify for the rebate, with cars from other countries to be included after international agreements.
- b. Auto efficiency standards will continue to rise after 1985.
- c. The 55 mph speed limit will be enforced, with the possibility of withholding federal funds from states that do not enforce it.
- d. A standby gas tax is to be ready if transportation goals are not met. For each year in which the goal is exceeded by more than 1 percent, a tax of 5¢/gal will be imposed. The total tax will not exceed 50¢/gal. Funds from the gasoline tax would be rebated through the income tax. If the standby gas tax is used, a program will be developed to compensate the states for revenue lost. This will be done through the highway trust fund.
- e. Mandatory fuel efficiency standards would be imposed on light duty trucks up to 10,000 lbs.
- f. The 10 percent excise tax on intercity buses would be removed to encourage mass transit.
- g. The tax on aviation fuel would be from 7¢ to 11¢/gal. The existing rebate on marine fuel would be eliminated.
- h. New government vehicles would exceed average fuel economy standards by 2 mpg in 1978 and by 4 mpg after 1980.
- i. A federal vanpool program will be developed. About 6000 vans will be purchased; costs will be repaid to the government.
- k. A new study of the energy transportation network will be undertaken.

The goals associated with the standby gasoline tax are to reduce consumption to 7.35 MMbbl/d in 1978; 7.45MMbbl/d in 1980; and 6.60 MMbbl/d in 1985.

Revenue from each 5¢ tax would amount to \$6 billion/yr. This would be rebated at a rate of \$25 per person per year.

If the goal of 10 percent reduction in gasoline by 1985 is not met, additional measures will be imposed. These include tax on commuter parking and minimum auto mileage standards.

Inspection and maintenance programs are noted as being able to conserve 2 percent in gasoline usage.

In the future, mass transit must play a greater role. This means new patterns of (urban) development. The nation must explore a system of incentives for more energy efficient transportation.

6.2 H.R. 8631

6.2.1 Measure 1: Gas Guzzler Tax and Rebate

6.2.1.1 Disclosure of Automobile Fuel Inefficiency Tax and Disclosure of Automobile Fuel Efficiency Rebate

These provisions require that a statement of the tax paid or rebate credited be included with the sale of an automobile. The amount of the rebate and tax must be disclosed in any automobile advertising.

6.2.1.2 Fuel Inefficiency Tax and Fuel Efficiency Rebate

These provisions are presented as amendments to the Internal Revenue Code. The tax or rebate is imposed on the sale by the manufacturer of each automobile. The threshold levels, in mpg, for the tax and rebates are equivalent and correspond to the average fuel economy standard in 1978-80, and 1985. These threshold levels, above which the rebate is given and below which are taxed, are:

<u>MODEL YEAR</u>	<u>THRESHOLD LEVEL IN MPG</u>
78	18.0
79	19.0
80	20.0
81	21.5
82	23.0
83	24.5
84	26.0
85 and after	27.0

The size of the tax increases each year for each fuel economy rating such that the tax on cars with less than a 12.5 mpg rating rises from \$449 in 1978 to \$2488 in 1985. Rebates remain roughly constant or increase slightly at the 38-40 mpg level and higher, and decrease at all other lower levels over the 1977-1985 time frame. These relationships are shown in Figure 1.

A rebate coefficient will be determined each year after consultation with the EPA. This coefficient will be used to equalize the taxes collected and rebates paid, less expenses, for the year. It will be published prior to the year it applies. There are provisions such that these taxes are applied to leased automobiles.

6.2.2 Measure 4: Standby Gasoline Tax

A tax of 5¢/gal is imposed on gasoline sold by the producer or importer for each full percentage point that the domestic consumption of gasoline exceeds the national target. No more than 5¢ can be added each year and the total tax limit is 50¢/gal. The targets are:

1978	7.35 MMbbl/d
1980	7.45
1985	6.6
1987 and after	6.5

When the tax is imposed, it is also added to gasoline held by wholesalers. The tax, less administrative expenses, will be rebated with a per capita payment.

6.2.3 Measures 6, 8, 9: Aviation Fuel, Motorboat Gasoline, Bus Excise Taxes, Federal Vanpool Program

The provisions proposed are precisely as stated in the NEP.

6.3 ANALYSIS

The measures discussed in the NEP and not included in the Act are as follows:

- Auto efficiency standards rising after 1985
- Enforcement of 55 mph speed limit
- Mandatory fuel efficiency standards for light duty trucks up to 10,000 lbs.
- New government vehicles exceeding average fuel economy standards
- A study to examine energy transportation network

Figure 1. Rebate for Selected Fuel Economies

According to the Act, the actual rebate to a buyer of an energy efficient car could be either greater or less than the published schedule of rebates. The Act provides for a rebate coefficient that will adjust the rebate schedule so that the program pays for itself. Thus, if not many people buy inefficient cars in a given year, the funds for rebates will be less and the rebate per person will be correspondingly less.

Figure 2 shows how the guzzler tax increases as a function of mileage for 1982. The tax rapidly becomes large as fuel efficiency decreases. Moreover, the tax becomes stiffer in future years. In 1985, the maximum tax is \$2448.

From our preliminary analysis it seems that the government's strategy in the transportation sector will have an unexpected effect. The amount of gasoline consumption will decrease as a result of the auto efficiency standards, and the average cost of driving, per mile, will decrease. The result would seem to exceed the President's goal for gasoline savings while at the same time offering a disincentive to carpools and vanpools. This comes about as follows:

- a. The number of passenger auto miles driven in 1975 was 4800 miles per capita. The fleet average was 13.1 mpg and the population was 213 million. Using these data, we can account for 9.8 quads of gasoline consumed. Assuming that vehicle miles/capita/year increase at the pre-embargo rate of 3.5 percent per year (1965-1972), that the population will be 234 million in 1985 (Bureau of Census, Series II projection), and that the fleet average will be 21 mpg, we can account for 9.4 quads of gasoline consumed in 1985. If passenger autos continue to consume about 75 percent of the gasoline, since there are also taxes on air and marine fuel, and regulations on light trucks, then gasoline consumption will be 5.8 MMbbl/d in 1985. This is 0.8 MMbbl/d below the President's goal.
- b. The cost of gasoline will not increase greatly by 1985. The FEA-PIES model predicts 63¢/gal without the standby tax. With a fleet average of 21-25 mpg in 1985, the cost of driving will be 2.5-3.0¢/mile. This compares with 4.4¢/mile in 1975 when the fleet average was 13.1 mpg.

Thus, the fuel efficiency standards alone could cause the President's goal to be achieved. Increased prices of gasoline will have a negligible effect by themselves. The combined effect will be a decrease in the cost of driving which will act contrary to the government's interest in carpools, vanpools and mass transit.

Figure 2. 1982--Threshold Level =
23 Miles per Gallon

Apparently the standby gasoline tax is primarily an insurance policy to be used in case the automobile industry, helped by the gas guzzler tax, does not meet the legislated standards. There are also recent demographic trends which may provide some pressure for the need of the tax. Specifically, growth in non-metropolitan area population in recent years has been higher than metropolitan growth. The opposite relationship occurred when vehicle miles per capita were increasing at 3.5 percent per year. The growth rates associated with these time periods are:

	<u>1960-70</u>	<u>1970-74</u>
Metropolitan Population Growth Rate	1.6%/yr.	.9%/yr.
Non-Metropolitan Population Growth Rate	.4%/yr.	1.1%/yr.
Vehicle Miles Traveled Per Capita Growth Rate	3.5%/yr	-

Presuming that the average vehicle miles traveled per capita is larger in non-metropolitan than metropolitan areas, one could say these trends would provide for greater growth in the U.S. average vehicle miles/capita. By returning the average fuel cost per mile to about 1975 levels, the standby gasoline tax could serve as an insurance policy to mitigate demographic trends and protect against the failure of the mandated fuel economy standards.

The majority of freight energy is used by trucks. Trucking is energy inefficient relative to shipping by rail. Furthermore, ICC regulations cause fuel wasting because they result in such inefficient activities as empty trailer travel and indirect routing.

There is no long-term policy towards transportation formulated in the NEP or contained in the Act. While the reductions in oil consumption may occur because of the near-term provisions, the main problem, i.e., oil use, still remains. More attention must be directed toward mode and fuel switching in the transportation sector.

6.4 IMPLICATIONS FOR ERDA CONSERVATION

The President's transportation program has concentrated on incentives, assuming that the industry will respond to the customer's new economics. There are other programs, however, that could help conserve gasoline beyond the savings that will be provided by more efficient vehicles.

6.4.1 Alternate Fuels

ERDA already has a program to investigate the use of methanol in Otto-cycle engines. This program is scheduled for completion by 1985. The program could be accelerated to demonstrate the technology in two years. The program could be coupled with a synfuels program to establish the price of providing coal-derived methanol to service stations. A localized demonstration program that would be modeled after the introduction of no lead gasoline and catalytic converters could be initiated.

6.4.2 Vehicle Maintenance

Only the State of New Jersey presently requires analysis of exhaust gases during vehicle inspection. Many states do not even require mandatory vehicle inspection. This is true even of California, where emission standards are the highest in the country. ERDA could start an initiative within the Administration to require adequate vehicle maintenance.

6.4.3 Drivers' Education

At least two companies have adopted programs to train their drivers in energy conscious driving habits. These courses include time spent in simulators. They have resulted in increased fuel economy of 20 percent. ERDA could emphasize drivers' education as a near-term transportation goal. ERDA's present efforts in this area are not being given adequate emphasis nor are they being given adequate publicity. ERDA's drivers' education program was not included in ERDA 77-2.

6.4.4 Fuel Switching

ERDA must make the case for a long-term transportation strategy which shifts fuel use to sources other than oil.

6.4.5 Freight Transportation

ERDA could look at ways to improve the efficiency of the freight transportation system in this country, e.g., the shifting freight travel by truck to freight travel by rail.

7.0 ENERGY PRICES AND AVAILABILITY

7.1 FACT SHEET AND NEP

The 21 measures that affect energy prices directly are listed below:

a. Petroleum Products

- (1) Gasoline standby tax (see Section 6.0)
- (2) Tax on aviation and marine fuels (see Section 6.0)
- (3) Old oil wellhead price ceilings of \$5.25 and \$11.28 continued indefinitely and allowed to escalate at general rate of inflation.
- (4) New oil wellhead prices allowed to rise, over a three-year period, to current world prices (adjusted for the general rate of inflation). Thereafter, the wellhead price is only allowed to escalate with inflation.
- (5) Incremental tertiary and stripper oil would be allowed to rise to world price.
- (6) Old Alaskan oil is regulated at \$11.28/bbl, while new oil is allowed to go to 1977 world price levels.
- (7) Crude oil equalization tax: a tax equal to the difference between the price of that oil and the world oil price would be placed on domestic oil in three installments. However, authority would exist to discontinue the tax if world oil price increases significantly faster than the general rate of inflation.
- (8) Petroleum users' tax: beginning in 1979, industrial users would be taxed \$.90/bbl. This tax would rise to \$3.00 in 1985 and remain there afterwards. Beginning in 1983 and continuing thereafter, utilities would be taxed at \$1.50/bbl.
- (9) Gasoline prices will be decontrolled.
- (10) Shale oil will be allowed to receive world prices.

b. Natural Gas

- (11) Declining block rates for the sale of natural gas would be prohibited. Interruptible and seasonal rates would be required.
- (12) A new gas wellhead ceiling will be imposed for all new gas. The ceiling is tied to the Btu equivalent refiner acquisition price of domestic crude. The crude oil equalization tax is excluded in that refiner acquisition price.
- (13) Prices are guaranteed at current levels for currently flowing gas.
- (14) Incentive prices will be established for specific categories of high cost gas.

- (15) Gas made available at the expiration of interstate contracts or by production in excess of contracted volumes will be regulated at \$1.42/mcf. The same gas going to intrastate markets would be regulated at \$1.75/mcf. Both ceilings increase with the general rate of inflation.
- (16) The cost of more expensive new gas would be allocated to industrial users.
- (17) Extend federal jurisdiction to SNG plants.
- (18) Beginning in 1979, industrial users would be taxed an amount equal to the difference between their average cost of natural gas and a price target keyed to the current price of distillate. The target level would be \$1.05 below the price of distillate in 1979 and would rise to the distillate price by 1985. Utility users would be taxed at \$.50/mcf below the Btu equivalent price of distillate in 1983 and this would rise to distillate levels in 1988.

c. Electricity

- (19) The use of declining block rates would be prohibited.
- (20) Utilities must offer time-of-day rates if customers are willing to pay metering costs, and more advantageous rates to customers willing to accept interruptible service.
- (21) The new pricing and tax provisions will affect electricity prices because of their effect on oil and gas prices.

Many of the other NEP provisions will impact fuel prices but in less direct ways. For example, conservation measures have the effect of decreasing consumption and thus delaying the production of the next increment of a resource which is more expensive. These types of provisions are not discussed here.

7.2 H.R. 8631

7.2.1 Petroleum Products

7.2.1.1 Crude Oil Equalization Tax (COE)

The COE is applied in three increments beginning in 1978. The full tax is reached in 1980. For a particular type of crude, it will be equal to the difference between the national weighted average cost and the national weighted average cost to domestic refineries, exclusive of any tariffs or import fees.

7.2.1.2 Refund of Crude Oil Equalization Tax

The government will refund the tax to vendors of distillate heating oil

for residences if the vendor proves he has subtracted the tax from the distillate price.

7.2.1.3 Per Capita Payment of Crude Oil Equalization Tax

The revenues collected from the COE will be returned to the public in per capita payments after administrative expenses and rebates for home heating oil are subtracted.

7.2.1.4 Measure 8: Oil Consumption Tax

The oil consumption tax applies to all petroleum products used by industry or utilities. The tax rises from \$.15/MMBtu in 1979 to \$.50/MMBtu in 1985 and after. The tax is increased at the general inflation rate. The full tax is not applied in every case. There is a sliding scale of the taxable use based on total Btus of oil and gas consumed. However, the tax only applies to the oil usage.

The determination of total oil and gas Btus consumed is not calculated at the "controlled group" level. This is an Internal Revenue Code definition and generally means the consumption for tax purposes will be determined at the company level.

Any taxable electric utility use of petroleum is taxed at \$.25/MMBtu beginning in 1983.

7.2.2 Natural Gas

7.2.2.1 Measure 18: Gas Consumption Tax

The gas tax is also adjusted for inflation and taxable use determined by "controlled groups." The gas consumption tax is tied to the average regional prices of No. 2 grade distillate sold for all taxable use. The regions are Petroleum Administration for Defense Districts (PADs). The distillate price used is the price before the oil consumption tax is applied.

For industry, the gas is taxed up to \$1.05 below the distillate price in 1979 and rises to the distillate price in 1985. For electric utilities, the gas is taxed up to \$.50 below the price of distillate in 1983 and rises to the distillate price in 1988.

For groups who produce gas for their own use, the tax would also apply. A price for the gas would be calculated based on the Act's gas pricing provisions and the tax tied to the regional price of distillate.

7.2.2.2 Measures 11-17: Natural Gas Pricing

The eight measures in the Fact Sheet and NEP are incorporated in the Act as listed above. Additionally, the Act states that all gas prices will be allowed to increase with the general rate of inflation. The categories of gas for which the President can set special prices include gas from geopressurized zones, gas from wells under 500 feet of water or greater, and gas from wells drilled below 15,000 feet of the land surface.

The Act specifies that the more expensive new gas be incrementally priced to low priority users. Specifically, any portion of the average cost of natural gas which exceeds the average cost in the 12-month period before the Act's enactment must be passed to low-priority users. However, the resulting price to low-priority users cannot exceed the cost of substitute fuels. Low-priority users are all users except residences and commercial establishments using less than 50 mcf on a peak day.

7.2.2.3 Industrial Oil and Gas Conversion Rebate

See Section 2.0.

7.2.2.4 Utility Oil and Gas Conversion Rebate

See Section 3.0.

7.2.3 Electricity

All of the Act's provisions relating to electricity are discussed in Section 3.0.

7.3 ANALYSIS

Although the Administration is specific in the NEP and the message as to what is meant by the crude oil equalization tax and the incremental pricing of new gas, the actual wording in the Act is unclear. Thus, the Administration has left itself some flexibility in the interpretation of the Act.

The NEP states that the costs of gas which exceed the average cost of gas computed over the 12-month period preceding enactment of the Act will be passed to low-priority users. However, the gas price to low-priority users cannot exceed "the reasonable price (as determined by the President)

of substitute fuels." As with the wording of the COE, the Administration has provided itself some flexibility of interpretation.

The following table shows the 1985 projected fuel prices resulting from the NEP. They are based on an April 14, 1977, run of the FEA-PIES model. This scenario is denoted as the "President's Initiative" by PIES. The model has only been run for 1985 and has incorporated the NEP provisions as they were formulated at that time. Since then, some of the provisions have been altered and adjustments have been made to reflect the specifics of the Act. The 1985 base case which does not include any of the NEP provisions is also shown in the table. Key assumptions of the base case are:

- Continued regulation of natural gas
- Constant imported oil prices (\$13.00/bbl)
- Average electric utility load factor of .60 (this value goes to .625 in the President's initiative case).

The average price paid by industry for natural gas does not reflect the total gas consumption tax. This is true for two reasons. First, taxable use may be from 0 to 100 percent of total use as determined by the "controlled groups" consumption. Second, investment in alternative energy property is deducted directly from the gas tax. Because of these factors, the FEA calculates that the average gas tax will bring the gas price to \$.14/MMBtu below the price of distillate. The figures shown in parenthesis in the table are the prices with the total tax in effect.

As shown in Table 1, the largest price impacts are on the industrial sector. Natural gas shows the greatest price differences from the base case. Assuming the Act is passed in its current form, the natural gas prices to the residential and commercial sectors will be the 1977 prices. The prices shown are the 1976 prices escalated to 1977 by the same real rate of escalation that occurred in the 1975-76 time frame. Thus, the NEP residential price is .69 cents cheaper than the base case, and the commercial price is \$1.02 cheaper. The industrial price is \$1.06 more expensive than the base case.

National electricity prices are shown not to differ significantly from the base case even though 14 percent of the 1985 energy is projected to come from taxed oil and gas. There are a number of reasons why this is true. First, the 14 percent from oil and gas is broken down into 11 percent oil and 3 percent gas. Thus, the majority is oil and the oil tax only adds 2.5-4.0 mills/Kwh to the price of delivered power. The range reflects the costs from

TABLE 1

NATIONAL AVERAGE RETAIL PRICES
BY CONSUMING SECTORS

In \$MMBtu (1975 \$)

(Prices include all taxes except gasoline standby tax)

	1975	1985 (NEP)	1985 (REFERENCE)
ELECTRICITY			
Residential	9.47	10.62	10.63
Commercial	9.27	10.81	10.74
Industrial	5.60	8.51	8.51
NATURAL GAS			
Residential	1.69	1.93	2.62
Commercial	1.34	1.51	2.53
Industrial	.88	3.12 (3.26)	2.06
DISTILLATE			
Residential	2.79	3.33	3.32
Commercial	2.58	3.27	3.08
Industrial	2.56	3.76	3.08
RESIDUAL			
Commercial	2.10	2.68	2.64
Industrial	2.10	3.10	2.60
LIQUID GAS			
Residential	2.64	3.85	3.55
Industrial	2.38	4.10	3.33
COAL			
Industrial	.86	1.59	1.47
TRANSPORTATION SECTOR			
Gasoline	4.57	5.40	5.12
Jet Fuel	2.98	3.67	3.48
Distillate	3.51	4.25	4.06
Residual	2.13	2.66	2.61
AVERAGE SECTOR PRICES			
Residential	3.58	4.41	4.97
Commercial	3.78	5.41	5.79
Industrial	1.90	3.77 (3.81)	3.61
Transportation	4.17	4.86	4.63

base and peak power.

The second factor is that the NEP is assumed to increase the system load factor from .60 in the base case to .625. This results in a larger fraction of the power being generated by base plants. Base plants produce cheaper power than other plants.

The last factor is that utilities are projected to convert 16.6 GWe of oil and gas plants by 1985. The conversion costs are subtracted directly from oil and gas taxes, and the delivered power from coal is cheaper than from oil or gas.

There are some regions that show substantial increases in the electricity prices over the base case. The largest increases occur in the Southwest which is projected to obtain 20 percent of its energy from gas in 1985.

The prices of delivered residual, distillate, and liquid gas to industry all contain the \$.50/MMBtu tax. The prices of these fuels to the other sectors do not differ largely from the base case because the refiner acquisition cost of crude is equivalent in both scenarios. They are equivalent for the base case because oil is decontrolled and goes to the world price. In the NEP scenario, crude oil is taxed to the world price by the crude oil equalization tax. In both cases, the world oil price is specified as \$13.00/bbl.

The same argument that applied for petroleum products applies to the transportation sector, i.e., the cost of crude is equivalent in both scenarios. The small differences between the scenarios shown are due to differing demand-supply interactions and different levels of imports and domestic oil produced. The standby gasoline tax is not shown.

The NEP has some interesting effects on average sector prices. Despite the taxes and pricing policies contained in the NEP which affect mostly industrial prices, the PIES model projects the average sector price of all energy to industry to exceed the base case price by only \$.16/MMBtu in 1985. This is due to the fact that the FEA specified an industrial shift of 4.7 quads of oil and gas to coal. This substantially larger use of coal mitigates all of the other tax and pricing effects in this sector. Even so, the average industrial sector prices show the largest growth from 1975. The sector price growth rates are shown below.

<u>SECTOR</u>	<u>GROWTH RATE 1975-85 (AVERAGE %/YEAR)</u>
Residential	2.1
Commercial	3.7
Industrial	7.1
Transportation	1.5

Thus, the residential sector is not only relatively insulated from the tax and pricing provisions of the NEP but, in fact, will face a lower set of energy prices than in the base case. The same is true of the commercial sector.

The industrial sector will face the highest prices of all. On further investigation, however, these low prices are due to an assumption that the price of imported oil remains at \$13.00/bbl in real dollars. If the price of oil rises, it will be reflected to a much greater extent in the transportation sector than in the other sectors.

The NEP results in an increase in domestic production of oil, gas, and coal shown below.

<u>FUEL</u>	<u>NEP (1985)</u>	<u>BASE (1985)</u>	<u>% Δ</u>
Oil	10.5 MMbbl/d	10.4 MMbbl/d	+ 1.0
Gas	17.2 Tcf	16.6 Tcf	+ 3.6
Coal	1264.7 M/tons	1065.7 M/tons	+18.7

The domestic production of oil changes only slightly in the two cases. In the base case, oil is decontrolled and goes to the world price of \$13.00/bbl. In the NEP scenario, new oil goes to the 1977 world price which is \$13.00. Since the world price of crude then remains at a real price of \$13.00/bbl in both scenarios, the conditions are essentially equivalent.

Gas production increases by .6 Tcf over the base case due to the new price ceilings, in the NEP scenario, which are tied to the domestic refiner acquisition cost of crude. In the base case, the ceiling price is held constant at \$1.33/mcf.

Although the NEP is not projected to result in large amounts of additional gas becoming available by 1985, it does have a significant impact

on the pattern of distribution. In the base case, 56 percent of the gas goes to the interstate market, while with the NEP, 79 percent goes to the interstate market. This occurs because both intrastate and interstate gas in the NEP becomes regulated at the same wellhead price.

In the NEP case, coal consumption is greater than the base case by 200 million tons. The industrial sector accounts for 89 percent of the additional demand.

The NEP also results in differences in the levels of imports:

<u>FUEL</u>	<u>NEP</u>	<u>BASE</u>	<u>% Δ</u>
Oil	7.1 MMbbl/d	11.5 MMbbl/d	- 38.4%
Gas	1.3 Tcf	1.2 Tcf	+ 8.3%

As shown above, gas imports increase by only .1 Tcf over the base case. Oil imports are radically different in the two cases. The NEP is projected to result in a level of imports 4.4 MMbbl/d less than in the base case. However, it should be noted that 78 percent of the decrease is due to assumed conservation savings and assumed industrial demand shifts to coal.

7.4 IMPLICATIONS FOR ERDA CONSERVATION

The new price structure removes a major uncertainty for ERDA. The relative prices of various fuels will soon be fixed and the actual prices will be tied to world oil prices. ERDA can then use these prices to assess technologies and their ability to be taken up by the marketplace. It can be assumed that several currently funded projects will no longer require government funding, while several other projects will not qualify for ERDA assistance under established threshold criteria. Where new technologies now appear to be competitive, ERDA can run demonstration programs and disseminate information to convince consumers that the time is right for major investments in conservation.

Because the pricing proposals are complicated, the overall effect of the new prices is unclear. The Conservation Policy and Planning Office can undertake studies to help the Administration in appreciating some of the implications of the new policies. In the residential sector for example, energy prices will be maintained at a low level, and gas will continue to be priced at 10 percent of the cost of electricity. Although gas is favored economically, it is still difficult to derive an estimate of future gas

consumption. The supply of gas to new residences will be affected by several price changes, by taxes and by regulations that affect the supplier industry.

In the industrial sector, input-output modeling can be used to identify the industries that will be most affected by the new policies. This could lead to new criteria for R&D projects in the industrial sector.

Because the new pricing policy affects all consumers, ERDA potentially has a new role in the area of information dissemination. ERDA can create models that would assist consumers in making economic choices under the new regulations. This would be especially useful for small industrial firms, and commercial and residential consumers who lack the ability to perform the calculations themselves.

A consumer could submit his alternatives for energy conservation to the Energy Extension Service. ERDA Conservation could then perform an economic evaluation of the choices, and provide the consumer with best estimates of first cost, lifecycle costs, and payback periods.