

**REPORT OF THE
ENERGY STUDY COMMISSION**

**TO
THE GOVERNOR
AND
THE GENERAL ASSEMBLY OF VIRGINIA**



SENATE DOCUMENT NO. 12

COMMONWEALTH OF VIRGINIA

Richmond

1977

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**REPORT OF THE
ENERGY STUDY COMMISSION**

Richmond, Virginia

November, 1976

TO: The Honorable Mills E. Godwin, Jr., Governor of Virginia

and

The General Assembly

I. INTRODUCTION

The "energy crisis" of the winter of 1973-1974 brought into sharp focus the United States' mounting problems with the production and conservation of energy resources. The domestic supply of usable energy resources could not meet the tremendous demand and imported resources no longer promised availability of energy at low cost. It became evident that a reevaluation of national and statewide policies and priorities with respect to energy was necessary.

The General Assembly of Virginia responded to this challenge by creating the Commission to Study the Energy Crisis pursuant to S.J.R. No. 128 in 1973:

SENATE JOINT RESOLUTION NO. 128

Creating a commission to study the energy crises in the Commonwealth.

WHEREAS, a conflict exists between the Commonwealth's increasing demand for energy to further economic growth and maintain a high standard of living, and its ability to provide that energy; and

WHEREAS, such conflict affects not only the Commonwealth, but also the nation, and has been termed an energy crisis; and

WHEREAS, the elements of this crisis consist of a decreasing supply of fuels, an increasing demand for the energy created by these fuels, and an increasing cost to acquire them; and

WHEREAS, ways must be found to meet the increasing demand for energy-producing fuel without sacrificing our natural environment; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That there is hereby created the Commission to Study the Energy Crises in the Commonwealth, hereinafter referred to as the Commission. The Commission shall study dimensions and consequences of the energy crises by conducting a study of the existing and future demands for energy-producing fuels in the Commonwealth, the amounts and types of needed fuel supplies that will be available, the likely cost to the future consumers of energy in Virginia, and the environmental consequences of extracting and utilizing such fuels.

The Commission shall be composed of eleven members, five to be appointed by the Speaker of the House of Delegates from the membership thereof, three to be appointed by the Committee on Privileges and Elections of the Senate from the membership of the Senate and three to be appointed by the Governor from the State at large.

Members of the Commission shall serve without compensation but shall be reimbursed for the expenses incurred by them in the performance of their duties in the work of the Commission, for which, and for such other expenses as may be required, including secretarial and other professional assistance, there is hereby appropriated from the contingent fund of the General Assembly the sum of fifty thousand dollars.

The Commission shall submit to the General Assembly an interim report no later than November one, nineteen hundred seventy-three, and a final report no later than November one, nineteen hundred seventy-four, of its findings along with recommendations to be considered in establishing an energy policy for the Commonwealth designed to meet the energy crises.

In the course of their study, the Commission realized that despite the disappearance of long lines at the gasoline stations, the energy outlook in America was growing worse, not better. The search for new and expanded sources of energy and the development and production of these sources was simply not keeping pace with the growing consumption. This mismatch in supply and demand and all its related problems threatened to be long term in duration.

Therefore, the Commission, in addition to submitting legislation on conservation of existing energy supplies and development of new recovery means for existing natural resources, recommended in 1975 that the Commission's study be continued, that their name be changed to the Energy Study Commission and that their focus be shifted to the formulation of long range energy objectives for the State of Virginia. The directives were set out in S.J.R. No. 97 as passed by the 1975 General Assembly.

SENATE JOINT RESOLUTION NO. 97

Continuing the Commission to study the energy problems of the Commonwealth.

WHEREAS, the Commonwealth and the nation experienced an energy crisis in the winter of 1973-1974; and

WHEREAS, this crisis precipitated a study that was set out in Senate Joint Resolution No. 128 by the General Assembly in 1973 which led to an interim report (SD #6, 1974) and a final report (January 1975) by the Energy Crisis Study Commission; and

WHEREAS, the energy crisis has become an energy problem predicted to be of long-term duration; and

WHEREAS, although the Commission worked diligently, work remains to be done; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Commission to Study the Energy Crisis in the Commonwealth is hereby continued and renamed the Energy Study Commission. The Commission shall study ways in which the State can take action on energy problems, including specific suggestions and legislative recommendations on the State setting the example for increasing energy supply and decreasing energy demand, requesting and encouraging voluntary conservation, requesting or requiring localities to enact energy and conservation measures, and requiring State energy conservation measures. Along with the recommendations the Commission shall submit means for implementation and note expected benefits.

The present eleven members of the Commission shall continue to serve, and the Commission shall be increased to fourteen members, five appointed by the Speaker of the House of Delegates from the membership thereof, three appointed by the Committee on Privileges and Elections of the Senate from the membership of the Senate and six appointed by the Governor, to include: one from an established Virginia environmental group; one from Virginia industry; two from local government, including one from a rural area and one from an urban area of the State; and two from the State at large. If a vacancy occurs for any reason, the appropriate above named person or persons shall appoint a successor.

Members of the Commission shall serve without compensation but shall be reimbursed for the expenses incurred by them in the performance of their duties in the work of the Commission. For such other expenses as may be required, including secretarial and other professional assistance, the balance of the funds previously allocated to the Commission from the contingent fund of the General Assembly are hereby reallocated for the purposes of this study. All State agencies shall assist the Commission in its work.

The Commission shall submit to the Governor and the General Assembly an interim report no later than November one, nineteen hundred seventy-five, and a final report no later than November one, nineteen hundred seventy-six, of its findings along with recommendations to be considered in establishing an energy policy for the Commonwealth designed to meet the energy problem.

II ORGANIZATION AND WORK OF THE COMMISSION

The members of the present Commission who have served since 1973 are: C. D. Dunford, Delegate from Tazewell; Claiborne Gregory, representative of Virginia Petroleum Industries; George W. Jones, Delegate from Bon Air; Glenn B. McClanan, Delegate from Virginia Beach; John L. Melnick, Delegate from Arlington; Lewis W. Parker, Jr., Delegate from South Hill; Stanley Ragone, representative of VEPCO; Eugene M. Scheel, Environmentalist. Present members appointed to serve on the Commission in subsequent years are: Charles J. Colgan, Senator from Manassas; Virgil H. Goode, Jr., Senator from Rocky Mount; W. S. Kerr, Commonwealth's Attorney from Appomattox; Madison E. Marye, Senator from Shawsville; Frank T. Sutton, representative of the Commonwealth Natural Gas Corporation. The members elected Delegate Dunford to serve as the Chairman in 1976.

In the first two years of its existence, the Commission directed its attention primarily to energy conservation and to those aspects of the energy crisis relating to fossil fuels. Summaries of the findings of the Commission during its first two years can be found in Senate Document No. 6 (1974) and Senate Document No. 23 (1975).

Throughout 1975, the Commission focused on solar energy and its potential and future in the Commonwealth. Details of their activities and conclusions can be found in Senate Document No. 22 (1975).

In the past year, the Commission turned its consideration to the overall energy situation on the State and national level with the intention of determining a sound and cohesive statewide energy program for the Commonwealth.

Commission members listened to testimony from State officials concerned with energy related matters and from representatives of the Federal Energy Administration (FEA) and the Energy Research and Development Administration (ERDA). Information gathered from these experts indicate that the energy problem is still a matter of serious concern and requires the combined efforts of the private and public sector in order to shift our growing dependence on foreign resources back to reliance on domestically produced energy sources. Commerce Secretary Richardson has reported that if the importation of foreign oil continues to increase at the present rate, an oil embargo in 1985 could produce "catastrophic results" - a loss in the Gross National Product of more than \$50 billion in one year and a loss of 1.3 million jobs, even if the United States had a billion barrels of oil in strategic storage. Incentives must be provided to locate and to develop the energy resources in this country and at the same time reduce the consumption of the supplies we now have.

Although there are several State and Federal agencies now striving diligently to handle this complex problem, an overall

commitment and direction is lacking on the national level. Congress and the Administration have not been able to agree on energy proposals and this failure to agree has resulted in the enactment of few progressive energy measures. The fundamental principles of the country's approach to energy are still in dispute.

On the State level, there is a lack of organization and funding necessary to carry out an effective and comprehensive program for the Commonwealth. The following executive entities all have some input into the state energy picture: (i) the Electricity Costs Commission funded at an estimated cost of \$70,000.00 per year; (ii) the Energy Resource Advisory Commission funded at an estimated cost of \$7,000.00 to \$8,000.00 for the present biennium; and the Ad Hoc Committee on Energy Conservation in State Government to be funded at an estimated cost of \$5,000.00 to \$7,000.00 for the present biennium. The General Assembly receives energy information from both this study, the Energy Study Commission, and the Coal and Energy Study Commission. The above mentioned costs represent the out of pocket costs to the energy groups previously mentioned and do not include the time and work of the State Energy Office which often provides valuable staff work and expertise to these groups. And finally, among the general public, there is a basic lack of information and incentive, both of which are essential to a national and State program of energy conservation.

III. RECOMMENDATIONS

As a result of its meetings and research the Commission offers the following recommendations:

1. That the responsibility for the study, administration and implementation of statewide energy programs be consolidated in one centralized authority.

Energy is a subject of vital concern to all citizens of the Commonwealth and worthy of concentrated, full time attention. At the present time, there are several groups studying and advising on the energy situation; however, it is the opinion of the Commission that a single office with appropriate authority and funding could better determine and implement an effective statewide energy program. It is believed that one office should determine State energy policy and then coordinate all energy related activities between agencies of the Federal, State, county and municipal governments and maintain appropriate liason with these agencies in order to promote energy resource development and management. Inasmuch as the roll of the private sector is so crucial in this issue, it is important to have a consolidated office capable of communicating with and encouraging cooperation on the part of the State's businesses, industries, institutions and the general public. See Appendix I of this report for the resolution continuing the Energy Study Commission.

2. That an effective public information program be launched throughout the State to inform citizens, commerce and industry of

the wisdom and necessity of energy conservation.

Although we are not presently suffering an "energy crisis" like the one in 1973-74, the possibility of another oil embargo plus domestic shortages is a serious threat and should be of immediate concern. All citizens must be made aware of this problem and the necessity and wisdom of incorporating conservation practices into their daily lives, as well as the consequences of not doing so. A statewide program designed to inform Virginians about the nature and scope of the energy problem and how they can contribute to its solution is of utmost importance. Also, the State Board of Education should supplement classroom instruction at all levels of the public school system by using such materials as "Energy Conservation in the Classroom", a series of pamphlets distributed by the State Energy Office. It should be the public policy of Virginia to encourage the young people of this State to better prepare themselves for possible energy consequences and changes which will be encountered in the future.

3. That the production and utilization of coal be emphasized and encouraged.

Coal is Virginia's most abundant fossil fuel. Yet, at the present time, only thirteen percent of the Commonwealth's total energy supply is derived from coal. It is the opinion of the Commission that every aspect of coal exploration, extraction, transportation and conversion should be researched and developed. In particular, methods should be developed to insure that in the future, coal which is mined in Virginia will be as competitive as possible with coal being produced in the western United States.

According to the U. S. Bureau of Mines statistics, the United States has 32% of the world's coal supply, and coal makes up 88% of the nations total known fossil fuel deposits. It is estimated that we have coal resources in this nation large enough to last up to 400 years at present consumption rates . By way of comparison, the United States has a greater amount of energy in its coal resources than the energy contained within the entire Middle East oil deposits. Given this abundance of coal at home and the fact that domestic supplies of oil and natural gas are dwindling rapidly, and dependence on foreign sources is not economically desirable or in the national interest, the Commission believes that coal as an energy resource must be pursued and the problems surrounding its extraction, production and use should be given special consideration. Some of the areas that should be pursued are: research and development of coal gasification; liquification and solvent refinement; intensive research to make coal a clean fuel, including the development of better stack gas sulphur removal devices; a study of tax incentives for industries which install and use pollution control equipment; continuation of surface mining of coal in Virginia in accordance with proper reclamation standards; and a re-evaluation of surface mining laws and procedures to insure the continuation of surface mining in this State while at the same time maintaining adequate safeguards and proper reclamation standards. The United States should look to the potential of coal in helping to attain national energy self-sufficiency. Energy self-

sufficiency is a national commitment in the Republic of South Africa. The South Africans have developed the two Sasol plants which provide for the conversion of coal to liquid and gaseous fuels plus various petro-chemicals. The Sasol plants will provide 50% of South Africa's liquid fuel needs and all their electrical power.

4. That offshore exploration and drilling for oil and natural gas be encouraged with proper safeguards and that the construction and expansion of refineries also be encouraged.

The United States is currently using about seventeen million barrels per day of petroleum products which represents 46 percent of current annual energy supply. We are importing approximately 43 percent of our petroleum needs. If current trends continue, oil imports could exceed 13 million barrels per day in 1985. At the same time, our domestic crude oil production has dropped to 10 million barrels per day, the lowest in almost a decade. Russia passed the United States in daily crude oil production in 1976. In addition to reevaluating our governmental policies on the production, pricing and importation of oil, it is essential that the United States continue its exploration and development of domestic petroleum supplies. Certain controls imposed by numerous Federal agencies should be modified or repealed to allow for the full production of America's petroleum resources.

The production of natural gas, the second largest source of energy, is also rapidly declining in the United States. Although natural gas supplies 28 percent of the total energy need, domestic production has declined 11 percent since 1973, the peak year. In Virginia, the supply of natural gas in the winter of 1976-77 is expected to be approximately equal to the supply which was available in 1975. Curtailments of delivery are in the range of 25-30 percent compared with 1972-73 supplies. Because natural gas is so important to the industrial and the household sector, it is necessary that sufficient supplies remain available to these consumers.

Exploration for both petroleum and natural gas is in the initial stage in the Atlantic Outer Continental Shelf. The Department of the Interior estimates that the total take from the area will be 2 billion to 4 billion barrels of oil and 5 trillion to 14 trillion cubic feet of gas. By comparison, the United States uses 5.9 billion barrels of oil per year and 20 trillion cubic feet of gas. There is considerable controversy among the Administration, Congress, the States and industry on establishing rules for developing the Outer Continental Shelf. At the present time, leasing is conducted under the 1956 Outer Continental Shelf Lands Act. The first sale of leases was completed in 1976 on lands 50-100 miles off the coast of New Jersey and Delaware. Virginia land was not included in this first offering. Virginia Outer Continental Shelf land will not be offered until mid 1978. It is interesting to note that there is a time lapse of around five years between sale of lease and flow of oil or natural gas.

The exploration and development of the Atlantic Outer Continental Shelf should be encouraged. Strategically located refineries and on-shore oil facilities should also be encouraged provided such refineries and facilities meet adequate and reasonable

environmental, health and safety requirements. It is vital that a fine balance between industrial and environmental concerns be maintained when building refineries so that economic activities such as the seafood industry are not jeopardized. Also the possibility of a deep water port off Virginia's coast for large oil tankers should be studied further by this State and the federal government and private industry should be encouraged to examine this area.

5. That safe nuclear generation of electricity be considered where technically and economically appropriate.

As problems with the production and importation of fossil fuels continue to grow, nuclear power offers an increasingly important alternative. Although nuclear fuel is of significance only to the production of electricity, it must be noted that electricity now accounts for 25 percent of the total energy consumed in this country. Increased use of nuclear energy by electric utilities makes available a greater supply of distillate fuels to other sectors, such as the household and transportation sectors which can use them more efficiently.

6. That solar research and development activities be encouraged and that incentives for individuals and businesses be studied to promote their investment in solar units.

Fossil energy sources are non-renewable. It is estimated that petroleum reserves are being depleted at such a rate that within the next century, they will be effectively exhausted. The price of fossil fuels has escalated as demand has increased and available supplies have become scarcer. Solar energy is a renewable, low-intensity resource. Solar energy does not present the pollution problems which often exist in other forms of energy. The economic costs to society of continuing the complex network of discovering and supplying fossil fuel should be weighed against the costs of developing suitable energy alternatives such as solar energy. An energy network which is based on resources nearing depletion must be carefully analyzed. Solar energy systems have higher acquisition costs than systems powered by fossil fuels.

At the present time, one quarter of all energy consumed in this country is used in relatively low temperature heating of water to supplement residential, commercial and industrial hot water systems in addition to the heating and cooling of buildings. We are burning our highest grade fuels for which there are no available substitutes to accomplish these purposes when solar energy could accomplish the task. Solar energy can be collected, converted and used all at one location. Although solar energy is considered by many as a novel source of power, the National Science Foundation Studies have shown that present limited application is possible. Solar units have proven themselves valuable as a source of supplemental heating and cooling. Because these units are designed only to heat and cool the building and heat hot water, they are especially suited to office buildings and schools. The Fauquier County High School in Warrenton, which was funded by a National Science Foundation grant, is an example of a working solar energy

project in Virginia. In Hampton, the National Aeronautics and Space Administration (NASA) has constructed an experimental energy saving home and engineering building, both designed to use solar energy for heating and air conditioning. In Virginia Beach, there is a privately constructed residence implementing solar energy for heating and cooling. Other projects making use of solar energy are a condominium in Berryville, the Terraset School in Reston and the Madeira School in Great Falls, Virginia. See Appendix II of this report for a statement describing the NASA solar energy unit in Hampton.

In 1972, nearly 26 percent of our total national energy consumption was devoted to direct process industrial heating, a very low form of energy use. Oil should be used for more efficient and useful tasks. Solar energy would provide an expedient means of satisfying such low-form demands while preserving depleting petroleum resources for higher uses. Although an alternate energy source might be necessary during inclement weather, thus causing problems in forecasting demand and planning for peak loads, solar energy's potential for reducing the use of more costly energy resources such as oil and coal makes it worthy of further research and development.

It is the opinion of the Commission that further research on solar energy should be encouraged by the State and that the use and development of solar energy by individuals and businesses be commended. Tax credits and incentives should be considered for investments in solar and other alternate energy units.

7. That the Commonwealth pursue the idea of solid waste as a source of energy.

Solid waste is a domestic source of heat energy that has the advantages of dependability, volume and fair BTU (heat) quality. Seventy to eighty percent of the 125 million tons of waste Americans throw away annually consists of paper, wood, cardboard, food scraps, and plastic which are burnable as a boiler fuel or which can be processed into pipeline gas. The balance of the solid waste is mostly glass, metal and dirt. The glass and metal can be recycled (chiefly aluminum at about \$200 per ton for scrap and steel at \$10 per ton for scrap) which results in large energy savings over the cost and energy expense of processing virgin ore. The disadvantages of utilizing the energy in solid waste (and recycling) are the initial cost of equipment, transportation, possible pollution, and the fact that it is only feasible in or near cities or metropolitan areas.

A Commission to study the possibilities of Solid Waste was set up by the General Assembly in 1973. This Commission intends to submit to the 1978 General Assembly a statewide solid waste management plan. Included in this plan will be provisions for energy producing facilities.

8. That research on and development of alternate energy sources be encouraged.

No potential source of energy should be neglected especially in light of the future possibilities. Energy sources such as magneto-hydrodynamics utilizing coal, hydrogen, geothermal and wind might hold some promise for Virginia.

9. That an active energy conservation program be developed for the Commonwealth.

The Commission recognizes that the only sure and immediate way to lessen the energy problem is to decrease demand. The State should employ all feasible energy saving measures and at the same time encourage private industry, commerce and residential consumers both by example and incentives to practice conservation.

The Federal Energy Policy and Conservation Act authorizes Federal funds to States willing to participate in a voluntary State-Federal joint undertaking with the goal of reducing State energy demand by 5 percent by 1980. At present, the State Energy Office has been assigned the task of developing a program by the Governor and will submit a management and conservation plan prior to the convening of the 1977 Session of the General Assembly. Other proposals which would curb demand for energy in its various forms are:

A. Revision of energy pricing and policies in order to encourage conservation.

B. Home construction standards should be altered and building codes revised to require more insulation, more efficient use of lighting and air conditioning according to sun and wind direction.

C. Decreased reliance on the individual usage of automobiles through the more efficient and increased use of other forms of transportation. This could be accomplished through the greater use of multi-passenger public transportation, encouragement of car pools, a reduction in the use of excessive gas consuming vehicles, and encouraging the construction and use of automobiles with higher miles per gallon gasoline efficiency ratings.

D. Continued promotion of State voluntary energy conservation program with special attention placed on more efficient driving habits.

E. To memorialize the United States Congress and the Executive Branch of the federal government to enact a comprehensive and wide reaching national energy policy.

Respectfully submitted,

C. Don Dunford, Chairman

Charles J. Colgan

Virgil H. Goode, Jr.

Claiborne D. Gregory

George W. Jones

W. S. Kerr

Madison E. Marye

Glenn B. McClanan

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Lewis W. Parker, Jr.

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Eugene M. Scheel

Frank T. Sutton, III

C O M M E N T S
UPON AND DISSENTS AS TO PORTIONS OF
THE FINAL REPORT
OF
THE VIRGINIA ENERGY STUDY COMMISSION

*DELEGATE GLENN B. McCLANAN.

In response to your letter of December 27, I enclose herewith my comments and dissent as to parts of the final report of the Virginia Energy Study Commission.

1. That the responsibility for the study, and implementation of a statewide energy program be consolidated in one centralized authority.

COMMENT: While I have some concern about the number of commissions and offices in Virginia working on various aspects of the energy problem, I have very serious reservations about establishing still another State agency, which will surely quickly grow and expand in the usual governmental bureaucratic style. Also, since the energy problem is such a complex and diverse matter, there is significant merit and strength in the present system of approaching the problem in different ways by different agencies and people. Certainly, continuing direct participation by legislators in the decision-making process is essential, as a means of keeping the decisions as directly responsive to the electorate of Virginia as possible.

2. That an effective public information program be launched throughout the State to inform citizens, commerce and industry of the wisdom and necessity of energy conservation.

COMMENT: I enthusiastically endorse this recommendation.

3. That the production and utilization of coal be emphasized and encouraged.

COMMENT: I endorse this recommendation to the extent that same can be accomplished pursuant to good quality land reclamation standards and without a lowering of air quality to a degree that would result in damage to the health of persons residing in the areas where coal is utilized.

4. That offshore exploration and drilling for oil and natural gas be encouraged with proper safeguards and that the construction and expansion of refineries also be promoted.

COMMENT: This recommendation is far too broad.

a) Offshore exploration and drilling for oil and natural gas - The Supreme Court case of the United States v. Maine established that State control only extends to a point three (3) miles off the coast. This means that the exploration and drilling could occur only three (3) miles off Virginia Beach. Obviously, this close proximity would not be acceptable. Though we have been lead to believe that exploration off Virginia's coast would occur approximately seventy-five (75) miles offshore, on approximately November 15, 1976, the Bureau of Land Management of the United States Department of the Interior announced that they were considering areas for leasing as close as fifteen (15) miles offshore from New York, New Jersey, Delaware, Maryland, and Virginia. The primary concern of Virginia must be that offshore drilling for oil and natural gas be done without damage to our valuable recreational (beach) and other marine resources.

b) The suggestion that is reported to have been made by Senator Charles J. Colgan that oil drilling occur within the three mile limit off the coast of The City of Virginia Beach, Northampton County, and Accomack County is totally unacceptable. The small amount of petroleum resources that could possibly be found within such a narrow strip of ocean just off our coast could not possibly match the very real likelihood that both severe environmental damage would occur combined with the ugly sight of petroleum apparatus just off our beaches. We must realize the many millions of dollars received by the State of Virginia and its citizens from the tourist industry each year. We must further realize that recent events have amply proved that adequate oil spill containment capability simply does not exist for Atlantic Ocean conditions.

c) The construction and expansion of refineries - First, we must recognize that our energy problem is the result of a shortage of crude oil, and is not due to a shortage of refining capacity. Few refineries in America, including the Amoco Refinery at Yorktown, are now operating at full capacity. A refinery being constructed in Portsmouth, or elsewhere, is not going to insure Virginians of petroleum products at reasonable prices. Also, we must recognize that refineries traditionally are a major source of air and water pollution. Again, Virginia's main concern must be the protection of its environment and the health of its citizens. If a refinery can be built in Portsmouth, or elsewhere, without these adverse consequences, it should be constructed. Otherwise, it should certainly not be encouraged.

5. That safe nuclear generation of electricity be considered where technically and economically appropriate.

COMMENT: We must recognize that the construction of nuclear reactors to produce electricity requires a tremendous amount of capital, substantially more than any other facility producing electricity. The paying for these expensive facilities is now one of the largest ingredients making up our electric bill. Secondly, an adequate supply of uranium for the future is simply not assured, regardless of VEPCO representations to the contrary. Thirdly, reactors produce a radioactive residue that retains its radioactivity for hundreds of years, making storage an obvious

problem. It is becoming less sure that VEPCO's strong commitment to nuclear power was a wise course.

6. That solar research and development activities be encouraged and that incentives for individuals and businesses be given to promote their investment in solar units.

COMMENTS: I enthusiastically endorse this recommendation. Further, our Commission should endorse legislation to implement the new revision of the Constitution of Virginia permitting localities to exempt solar energy equipment from taxation, or in the alternative, for Virginia to provide by general law the procedures by which each locality shall exempt solar energy equipment from taxation.

7. That the Commonwealth pursue the idea of solid waste as a source of energy.

COMMENT: Again, I enthusiastically endorse this recommendation. This solution helps solve a very serious problem of where and how to store solid waste, while providing a source of needed energy. The present plan for the United States Government to utilize a portion of the solid waste collected by the City of Norfolk as an energy source should be watched closely. This potentially highly beneficial example should be followed throughout the Commonwealth wherever feasible.

8. That research on and development of other exotic energy sources be encouraged.

9. That an active energy conservation program be set for the Commonwealth.

COMMENT: I enthusiastically endorse both these recommendations. Our citizens must be made aware that in no small measure their only salvation from high electric bills may well be their own capability to utilize alternate energy sources and to conserve energy in every possible way through insulation, building design and location, and full use of fresh air for natural heating and cooling.

*SENATOR VIRGIL H. GOODE, JR.

The following are my comments, dissents, and suggestions on the 1976 Report of the Energy Study Commission to the Governor and the General Assembly of Virginia.

First, in the last paragraph of part II of the report and just prior to the recommendations, it is stated that "there is a lack of organization and funding necessary to carry out an effective and comprehensive program for the Commonwealth". While this statement may be accurate to a degree, I cannot endorse it without more information as to current expenditures and without having knowledge of how a greater funding would be spent.

I would have liked to have seen a detailed breakdown of all

expenditures of the Electricity Costs Commission, the Energy Resource Advisory Commission, the Ad Hoc Committee on Energy Conservation, the Energy Study Commission, the Coal and Energy Study Commission, the Virginia Energy Office, and any and all other entities connected with the State and the energy situation. A detailed breakdown of costs should include such items as consultant fees, salaries, printing, travel, and all other costs and expenses. Such a request is not intended as a criticism of any of these commissions, committees or officers. In fact, for example, both the personnel from Legislative Services and the Virginia Energy Office were extremely cooperative and helpful in working with the study commission. But, in my opinion, such information should be available in detail as part of the report of such entities. Moreover, it should be included as part of the annual reports of all state agencies, boards, departments, etc.

While I am in sympathy in a general way with Recommendation # 1, calling for one centralized authority, I would not endorse the position because, in part, of the lack of detail set forth in the preceding paragraph. Before there is reorganization and increased funding in almost any area of state government, I think a detailed breakdown of personnel and costs involved is needed. It would be preferable to have the Virginia Energy Office exist by statute instead of by executive order as it now exists. It is also stated in the paragraph following Recommendation # 1 that "one office should determine State energy policy". I disagree. Perhaps one office should administer and implement the policy, but not determine it. Elected officials should determine it.

In the last sentence of the first paragraph of Recommendation # 4, the repeal or modification of Federal controls is mentioned. I agree that "red tape" and "paperwork" controls should be curtailed, but I believe that there should be controls keeping a close eye on where the billions of dollars in the oil and gas areas go. I would be against modification allowing monopolistic and unrestrained profiteering which is so harmful to the competitive market and free enterprise and which is so detrimental to the economic condition of the ordinary citizens of the United States.

Also, footnotes citing the specific source by name, author, date, etc., perhaps should be added for some of the percentages, figures, and statistics set forth.

At the end of the first paragraph of Recommendation # 6, I cannot agree with the statement that solar energy systems have higher acquisition costs than systems powered by fossil fuels. This is not true in all cases. It may be so in some instances, but much depends on the definition of energy system.

With regard to Recommendation # 9A, I would have preferred language a little more specific. For example, I would like to have seen a statement that revision of rate structures, especially those of electrical utilities, could be changed in order to encourage conservation. Under current rate structures, large users get much cheaper rates than the smaller users. This does not encourage conservation and hits in many cases most heavily those that are

least able to afford electricity. A modification of current rate schedules could also lead to the development of alternative energy sources. Under modified pricing structures of the electrical utilities, the larger customers, which frequently are the wealthier ratepayers, would not receive such favored and beneficial rates and would, therefore, be more likely to pursue solar or some other alternative energy source. This would be in the best interest of the United States, as we need to develop energy sources that will make us less dependent on Arab oil and energy supplies from foreign lands. Many of the electrical utilities, however, are not so interested in conserving energy and in developing alternative sources as they are in making profits. While they should be interested in making a fair and just profit, they should also, in my opinion, be concerned about the best interests of the United States and her citizens. The American Electric Power Company, for example, in its third quarter report to shareholders, bemoaned the fact that the United States, in the area it served, had a cooler than normal summer, during which less electricity was consumed than expected.

With regard to Recommendation #9C, I agree with the general thrust of the paragraph but disagree as to some of the specific language and wording. While I believe that the Federal government should involve itself less in many areas of business and private life, I believe it should more directly involve itself in the production of motor vehicles in order to insure and to promote the development and distribution of motor vehicles that will get much greater gas mileage than they currently do.

With regard to Recommendation # 9D, I think that all State agencies, institutions, and facilities that have showers should be directed to utilize a shower flow control device that would cut down on the amount of water used in such showers. This would not harm the quality of the shower and the devices, which cost less than a quarter, could be installed in the course of normal maintenance at no extra cost in all State institutions and structures that have their electrical or water bills paid for wholly or in part by the State Treasury.

In my opinion, it is in the best interest of Virginia and the United States to offer incentives for the development of energy efficient means of transportation. For example, the Commonwealth could offer a \$1 million dollar reward to the inventor of a solar-powered automobile or of an automobile powered by an energy source that was abundantly available at a very low cost to the general public.

Currently the largest single use of petroleum is in the field of transportation, especially the gasoline for motor vehicles. The dependence of the United States on foreign sources of petroleum jeopardizes the national security and undermines the economic well-being of the United States and so many of its businesses and its citizens. Thus, the development of such a vehicle would be of great value, not only to Virginia, but to our nation. Such a reward would provide an incentive to help alleviate the problem. In return for such a reward the State of Virginia would have to be awarded a share in the profits from the sale of such a vehicle. Moreover, the vehicle

would have to be capable of being mass produced and operated at a cost and in such a manner which would enable it to be competitive and enable it to be produced and sold in a way to insure that it was able to have a good percentage of the motor vehicle market. It would also have to be safe, damage resistant, easy to repair, durable and be able to accelerate, start in cold weather, attain a good cruising speed quickly and meet other reasonable performance standards.

It would also have to be produced and operated in a manner consistent with current Federal and State safety and environmental requirements.

It is argued that such an incentive is not needed because private enterprise will do it. Unless such a vehicle was so complicated that it could not be easily copied, the profits from the energy would not give it the appeal that exists where vehicles use restricted energy sources, and this situation would not exist in the instance of this reward because the inventor would have to develop it in such a way that its energy source would be abundantly available at a very low cost to the general public.

APPENDIX I

HOUSE JOINT RESOLUTION NO....

Continuing the Energy Study Commission.

WHEREAS, the Commonwealth and the nation experienced an energy crisis in the winter of 1973-1974; and

WHEREAS, the General Assembly created the Commission to Study the Energy Crisis in the Commonwealth pursuant to Senate Joint Resolution No. 128 in 1973; and

WHEREAS, the Commission to Study the Energy Study Crisis in the Commonwealth was continued and renamed the Energy Study Commission pursuant to Senate Joint Resolution No. 97 by the 1975 General Assembly; and

WHEREAS, the Energy Study Commission has recommended to the Governor and the General Assembly in its 1976 report that the responsibility for the study, administration and implementation of statewide energy programs be consolidated in one centralized authority; and

WHEREAS, the General Assembly and the public need to be apprised of the constantly changing energy picture in the Commonwealth and the nation; and

WHEREAS, although the Commission worked diligently and completed its legislative mandate, work remains to be done; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Energy Study Commission is hereby continued. The Commission shall continue to apprise the Governor, General Assembly and the public of the changing State and national energy situation and make such recommendations as the Commission deems advisable to alleviate present and future energy problems.

The Commission shall also review and study present energy programs being conducted by various State agencies with the ultimate goal of developing legislation which would create a single, unified energy agency capable of administering and implementing State and Federal energy programs.

The present fourteen members shall continue to serve on the Commission. If a vacancy occurs for any reason, successors shall be appointed by the appropriate person or persons pursuant to the method of appointment specified in Senate Joint Resolution No. 97 (1975).

Members of the Commission shall serve without compensation but shall be reimbursed for the expenses incurred by them in the

performance of their duties in the work of the Commission. For such other expenses as may be required, including secretarial and other professional assistance, the balance of the funds previously allocated to the Commission from the contingent fund of the General Assembly are hereby reallocated for the purposes of this study. All State agencies shall assist the Commission in its work.

The Commission shall submit to the Governor and the General Assembly an interim report no later than October one, nineteen hundred seventy-seven, and a final report no later than October one, nineteen hundred seventy-eight, of its findings along with specific recommendations and legislation.

APPENDIX II

Statement of Dr. Ross L. Goble, Chief, Research Facilities Engineering Division, NASA to Delegate C. D. Dunford, Chairman of the Energy Study Commission on December 14, 1976.

Dear Mr. Dunford:

In response to your inquiry regarding our Tech House project, a brief description follows:

The NASA Technology Utilization House, called Tech House, was designed and constructed at NASA's Langley Research Center in Hampton, Virginia, to demonstrate new technology that is available or will be available in the next several years and to show how the application of aerospace technology could help advance the homebuilding industry. Solar energy conversion, energy and water conservation, safety, security, and cost were major considerations in adapting the aerospace technology to the construction of Tech House.

The house is a single level structure of contemporary design, comprised of two square modules connected by a flat-roofed hallway containing an entry vestibule at the front and rear and a laundry room in the rear vestibule. The connecting hallway uses a skylight which reduces the need for artificial light during daytime and may be opened for ventilation in periods of moderate to warm weather.

While Tech House is not large, it is extremely functional and contains approximately 1500 square feet of enclosed living space consisting of three bedrooms, living room with fireplace, dining area, kitchen, two bathrooms, and laundry room, plus an attached garage. It is expected that within five years the house, with all its special features, could be built commercially for approximately \$45,000 (in 1976 dollars) on an existing lot. However, this forecast is based on the mass production of components and is subject to the homeowner's personal preferences and location.

One of the first steps in Tech House planning was to determine energy consumption requirements and how total energy could be reduced. This was accomplished by analyzing different types of ceilings, roofs, windows, doors, and insulations to determine which would be most energy efficient and cost effective. A system or product was considered "cost effective" if its added initial cost plus 10 percent interest could be returned to the buyer through energy or other savings over the lifetime of that system. The results of these studies, showing a comparison of energy consumption in a contemporary house, electrically heated and constructed by 1974 standards, with energy consumption projected for Tech House, follow:

<u>Energy Consumption</u>	<u>Contemporary House (KW-HR)</u>	<u>Tech House (KW-HR)</u>
Central heating	29,300	8,000
Central air conditioning	3,800	2,100
Water heating	4,380	1,500
Lights	2,000	1,000
Appliances	5,609	3,400
Miscellaneous	1,111	1,000
Total	46,000	15,000
		(Approx. 68% reduction)

The heating system for Tech House utilizes solar energy to supply the major heating requirements through one of several modes of operation depending on heat requirements, weather conditions, and water temperatures in the storage tank. The major components in the heated system are the solar collectors where water passes through flat plates, a hot water preheat tank, thermal storage tank, heat pumps, and direct heat exchanger. Of all energy reduction efforts, the solar domestic water heating system appears to be the most cost effective with capital cost pay back within six years.

Although not directly related to solar energy per se, another important investigation for the Tech House project is related to water conservation. A study which had previously been conducted by NASA determined that a significant reduction in water consumption could be achieved by recycling waste water for toilet flush and using recently developed water saving fixtures, such as water saver shower heads and low profile water closets. The following comparative figures were based on that study:

<u>Water Consumption (For a Family of Four Excluding Lawn Watering)</u>	<u>Contemporary House (Gals.)</u>	<u>Tech House (Gallons)</u>
Bathing	22,285	16,480
Dishwashing	2,920	2,190
Laundry	5,840	5,840
Cleaning	2,190	2,190
Toilet	32,485	0
Miscellaneous	7,300	7,300
Total	73,000	34,000
		(Approx. 50% reduction)

While the reduction in energy and water consumption represents considerable savings in utility costs, it is important to reiterate that the demonstration of space-age technology to domestic needs was the primary basis for this project, not energy conservation alone.

As a final note, it should be pointed out that energy-conserving homes are most efficient when carefully designed to fit specific sites with their particular characteristics of access, orientation to sun and winds, history of weather conditions, and thermal requirements. For this reason, Tech House was not intended to be, and should not be, considered a prototype or mass-producible design suitable for all locations. Instead, Tech House should be viewed as a demonstration model and research facility containing many individual systems,

components, products, and ideas which can be applied in some degree to all housing.

I hope this description will be of use to you in your continuing efforts to define a comprehensive energy program for the Commonwealth of Virginia.