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PUBLIC HEARING
before
ENERGY CONSERVATION SUBCOMMITTEE
of the
ASSEMBLY ENERGY AND NATURAL RESOURCES COMMITTEE
ON
ENERGY CONSERVATION: RENEWABLE SOURCES & ALTERNATIVE TECHNOLOGY

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Held:
August 26, 1981
Assembly Chamber
State House
Trenton, New Jersey

MEMBERS OF COMMITTEE PRESENT:

Assemblyman Gerald R. Stockman (Chairman)
and
Rose Brunetto, Representing Senator James Bradley

ALSO:

Mark Connelly, Research Associate
Office of Legislative Services
Aide, Assembly Energy Conservation Subcommittee

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ASSEMBLYMAN GERALD R. STOCKMAN (Chairman): Good morning. I am Jerry Stockman, Chairman of the Energy Conservation Subcommittee of the Assembly Energy and Natural Resources Committee.

I want to welcome you this morning and thank you for coming to participate in this hearing on energy conservation: renewable sources and alternative technology.

Ten years ago, when fossil fuels were inexpensive and seemingly abundant, the subject of today's hearing would have seemed exotic and farfetched. But the well known facts of our recent energy history have transformed what was once a subject of tinkers and visionaries into a subject which any person grappling with our current energy problems must seriously consider, thus our presence here today to consider the role solar energy can play in our energy conservation effort.

Solar energy is exotic, but by exotic, I do not mean that the equipment or technology necessary to capture and make use of solar energy is exotic or ultra-sophisticated. As probably everyone here today knows, it isn't. Most solar applications involve relatively simple technology. Solar energy is exotic in a different sense; that is when we compare it to the energy sources we are currently so dependent on, the differences are dramatic.

To use solar energy, we do not have to pollute our air, ravage our landscape, construct huge pipelines, use dangerous technology, or worry about the energy implications of politically instable countries across the ocean. And, of course, solar energy is free for all practical purposes; there is more than we can ever expect to use.

Now, so that I don't appear to be suffering from the effects of an over-exposure of solar energy this weekend, let me hasten to add that I am very aware of the difficulties which harnessing Apollo's power entails. In many instances, however, the obstacles to the widespread use of solar energy are social and economic, not technological.

The technology for active solar thermal systems for domestic water-heating is well developed. And, of course, passive solar systems like greenhouses and heat sinks, involve only basic construction methods. These rather simple solar applications offer potentially great energy savings for a state like New Jersey, even when its admittedly less than perfect climate for solar energy is taken into account. Yet we all know that New Jersey's progress in solar energy development is slimmer than we would like. This is the case even though we have some excellent solar statutes: a property tax exemption for solar installations, sales tax exemption for solar equipment and materials, a solar easement law to help assure access, and a solar land-use law. We also have an excellent solar financing program operated by the New Jersey Mortgage Finance Agency.

One of the problems is simply resistance to change. Another problem is economic. Most solar applications entail an initial and substantial up-front expenditure. Many cannot afford the initial cash outlay, even though in the long run it would reduce their energy costs. However, as the price of fossil fuels continue to seemingly climb irreversibly upward, the cost of solar energy installations will become increasingly competitive with the cost of other fuels. This might be one of the few beneficial results of rising energy prices.

It is clear then that there is much to be done to provide the use of solar energy in New Jersey. Recent projections indicate that by the end of this century solar energy will provide only about five percent of the State's total energy needs. I think it is incumbent on all of us to take steps to insure that we do substantially better than that. And I am confident that today's hearing will help point up the right direction.

With that brief introduction, I would like to call our first witness, Joel Jacobson, Commissioner of the Department of Energy.

J O E L R. J A C O B S O N: Good morning, Assemblyman Stockman.

I am accompanied this morning by Assistant Commissioner Charles Richman, who is present to answer any intelligent questions. The stupid ones, I can answer.

First, I want to indicate my genuine appreciation at the opportunity to appear before this committee, particularly before you. In fact, I would go so far as to solicit the opportunity to come before your committee much more frequently than I have had the opportunity in the past. This desire to appear before you is based upon two significant reasons. The first is that we make many decisions in this State based upon facts and I believe we have an obligation to you and to our constituents to justify those decisions and to verify the accuracy of the facts.

The second reason, I must tell you in complete candor that I am considerably annoyed by the ignorance about the Energy Department of the State of New Jersey as evidenced no more recently than last night in a political debate where one of the candidates elevated that ignorance to the level of a science by his abysmal lack of knowledge as to what our department is doing by more abysmal recommendations to pursue. I really don't want to make this political, but I must tell you - again, in candor - that I have no intention of having this department become a political football because of the ignorance of one man who is seeking high office in this State.

In making the decisions upon which we do proceed, I indicated that we look at the facts. In a volatile world with constantly changing economic conditions, with constantly changing energy parameters, it is very difficult to identify if these events are long-range trends or just momentary aberrations. We are continually doing that and one of the reasons I think it is important for us to appear before you is to do that in public and for your review as well.

However, two facts have been established beyond any ability to challenge them. The first is the perfectly obvious fact that the era of cheap energy is over. Since this administration has been in power, we have seen the price of crude oil escalate from about \$3 a barrel to \$36 a barrel, the price of a gallon of gasoline escalate from about 48 cents to \$1.35, the price of a gallon of heating oil escalate from 20 cents a gallon to about \$1.20, and the price of natural gas escalate from 21 cents per thousand cubic feet to a controlled price of \$2.95. With the price zooming skyward, we have continual problems, of course, as the sources of supply are insecure. While we are currently in the midst of a glut, only the most profound optimist would believe that this glut will be long-lasting. It may very well not last as long as we would like. Generally, the crisis is not over. But the combination of soaring prices and insecure sources of supply impose upon anybody with an ounce of brains the necessity of departing from normal operations. I think that is one of the reasons you called this hearing here today.

The second thing that I think is significant, again within the confines of this hearing, is the fact that conservation is working. I don't want to bore you to death with some statistics, but I do believe they are relevant, again emphasizing we try to make our decisions based upon facts. We have seen for the year 1980 the entire nation has reduced its use of energy to 76 quads, a 3.3 percent drop over the previous year, the largest single drop for any year since the end of World War II, a significant cutback in energy uses in the nation.

With regard to the use of petroleum products, in January of 1979, this

nation used every single day 21 million barrels of oil. In August of 1981, we used 15.7 million barrels of oil, again a most significant drop in usage. And in one product for which all of us have a passionate affection, gasoline, our usage in 1981 over 1979, was down about 8 percent.

In the State, Assemblyman, I have some very interesting statistics, indicating that conservation is working. First, although the total usage of natural gas has gone up, primarily because of the heavier use by the utilities, residential usage is down. In June of '81, the average therm per customer was 38; in June of '80, it was 44, again a significant drop. With regard to the electricity sales, for the 30-year period following World War II, there was a very constant growth of 7 percent per annum. Electricity sales for the first six months of 1981 over 1980 have been at the rate of 1.3 percent and our prognosis for the future indicates that even that might be an optimistic figure. It might be even less in the future. With regard to the usage of oil within the State for the first six months of 1981, it is down 20 percent from the previous year; that is the usage of fuel burned and kilowatt hours generated.

With regard to the use of gasoline within the State, we are using 58 million gallons less in the first six months of 1981 over 1980, a drop of something like 4 percent. And for those interested, the sales of gasahol, originally an encouraging fling, dropped percipitously. It is down about 65 percent of the previous year.

All of this conservation has been generated, I want to emphasize, while the refinery capacity utilization for American refineries has dropped from about a normal of 90 percent to below 70 percent, indicating that the capacity to produce much more is there, but the diminished usage is one of the reasons for the cut-back.

A more significant figure --- I hope I am not boring you.

ASSEMBLYMAN STOCKMAN: No.

COMM'R JACOBSON: A more significant series of figures has been discerned with the conclusion of the OPEC meeting, which was just held in Geneva. In 1977, the OPEC nations produced 31 1/2 million barrels of oil every single day. In June of this year, that production was not 31.5 million barrels of oil, but 22 million barrels of oil. We have talked in terms of relieving our dependence upon OPEC. The conservation about which I spoke earlier has already had a significant impact upon the production by OPEC.

I must point out parenthetically that in 1977 when OPEC was producing so much oil, this nation imported every day as high as 10 million barrels of oil. Our importation today is roughly half of that, about 5 million barrels of oil.

I would point out that these figures are not unrelated to this hearing. In fact, I think they are directly related to the imposition of what we must do in the future. The fact that Saudi Arabia has opposed a higher price for crude oil, that it has maintained its high production, even though they are going to reduce it a bit, is not because they love the United States but because they know full well the economic fact that higher prices are deteriorating their market and the higher price is pushing people to use alternate sources to generate conservation and, hopefully, to do some of the things that we are going to be talking about in just a moment.

So, I would say that what we are trying to do here today, if it has no other impact than to put a continued squeeze on OPEC is the right thing to do.

We have generated significant savings in New Jersey and I am not going to be so immodest as to say we are exclusively responsible - our department. I must

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tell you I am not going to be so stupid as to say that we haven't done a lot. I believe our department has made a significant contribution to conservation, to energy efficiency and to the development of new and alternate technologies. In reporting to the United States Department of Energy for the year 1980 and offering computations based upon the methodologies adopted by Price Waterhouse, an outstanding accounting firm, the programs generated by the New Jersey Department of Energy resulted in a savings of 77 trillion BTU's. If you reduce that to terms that most people understand, that equates to about 5 hundred million gallons of Number 2 heating oil. At the current price of about \$1.25 a gallon, that is a total savings of something like \$625 million.

I would point out to those political know-nothings who say that our department has done nothing, that this means for every dollar this department spent, we generated savings of \$130. Not even Mobil and Exxon can make that claim for return on their investments.

So I would repeat that our department has made significant contributions. Yet I would agree - and I am sure you do - that this is just the beginning and that as prices increase and as we are aware of the fact that supplies are nebulous and fossil fuel resources are finite, we must take quantum maximum steps toward the use of renewable sources of energy.

We have really 30 technologies that fall within this category - and you know them as well as I do: solar, wind, wood, biomass, hydroelectric, photovoltaics, geothermal, alcohol fuels, waves, coal gasification, fluidized bed combustion, fuel cells, hydrogen, electric and hybrid vehicles, and cogeneration. All of these have a potential for drastically reducing energy usage and for relieving our dependence on OPEC sources. The problem has been in most instances with regard to the new technologies that while they are technically feasible, at the moment they are not economically competitive.

I can cite two specific examples, one through personal experience and one through empirical observation. Several years ago, I had the opportunity to be in Israel during the summer. I was there for 21 days and the sun beat down every single day. It was hot all three weeks I was there. Many homes in Israel have solar hot-water heating. In an attempt to advance my own knowledge about this, I visited the Technion University in Haifa where I met with the professor who was in charge of solar experimentation. He took me on top of a roof where he had about 30 or 40 different pieces of apparatus of solar energy. He pointed to one and he said, "This is a solar desalinization apparatus." I said, "By God, that's wonderful. You have solved your problem. You now have potable water generated by fuel from the sun." He said, "Not exactly. We have the technology to do it, but it costs something like \$15 a gallon." Obviously, there are required technological breakthroughs to make that available.

One of the most encouraging sources, of course, are the photovoltaic cells which uses silicon to convert sunlight into electricity. At the present time, it costs about \$3 per peak watt. In order to be competitive, that figure has to be reduced to 30 cents.

So, I would emphasize that while many of these technologies are encouraging, it still requires the contribution of the scientists to make the technology economically feasible and competitive with alternate sources.

If you were to ask me to look into my crystal ball and pick the year 2000 - I pick the year 2000 because I am not going to be around to be proven wrong - I would make the following projection.

ASSEMBLYMAN STOCKMAN: Don't be such a pessimist.

COMM'R JACOBSON: Well, thank you. I would make the following projection of a possibility, perhaps even a goal, for the State of New Jersey. I would like to think by the year 2000, we could generate about 2 1/2 percent of our State's total energy needs through solar energy. If we were to do this, this would reduce the oil consumption from its current level of about 60 percent of our total energy needs to about 45 percent, and, in the process, save scads of money. The estimate I have is something like \$600 million.

In order to do that, I believe at the present moment, barring the unforeseen technological breakthrough that would spur the development of some other source, there are two major sources for this goal. First is solar; the second is resource recovery. I think New Jersey has taken steps to address these technologies and there are still things to be done.

Let me talk about resource recovery first. Obviously, as you know, it is the ability to convert solid waste into energy. One of the purposes it serves is eliminating the designation of valuable real estate. I have seen estimates as high as 50 or 60 million dollars worth for the use of landfills which are ecologically fragile in addition to giving the wrong use for our land. It makes eminent good sense to pursue a process that eliminates the necessity of using valuable land for landfills and still provides us with a source of energy. The trail-blazing of this technology, of course, has taken place in Japan and in Europe where land is valuable, as valuable as it is here, but at a premium. They do that because of necessity.

New Jersey presently generates about 15,000 tons of garbage every day. I have seen the estimate by one of our staff people that at this rate we could fill Giant Stadium every two weeks with garbage. I am not going to be so bold as to suggest that that might not be much better than what we see in Giant Stadium. But it indicates a significant source of solid waste. If a statewide program of source separation, of recycling, were to be placed into effect, by the late 1980's, I believe a significant quantity of energy could be available. I believe it is incumbent upon us to spur the incentives.

One of the problems is bureaucratic. There are currently 22 management districts for the disposition of solid waste: 21 counties plus the Hackensack Meadowlands. It is these 22 agencies which determine where and how waste is eliminated, subject to the rules of the Department of Environmental Protection. By the mid-1980's, we estimate about 50 percent of New Jersey municipalities will be out of landfill space. Now, the question arises: Is there anybody who would like to volunteer his backyard for the disposition of solid waste? The same way: Is there anybody who would like to volunteer his backyard for the disposition of spent nuclear rods currently used in our nuclear stations? Obviously, nobody is looking to volunteer for that. That means that government must bite that bullet. Somebody has to make that decision. Hopefully, it will be a rational, intelligent decision; but somebody has to make the decision.

I believe the decision can be made and there are certain spurs or incentives that can be added to make it possible to make an intelligent decision.

First, the host community which would seek the opportunity to site a resource recovery facility would find that because most of them are privately owned, it would increase their ratables. Secondly, they would provide a new source of energy for the industry of cities, hopefully, retain old industry and attract new industry. Thirdly, because the source is near the usage, you reduce considerably the operation and maintenance costs which are currently incurred to fill a landfill. And it may be necessary for the State to provide additional tax incentives to provide the spur for a municipality to do that.

All in all, I think with this type of approach, we can depend more heavily upon resource recovery for energy sources by the end of this decade.

The second area, of course, is solar. Everybody knows that we do have at the moment the technology for solar hot-water heating. I want to point out a bitter lament, that every time the government, either the state or federal government, provides additional incentives for the homeowner to install solar hot-water heating, every time there is an additional tax credit or advance loan, the price of the technology increases a corresponding amount. I would like to dump that right in the lap of any contractor who may be here today to justify that. The purpose of the incentives is to encourage the technology, not to enrich, still further, contractors. I would like to hear some contractor respond to that and justify why they have done what they have done.

In any event, our estimates indicate that there are about 400,000 new single-family homes to be built in this State between the year 1985 and the year 2000. We would hope that 50 percent of these homes could utilize passive solar heating techniques. I am familiar with the fact that on the campus of Massachusetts Institute of Technology in Boston there is a passive solar facility, a huge window facing south, that in the recent winter when the temperature was 34 degrees outside, it was 78 degrees inside merely through passive solar.

New Jersey presently has about 3,000 solar installations. As I indicated, there could be significant savings in BTU's and money by advancing that. I would like to point out that last year we projected that by investing \$372,000 to install solar systems at 15 State-owned facilities, the State could avoid paying almost three-quarters of a million dollars for fossil fuels. As a result of the Energy Conservation Bond Issue approved by the voters last year, 5 of these installations are expected to be completed within the year.

Solar energy will also play an important role in the future land-use decisions, thanks to a 1980 amendment which the Legislature provided for the State's Municipal Land Use Act. The amendment gives municipal governments tools to make their communities more energy efficient and, of course, less dependent on fossil fuels. Towns may now zone for solar access and the use of renewable resources, including resource recovery.

Studies have indicated that 15 to 30 percent of residential heating costs can be saved through the use of solar energy. The New Jersey Department of Energy is currently assisting East Windsor Township and Washington Township in revising their master plans and ordinances. Technical assistance will also be given on conducting an energy audit for each town itself. These two municipalities will serve as case studies, the project then being extended to assist other communities in implementing the Land Use Law.

In conclusion, Assemblyman, I would like to make one or two further observations and perhaps a recommendation or two. Again, let me preface this by saying I realize that this time of year, it is difficult to make a substantive statement without being accused of being political. Let, let the facts fall where they may and let whatever interpretation one wants be given to them.

I regard as nothing short of a disaster the Reagan administration's efforts to cut substantial funds from alternate technology research and development programs. I repeat, it is nothing short of a disaster. Frankly, I find it absolutely appalling that the administration is giving free rein to energy producers to raise the price of oil and natural gas while it cuts funds from programs that assist consumers in finding ways to reduce their energy consumption. We are seeing

here a simple return to the law of the jungle, as justified last night by one of those candidates.

The Carter administration, prior to leaving office last January, proposed a 583 million dollar budget for solar energy programs in fiscal year '82. The Reagan budget-cutters, these humanitarians, slashed that amount by two-thirds and proposed to spend only \$193 million for solar energy. I should point out that the House Appropriations Committee attempted to rectify the situation by approving a budget of \$304 million. Even if this is allowed to stand, however, it is still 40 percent below the fiscal year '81 budget and just half of what had been anticipated prior to the change of administrations.

Second, I would urge the New Jersey Legislature to extend the property and sales tax exemptions which now apply to solar energy systems, as well as to explore other tax credits and incentives to promote alternative energy systems. I realize this must be balanced against the revenue needs of the State. But if we are to encourage this technology, this path, I think, must be explored and possibly pursued.

Another possibility is the credit on the New Jersey State income tax for those persons who purchase and install alternate energy systems. A tax exemption might also be granted on income derived from the sale through a utility of electricity generated by an individual's wind or solar system.

I believe that economic incentives should also be given to industries which manufacture, service or install renewable resource equipment. Studies have shown that more jobs are created at less cost through the production of energy through conservation and renewable source measures than through the production of energy through traditional sources, such as drilling, mining and power plant construction.

The Legislature should review the State's Clean Air Standards with regard to alternate technologies. I would hope that initiatives, such as Curtiss-Wright's fluidized bed combustion project in Woodridge could be encouraged when we strike the proper balance in the adoption of reasonable air quality standards.

In conclusion, I would like to reiterate the important role which alternative technologies are expected to play in New Jersey's future. With fossil fuel prices continuing to rise and worldwide energy supplies becoming progressively tighter, the need to develop energy sources which are virtually limitless becomes paramount.

I urge this committee to recognize the huge potential which the sun, wind, water and, yes, even our garbage hold for New Jersey. It is up to government to help educate the public on the benefits of alternative technologies and promote their utilization in our State. And our department extends to you our full pledge of cooperation in pursuing this objective.

ASSEMBLYMAN STOCKMAN: Thank you very much, Commissioner. Once more, I appreciate your taking the time to cooperate with us. I want to also thank, Mr. Jacobson, your associate who came down and spent the better part of an afternoon with me early in the week to talk about some subjects, including this hearing today. I want to say publicly - I won't say you get at all partisan because you were careful not to even identify whom you were talking about as far as gubernatorial candidates, but your department certainly has been very cooperative with me and with this committee in the course of our efforts to come up with some new ideas and suggestions legislatively. We hope to continue that cooperation with you. Thank you very much.

COMM'R JACOBSON: Thank you. May I just say in conclusion I do want to

pay tribute to Assistant Commissioner Richman. He and his staff really deserve the lion's share of the credit. I am just the civilian administrator. I would like to point out that the significant work done by the department has been done by Assistant Commissioner Richman and the staff.

ASSEMBLYMAN STOCKMAN: Thank you very much.

Before I call the next witness, I want to acknowledge Rose Brunetto, who is seated here with us. If Rose wouldn't mind, I would be happy if she came up and joined me here since there is room. Rose is a representative from Senator Bill Bradley's office. Senator Bradley has been working closely with me and, as a matter of fact, partly inspired the creation of this subcommittee and these hearings. He made the first hearing. He is in a situation where his schedule wouldn't allow him to be here today. But I am happy to see that he has a representative from his office here with us. When we publish our findings and our report, I am optimistic that Senator Bradley is going to participate in that publication. So, Rose, why don't you come up and sit alongside me.

Bill Saller will introduce someone from Public Service.

W I L L I A M S A L L E R: Good morning, Assemblyman Stockman, Rose and Mark.

Public Service thanks you for the opportunity to make a presentation this morning. I am Bill Saller, General Manager - Governmental Affairs, for Public Service. As you are probably well aware, we are involved in many research projects involving conservation, solar and future energy alternatives, for New Jersey. To review this with you this morning, we have Pete Lewis, who is Manager of Applied Systems for the PSE&G Research Corporation. He has a slide presentation, which takes approximately 20 minutes, which will cover the many areas that we are involved in. If you have any questions, I am sure he would be happy and pleased to respond to them.

P E T E R A. L E W I S: Thank you, Bill.

Good morning, Assemblyman Stockman.

On behalf of the company, I wish to thank you for this opportunity to present a summary of our program to assess and develop renewable sources and alternative energy technologies.

Earlier this year, the Energy Conservation Subcommittee heard testimony on cogeneration presented by Rudy Stys, Vice President, System Planning, and on energy conservation and load management presented by Fred DeSanti, Vice President, Rates and Load Management. This morning, I will briefly describe our research, development and demonstration program for alternative energy technologies.

Our operating territory covers the central portion of New Jersey between New York City and Philadelphia - only about 20 percent of the State's land area. However, our 1.7 million electric customers accounted for about 60 percent of the electric energy consumption in the State during 1980. Our 1.3 million gas customers accounted for 70 percent of the gas consumption.

After experiencing a period of rapid growth in the '60's, we went through a period of reduced growth following the OPEC oil embargo of 1973 and the subsequent recession. This decrease in growth is due to sharply increasing energy costs, reduced population growth, and a decrease in the amount of industry in our service territory, combined with State, utility and consumer conservation actions. As Commissioner Jacobson pointed out, conservation is working. Our current forecast indicates growth in electric demand of about 1.1 percent per year between now and 1990 and a growth rate of 2 percent per year in gas demand for the same period.

PSE&G's electric capacity program, shown here, is tuned to serve this

demand based on currently available technologies. In this exhibit, the vertical axis on the left represents installed generating capacity in millions of watts. The horizontal axis along the bottom represents the years of the decade of the '80's starting with 1981. The major block of generating capacity in blue along the bottom represents our existing fossil fueled and pumped storage hydro facilities. The rising white line represents the minimum amount of generating capacity required to insure reliable and adequate service to our customers. The upper portions of this slide represent PSE&G's nuclear program. Shown in red and pink are existing nuclear stations. Included is our Salem #2 unit which is currently undergoing start-up testing and will soon be placed in commercial operation.

The Hope Creek Nuclear units planned for service in late 1986 and late 1989 are shown in green. The impact of nuclear power is significant when the amount of oil and gas that nuclear is displacing is considered.

Even with active conservation programs, 35 percent of our electric energy was produced from oil and gas, while 22 percent came from nuclear units in 1980. By 1990, we expect that only 9 percent will come from oil and gas, while 54 percent of our electric energy will be produced by nuclear plants.

We estimate that as of the end of 1980, PSE&G's nuclear program has saved the equivalent of 69 million barrels of oil valued in excess of a billion dollars. By 1990, we expect to have saved a total of 320 million barrels valued at 16 billion dollars.

ASSEMBLYMAN STOCKMAN: Let me stop you there, Mr. Lewis, for just a moment and ask you: That projection through 1990 for the breakdown of sources of energy in New Jersey, is that premised on current facilities in place and being completed, I assume?

MR. LEWIS: That is correct.

ASSEMBLYMAN STOCKMAN: That would include Salem I and II, Peach Bottom ---

MR. LEWIS: --- and Oak Creek Generating Station.

ASSEMBLYMAN STOCKMAN: Assuming Oak Creek would be completed, that would be the fourth and that would create that mix of energy sources by 1990.

MR. LEWIS: That is correct.

ASSEMBLYMAN STOCKMAN: Thank you.

MR. LEWIS: In cooperation with the national effort to reduce our dependence on foreign oil, PSE&G has announced plans to convert a generating unit at Burlington, New Jersey, from oil to coal by 1985. We are also evaluating the conversion of our Bergen Station from oil to low sulfur coal. These conversions could result in a saving of about \$130 million per year to our customers while reducing oil consumption by about 3 million barrels per year.

The nationwide natural gas shortage beginning in the early 1970's produced a severe impact on the Company's gas operations during the mid-1970's. However, this situation has eased considerably in the last several years. Our gas supply picture is brighter today than it has been in a long time.

The successful drilling efforts of our subsidiary, Energy Development Corporation, have made more gas available for New Jersey. During 1981, we anticipate 6 percent of our gas will be supplied from EDC wells.

Oil, primarily expensive foreign oil, is cited as the major cause of our energy supply problem. The real problem, however, is that supplies of oil and natural gas are exhaustible. Sometime in the future, not by 2000, but eventually, these fuels must be replaced by relatively abundant energy sources, such as nuclear and coal, or inexhaustible sources such as solar, biomass, geothermal, wind, ocean thermal, low-head hydro, wastes and fusion. The development of these alternate

sources will require vast resources - dollars and people - as well as time before they are commercially available. It is a myth to assume that these technologies are ready now.

At PSE&G we are constantly searching for new ways to provide a safe, reliable, energy supply to our customers at the lowest possible cost. As a demonstration of this commitment to developing energy technologies, the company in 1977 established a wholly-owned subsidiary, the PSE&G Research Corporation. The goals of PSE&G Research Corporation are directed toward conserving energy and improving the environment through a program designed to:

- Reduce dependence on foreign oil.

- Develop means for conserving energy use both in production facilities and in the way energy is used by customers.

- Develop alternate energy technologies for the production, transmission, distribution and utilization of energy.

- Improve operating efficiencies through the application of emerging technologies.

- Investigate and develop new business ventures to broaden the base of company revenue.

Currently, this subsidiary has approximately 250 employees conducting research, development and demonstration programs in energy related areas.

PSE&G has been involved with nuclear fusion research at the Princeton Plasma Physics Laboratory since 1957. Nuclear fusion is a very attractive new energy option because the fuel is nearly inexhaustible. One gallon of ordinary sea water contains the energy equivalent of approximately 300 gallons of gasoline. Other attractions of nuclear fusion are its minimal problems in areas such as safety, emissions and waste disposal. Unfortunately, this promising new energy source will probably not be commercially available before the beginning of the next century.

Besides energy, one of New Jersey's most pressing problems is waste disposal. As the nation's most densely populated state, New Jersey produces an abundance of solid waste material and sewage sludge.

At PSE&G, we are investigating several ways to determine the feasibility of utilizing the energy from refuse in our operations. This includes refuse derived fuels for use as supplemental boiler fuels, the extraction of methane gas from sanitary landfills, and producing pipeline quality gas from a refuse/sewage-sludge mixture.

The technology for producing energy from waste is here today. The major obstacles to the rapid deployment of waste-to-energy systems are institutional, jurisdictional, legal, and financial. However, even if fully utilized, energy from waste would satisfy only a small portion of New Jersey's total energy requirements.

In recent years, there has been a growing public enthusiasm for renewable energy sources such as solar and wind energy.

We have installed photovoltaic test panels in our Research and Testing Laboratory in Maplewood. These panels convert solar energy directly into electrical energy. At the present time, these photovoltaic devices are very expensive. If installed today on a home to satisfy only a portion of a family's electrical requirements, the cost of the equipment could easily exceed the cost of the home. The United States Department of Energy projects that dramatic price reductions may be possible by the late 1980's. This could lead to significant numbers of photovoltaic installations by the turn of the century.

Besides conversion to electricity, solar energy can be used to directly provide heat for applications such as domestic hot water. PSE&G recently completed a three-year solar demonstration program and we are now seeking approval of the state and federal governments for a program that would offer our customers a soundly engineered solar water heating system installed under PSE&G supervision.

PSE&G has also been assessing the feasibility of using wind turbine generators in New Jersey. We have been analyzing wind data from our four weather stations. Average wind speeds in the PSE&G territory typically are less than seven miles per hour, while twelve miles per hour are needed to justify a wind turbine installation.

With the possible exceptions of areas along the New Jersey coastline and the extreme northwestern corner of the State, the prospects for wind power in New Jersey are not favorable.

For a long time hydro power has been an attractive way to generate electricity. However, in New Jersey, we see only a very small potential for hydro installations.

Instead, we have focused our attention on pumped storage projects which are a form of hydro power. Pictured here is the lower reservoir of our Yards Creek Plant which we jointly own with Jersey Central Power and Light Company. During the night when lower cost power is available, water is pumped into a second, higher elevation reservoir. Then, during the day, when power demand is high, the water flows back down to the lower reservoir through turbine generators. For the future we are investigating the feasibility of pumped storage in underground sites and the possibility of utilizing the Tocks Island project should it materialize. This technology could be used to cogenerate electricity as part of a water resource management project.

By all indications, new and renewable energy sources will not solve our energy problems during the next ten to twenty years. In addition to nuclear, greater reliance will have to be made on our existing fuels such as coal, our most abundant domestic resource.

We support the development of processes to convert coal to clean gaseous and liquid fuels. This is a photo of a 5-ton-per-hour coal gasification plant that produces a fuel gas with low heating value. Recent U. S. Department of Energy projections estimate that by the year 2000 , synthetic coal gases and liquid fuels will be supplying only a small fraction of our energy needs.

As part of the Nation's advanced battery development program, we are the host utility for the National Battery Energy Storage Test Facility. This laboratory will test and evaluate the performance of advanced load levelling battery systems, operating in parallel with the utility network. We expect this laboratory to be in operation late in 1981.

The use of batteries will help utilities conserve energy supplies by storing electricity produced by more efficient nuclear and coal powerplants during hours of low customer demand. This storage energy can then be used during periods of high customer demand instead of being generated at that time by older, less efficient, oil and gas units. Storage batteries are expected to become commercially available during the late 1980's.

Fuel cells are another very promising way to conserve energy supplies. These devices convert fuel to electricity through an eletrochemical process. Fuel cells have a negligible impact on the environment and are very efficient. These characteristics suggest early applications in cogeneration and integrated energy systems with efficiencies up to 80 percent. Pictured is a 40 kilowatt gas-supplied fuel cell which PSE&G is planning to test as part of a nationwide demonstration program.

Fuel cells might be commercially available for widespread use by the end of this decade.

The electric vehicle is potentially a valuable way in which we can make better use of our more abundant natural resources, such as uranium and coal. By using these fuels to make electricity in modern powerplants, these resources can then be used for transportation, thus offsetting the use of imported oil. This slide shows a passenger car called the "lectric leopard" which PSE&G is testing and evaluating.

In another effort to make better use of our energy resources, we have been experimenting with raising fish in heated discharge water from an electric powerplant near Trenton. Ponds and raceways have been used to determine if low-grade waste heat can be used to accelerate the growth of fresh-water trout, catfish, and eels to commercial size. These trout are typical of those harvested at Mercer Generating Station.

Also located at the same powerplant is a prototype greenhouse which utilized the same heated discharge water to extend the growing season for agricultural products. Here are samples of our tomatoes.

While these aquaculture and agriculture experiments will not solve our energy problems, they represent PSE&G's interest in pursuing ideas that will help to squeeze additional value from what would otherwise be wasted energy.

District heating and cogeneration are other ways of conserving energy by utilizing waste heat from powerplants. We are pursuing a study that will determine the feasibility and potential benefits of retrofitting PSE&G powerplants to provide hot water for district heating and cooling to neighboring areas. This concept may have some potential in New Jersey, especially in the crowded northeastern corner of the State. We are also investigating several possible cogeneration projects.

PSE&G also has research programs to support consumer energy conservation activities.

The first of these conservation measures is the Space Heating Efficiency Improvement Program. Two hundred homes in New Jersey have been tested for the application of energy conservation ideas. Results have shown that the addition of insulation to a house can save as much as 40 percent when compared to an uninsulated dwelling, and new furnace designs offer the promise of saving up to 20 percent.

However, the most effective energy saving technique that can be implemented immediately by consumers is to set back their thermostats. For each degree of setback, fuel savings of up to 3 percent can be realized. Reducing the temperature from 72 to 68 degrees can save approximately 12 percent on heating bills.

To help consumers with energy saving technologies, the Home Energy Audit has been instituted. For a \$15 fee, utility representatives examine a house from top to bottom and point out those areas where energy is being wasted. Literature is also available to help homeowners perform a do-it-yourself home energy audit.

As you have seen, PSE&G has been actively assessing many alternative sources of energy for the 1980's and beyond. The results of these assessments to date indicate that of all the alternates available, aside from conservation, coal and nuclear are the only technically practical and economically feasible sources of electric energy capable of having a significant impact on the supply side of the picture for New Jersey in the decade of the '80's. Nevertheless, our research and development efforts will continue the search for new solutions to our energy problems. Thank you.

ASSEMBLYMAN STOCKMAN: Thank you, Mr. Lewis. I have a couple of

questions I would like to ask you. I had seen that slide once before, thanks to Bill, and it is very interesting to me.

One of the questions on my mind is the inherent problem of how a public utility, such as Public Service, earns its profits, so to speak, and how that arrangement interacts with efforts to reach into new areas of energy sources, and whether there isn't a certain inherent conflict and, therefore, problem with a utility such as Public Service, for instance, arguing for conservation, which I know you have been involved in doing? One of the questions that troubles me is: How do we deal with that problem? You use the phrase, working to broaden the base of the company's revenues in the course of, say, solar development, etc. Traditionally, it is my understanding that a utility such as Public Service earns its return on its investments through its major assets in the form of generating plants. When you go into some of these alternate technologies, do you see problems or do you have any suggestions or, in time, does the company have any suggestions for us as to how we can make sure that you are not killing yourself in the course of doing it, that there is some happy sensible balance between trying to solve this energy crisis problem and not put a Public Service figuratively out of business?

MR. LEWIS: I think a partial answer to that question may have been given in earlier sessions before the Energy Conservation Subcommittee. The things that we are doing in the area of developing new energy conservation technologies are designed to be cost effective. There is a certain cost in making investment in new generating plants, there is also a cost that is associated with providing energy conservation measures that can also help reduce our peak loads. There are two ways of meeting our energy requirements. One is to increase the installed capacity and a second way is to reduce the requirement for installed capacity. We are looking at both of these options extensively in our load management studies and our energy conservation measures, and also in our capacity planning programs.

ASSEMBLYMAN STOCKMAN: What sort of budget does the Public Service Electric and Gas Research Corporation have currently?

MR. LEWIS: Our current research and development program is about \$16½ million for 1981. We have projections that were made last year that in 1982, this would increase to approximately \$21 million.

ASSEMBLYMAN STOCKMAN: And that is in juxtaposition against what total budget for the Public Service, itself?

MR. LEWIS: I believe the company's gross revenues last year were approximately \$2 billion.

MR. SALLER: Roughly \$3 billion.

MR. LEWIS: \$3 billion.

ASSEMBLYMAN STOCKMAN: It has been argued to me --- and I certainly want my remarks understood. First of all, Public Service, in particular, has been cooperative with me and with this subcommittee. Bill Saller, in particular, in my legislative experience has been quite so. It has been argued to me, however, that we have not gone far enough - that is, the utilities haven't, in terms of investments of the sort that we are talking about. That figure - I didn't recall it - but it has been brought to my attention that in terms of an industry that is a three billion dollar a year industry, the investment of \$16 million towards the subject of research and development perhaps doesn't reflect an adequate commitment. Do you have any feeling about that or comment on it?

MR. LEWIS: I look at this from the position of somebody who works in the research area. I think I would perhaps support the statement that you just made that there might be other areas in which we should be investing some research dollars.

On the other hand, in the total scope of the discretionary funding that the company executives have to manage, they have to establish priorities and perhaps these priorities indicate that \$16 million on the programs we currently have in place is adequate.

ASSEMBLYMAN STOCKMAN: Are there ways that State government, either through the Board of Public Utilities or through statutory legislation, could spur or encourage the entry of utilities like Public Service into a more vigorous and aggressive effort at new technologies - new energy sources? Do you have any ideas, and I don't mean only now, but if you have any that you want to submit to this sub-committee or to me, I would be delighted to hear about them. As someone in research, I suspect that your heart as well as your head probably lies very much in that direction. We would be happy to hear any suggestions if you have any.

MR. LEWIS: Well, there are programs I think that have been advanced in other states. At the outset, I would like to point out that the Department of Energy and, I think, the Board of Public Utility Commissioners have been supportive of our research programs. The references I made to programs in other states - I think particularly in New York State and California there have been some legislative actions taken that would perhaps help utilities. But, in the longer term, we also have to look at the total cost of our energy to the consumers and assure that they are not paying an undue burden.

I recently looked at some figures relating to the research and development expenditures of utilities in the United States and I think Public Service was the seventh highest in their investment in research and development.

MR. SALLER: Could I make a comment?

ASSEMBLYMAN STOCKMAN: Yes.

MR. SALLER: If I may I would like to just add that Public Service also contributes to the Electric Power Research Institute, which consists of many utilities throughout the country - and there are hundreds of utilities that we have in the country - So that each utility doesn't spend a lot of money on the same research program, we are working cooperatively through the Electric Power Research Institute and pooling our money there. So a lot of research is being done by the Electric Power Research Institute, a national institute. I think it is located in California.

ASSEMBLYMAN STOCKMAN: Do you have any rough figures on that, what Public Service ---

MR. SALLER: Pete may be able to expand on this further because they do a lot of research for the electric utility industry.

MR. LEWIS: The Electric Power Research Institute has a budget that at this time is approaching \$250 million per year.

ASSEMBLYMAN STOCKMAN: Mr. Lewis, what part of that is contributed by Public Service of New Jersey?

MR. LEWIS: Public Service contributes approximately five and one-half million dollars to EPRI.

ASSEMBLYMAN STOCKMAN: Thank you very much. I have no further questions.

Helen Kushner, please. Miss Kushner is from the New Jersey Association of Counties, Energy Coordinators Association. Is that correct?

H E L E N K U S H N E R: That is correct.

Good morning! My name is Helen Kushner and I am one of about a dozen and a half County Energy Coordinators in the State of New Jersey. An Energy Coordinator is a recently evolved form of life, which has been generated out of the ancient species "bureaucratus governmentus." By way of introduction, I would like to describe

somewhat the peculiarities and habits of this newest and rather rare creature in government structure; and in doing so, I would define the role we would wish State government to fill.

Genus Energy Coordinator arose in response to the need for some institutionalized voice or effort made by local government to assist individuals, groups and other governmental units to combat rising fuel and utility costs. Thus, such a breed as this thrives in the marshes of energy conservation and on the hidden hills of alternate energy technology. These creatures, such as myself, subsist primarily on federal grants which provide a sparse and, unfortunately, diminishing budgetary supply. However, our breed is sturdy, committed and energetic.

The existence of genus Energy Coordinator in some active governmental form is vitally necessary, even if its existence is a very short one. I say this because an Energy Coordinator may offer the only sustained local governmental effort to bring orchestration and volume to the many smaller voices speaking for conservation and renewable energy sources.

The values and strengths of alternate and renewable energy technology lies in its diminished size, the lack of need for enormous capital expenditures to create and sustain its bulk, its decentralized method of delivery of energy and its accessibility for individual and small group development. However, these characteristics which represent the strengths of alternate energy paths also represent its vulnerability. These paths are trod by practitioners such as small, sometimes powerless, citizen groups, independent small businesses seeking to market prototype products, individuals experimenting with new technical devices, and also municipal and county governments looking at a variety of methods to cut energy consumption. In contrast to the large monolithic industries which present a united public posture and speak with an orchestrated voice, the public presence of alternate and renewable energy endeavors is very often diffuse and decentralized. In contrast to the power and energy of public relations generated by the already successful multi-nationals, the alternate energy groups can offer no comparable economic entity.

As Roger Sant, former Assistant Administrator for Conservation in the Federal Energy Administration, observed: "Outside of perhaps the insulation manufacturers, there is no organized conservation industry in this country, so that we have nothing to compare to the energy producers in terms of marketing, distribution and lobbying." This same comment could be made in reference to renewable energy sources, particularly after the latest session of federal budget cuts.

There was a recent item on the Today TV show which spoke of an effort by some major energy industries to acquaint federal judges with supply-side economics by offering them an educational two-weeks, all-expense-paid seminar in Florida. It is that kind of offering, I believe, which underscores one of government's responsibilities and helps to define your role. It is to offer balance. We need to balance the effort and monetary commitment exerted by the major energy producers to persuade decision-makers to their perspective, with a protective and nurturing environment for alternate and renewable energy efforts, so that they may also compete in a reasonable market arena.

I would ask our State government to assume the role of protector and supporter, both philosophically and monetarily, of alternate and renewable energy endeavors.

It is necessary to remember that our present energy technologies were developed in a different era wherein competition was much more even-handed and in a much more protected environment than now exists for developing alternate energy technologies. Government needs to provide that protective environment in which

fledgling technologies and new techniques can afford to succeed and can afford to fail. Alternate technology will only succeed if it also has opportunities to partially fail.

I would ask for legislation, such as Assemblyman Dalton's bill and others, to provide local municipalities with the legislative and financial assistance necessary to explore alternate energy options. The municipalities are hurting in New Jersey. These are your municipalities. There are communities no larger sometimes than four square miles which pay over \$40,000 annually simply for street lighting. They are turning out those lights and they are shutting down their buildings.

The present law which exempts increased energy costs from under the Cap law may be short term and short-sighted. By placing under the Cap those measures which save energy, curtailment of energy usage is made impossible. There is no incentive and, more realistically, there is a disincentive for communities to weatherize, retrofit and seek alternate energy.

Perhaps it is time for the State to strengthen counties' local services by statutory enactment in the field of energy conservation with the creation of certain kinds of energy offices.

It is very difficult to step outside one's social and economic time frame and attempt to view it from another perspective. We are all constricted by our immediate involvement in the present and we are all presently constricted by conventional energy sources and technologies. I would just call to mind for you the polished Public Service slide show you just saw. The energy debate, its shape and constrictions, are too widely dominated by those conventional sources and we need to see that often those projections are shaped and determined by what is naturally a vested self-interest in their own perpetuation. We seem to have arrived at the point of diminishing return whereby the amount of energy necessary to dig fuel sources out of the earth is far greater than those we finally extract from the earth. What we need to do individually and governmentally is to examine very closely what we wish to accomplish. It is not just lower costs we are seeking, but lower consumption, consumption powered by other alternate energy sources when possible. And future legislation needs to speak to those goals.

We ask that government serve as it should as an articulator and speak for your constituents, provide their many separate voices with amplification so that they may be heard from the marketplace. Government truly needs to be the defender of this new thinking towards new directions and energy resources. Thank you.

ASSEMBLYMAN STOCKMAN: Thank you very much.

I am happy to see that Congressman Florio is here. Since I suspect he has a fairly busy schedule, he will be glad to come forward now and give us the benefit of his thinking. I want to say that we invited both gubernatorial candidates. Unfortunately, Mr. Kean could not be here with us today. But I don't want anyone to think this was a one-sided invitation. I have known to be a little partisan at times, but not as committee chairman, I hope.

Incidentally, Jim, I want to introduce to you Rose Brunetto, who is sitting to my left. She is a representative from Senator Bradley's office. Senator Bradley has been working closely with this subcommittee as we try to do some things in the area of conservation.

C O N G R E S S M A N J A M E S F L O R I O: Thank you very much, Mr. Chairman and members in attendance, I would like to express my appreciation for the opportunity to comment and just give you some thoughts on the subject you are dealing with today. In the interest of conserving the Committee's time, I have a full statement that I would like to enter into the record, and I will feel free to summarize from it.

It is interesting to note that, as perhaps members know, I am the Chairman of the Transportation and Commerce Committee in Washington, and that traditionally has been regarded as the railroad committee. But, over the last number of years another area of our jurisdiction under the Commerce Clause, a whole area of solid waste, hazardous waste, resource recovery, recycling, and that syndrome of issues, has taken up as much of our time as has the area of railroads. I think that is symptomatic of the sensitivity of the Congress, and hopefully it reflects the national concerns. This is an area that is getting much more attention, and I think appropriately so. I think it is as a result of nothing more fundamental than the economics that are changing over the country.

The major thrust of my remarks is really to emphasize conservation in a much more expanded definition. Conservation should not be simply thought of as providing belt tightening and receiving less. I would define the conservation effort as not only the use of less energy but the use of alternative forms of energy, the reuse and recovery of resources and materials, particularly emphasizing the indirect savings in energy that comes from recycling and reuse of certain materials. I suspect that we are all familiar with traditional conservation efforts, enough not to have to dwell on it too much. One of the more significant legislative enactments in Washington was the Energy Policy and Conservation Act, which mandated certain fuel efficiency standards for Detroit -- that is, for the automobile industry. We all know that one of the major utilizers of our energy supply is the automobile, and to the degree that the Congress early on - 1975 as a matter of fact - started mandating certain fuel efficiency standards, we probably have saved the automobile industry an awful lot of aggravation that they felt they would not have to deal with. And, of course they have had to deal with fuel efficiency. So, that is an interesting development, where governmental regulation ended up probably saving at least a portion of the industry when in fact the marketplace forces didn't seem to be propelling them in the area of new, high efficiency engines at that particular time.

Industrial conservation programs have clearly paid off and we see direct benefits to our industrial sector. We are all familiar with the residential weatherization and efficiency programs which certainly do yield direct conservation benefits.

Turning to alternative energy sources, one of the things that is now regarded as commonplace, but which just a few years back was thought of as something for the 21st Century, was the various means of utilizing solar energy, and not just direct solar but talking about passive solar, wind solar energy, and things of that sort. These are now competitive in terms of energy. Hot water heating and home heating are all measures of utilizing solar power in a cost-effective, competitive way. Changes in the Federal tax code have been very helpful in inducing people to modify homes so as to take advantage of this particular source of energy.

Cogeneration is certainly something that New Jersey is very much prepared to go forward with. Coming from a dense, industrial base, the opportunities

to use the waste heat that is generated from the electrical generating process and from the industrial process for the achieving of conservation by using this 25% waste heat that comes out of the generating process in the utility production of electricity is something that we just can't afford not to utilize. I think we are charged at the national level and at the State level with removing those disincentives. For the most part, they are not financial disincentives; they are social disincentives, economic disincentives, and some political disincentives, to try to facilitate the use of cogeneration. One of the indications we had was waste heat resulting from utility power generation of industrial steam production, amounting to the energy equivalent of over seven million barrels of oil per day. So, we just can't afford not to use that source of energy.

The conservation of solid waste energy is another proven substitute for energy. Of course, I am talking about resource recovery. There are multitudes of technologies. This, again, is not something that is far off. It is there. I don't know if the Committee is into traveling, but if it ever wanted to go to Saugus, Massachusetts, it could go to see a resource recovery facility that is operational, utilizing the solid wastes of the greater Boston area. Steam is being generated and sold down the road -- I believe it is to General Electric. It is a private sector operation. It is in the black. And, it is something that we should be attempting to emulate here in New Jersey: being able to convert a problem - that is, garbage and all the associated problems with it in terms of land filling, ground water contamination, and so on, into a positive asset, meaning the energy. So, we should be looking for all types of ways of facilitating the transition into more resource recovery.

Resource recovery in the area of solid waste garbage is one means, and one can use it to convert it to steam. Direct electricity is able to be generated under types of techniques. Another aspect of resource recovery, the tapping of landfills to extract methane in the Los Angeles area, is done on a regular basis. One can go to Cinnaminson and see it done. Public Service Electric and Gas is down in the area extracting methane and feeding it -- which is the equivalent of natural gas -- to a local industrial firm that is using it in its production process. This is new, and there are all kinds of new technologies. It is my understanding that there is a new waste energy process that turns sludge into clean water. It has come into use in a demonstration project in West New York-New Jersey. So, that is something that I think we should be looking at and then making the determination as to what the appropriate technology is for the local waste stream or the local conditions. That is a very important thing, and I would just suggest that the private sector has to be encouraged to come into this area because it really is something that they should be doing. The public sector role should be the catalyst, as the entity that will remove the disincentives and perhaps provide some incentives, not necessarily financial incentives.

The last point that I would like to talk about is the -- I suppose it is the aspect of resource recovery that is represented by recycling. Recycling is an indirect conserver of energy. One of the points I suspect most people know about is the recycling of aluminum. If one takes recycled aluminum, one conserves 95% of the energy that is required to convert bauxite - the basic material - into virgin aluminum. So one can conserve massive amounts of energy

as a result of the recycling process. Paper made from recycled fibre uses approximately 50% less energy as compared to virgin pulp. Recycled glass consumes 35% to 40% less energy than glass made from raw materials. And, I could go on with a whole list of things that indicate the direct energy consequences - saving consequences - of recycling.

It is interesting. As I go around this State, there are a whole host of recycling projects, and I am sure the Committee is aware of this. If it is done with something that is good in terms of the direct energy benefits, and conservation benefits, you would be surprised - or perhaps you wouldn't be - as to the sense of community activity in the recycling movement. There is almost a sense of patriotism that comes, and it is a very wholesome and a very important community unifying force. Woodbury, in my Congressional district, is a municipality that has recently instituted a mandatory recycling program which is working. It is a combination recycling, source-separation type of recycling and it is working very well. It is translated into dollar savings for the municipality because they are able to, obviously, generate monies from some of the materials that are sold, and on the other hand they are required to pay less for the disposal in the landfills of the waste because some of the waste is being extracted from the waste stream and being sold commercially. So, there are a multitude of benefits in a very direct way and in a very indirect way.

A recent Rutgers study concluded that for every one million dollars in private dollars spent in the manufacturing and installation of energy conservation and renewable resource technology, fifty three jobs are created. The identical investment in traditional sources of energy production results in only 18 jobs. This, of course, highlights my last point, which is to say that this whole initiative should in no way be regarded as a job-threatening initiative. In fact, the argument can be made, and I think very validly, that there is a whole new industry out there that we in New Jersey should be in a position to profit from, that is the renewable resources recycling and all those types of issues that I have tried to touch on. It really is a growth industry. The private sector -- it is regarded as a blue chip industry, and many of these companies are doing very well, and they are going to do very well in the future.

The only other point that I would make is - and it is not something to go into today - the potential for using hazardous wastes in a resource recovery mode. We generally think of energy as coming from solid waste, but the Danes have, for a long period of time, actually generated energy out of their disposal facilities for hazardous materials. It may very well be something that the Committee wants to look into as we try to go forward with that very thorny problem of disposing of hazardous waste.

Conservation isn't really only a national responsibility. It is a partnership between the various levels of government and the private sector and individuals. I think, as we see shifting responsibilities coming out of new policies which, for the most part, are shifting responsibilities back to the state, this is one of the areas where the State can, in a sense, benefit from these shifting responsibilities. And, we in New Jersey who have a great abundance of this particular resource that we have never really thought of as being something good, namely solid waste, really can take advantage of the new sensitivity to the utilization of these types of materials.

The Port Authority of New York-New Jersey has proposals they are talking about in terms of modular resource recovery facilities to be tied in with an industrial park development project, providing the energy for the industrial parks out of modular resource recovery units utilizing solid waste.

Actually, the fact of the matter is, one's imagination is the only limitation on the things that one can do in this whole new developing field, and I would just commend the Committee for spending the time in this area, trying to review the appropriate laws to see which laws are helpful and which laws are not, and what new industries are required. And, I, in whatever capacity I end up serving, am pleased to work with the Committee, and I thank you very much for the invitation.

ASSEMBLYMAN STOCKMAN: Congressman, I thank you very much for your remarks. It is evident that you have some interest and expertise, and I am impressed with your comments about these various technologies that apparently your service in the Congress has brought you into touch with.

My service on this Subcommittee had led me, more and more, to a sense of feeling that energy conservation is extremely important, especially to a State like New Jersey. As a matter of fact, I would like to suggest to you here, publicly, today that perhaps we could think about trying to make energy conservation a matter of special state interest and concern in New Jersey. We can make New Jersey the energy conservation state of the nation. It seems to me that no state could probably better lay claim to a need for wise efforts in the area of energy. We are a state largely barren of natural resources such as coal and oil and that sort of thing. We are a densely populated state, and as you pointed out, we are a state that produces a great deal of refuse, for a lot of reasons. I guess one might even recall that we are the State of Thomas Edison.

I think it would be a noble and a very wise idea if perhaps you and -- perhaps we could persuade your opponent even to sort of jointly concur in trying to develop that concept: the energy conservation state of the nation.

I want to thank you for appearing before this Committee today, obviously in the role that you play. I think you have added much to the hearing today, and I appreciate your taking the time to come. Thank you very much.

CONGRESSMAN FLORIO: Thank you.

ASSEMBLYMAN STOCKMAN: Our next witness will be Constance Gibson, Assistant Executive Director of the New Jersey Mortgage Finance Association. C O N S T A N C E G I B S O N: Good morning. I am very pleased to be here on behalf of the Mortgage Finance Agency, and for Christopher Kelly, who is Executive Director of the Agency. He cannot be with us today.

We are very impressed with the work of the Committee because our work, which is involved with the one small sector of the energy conservation effort, has led us to realize that the need for public awareness of energy conservation is critical. I see this effort by your Committee as an essential aspect of that.

Our Agency's role has been and can be in providing financial incentives to homeowners in making energy conservation improvements to their homes. We did a pilot program last year. We took two million dollars that we had from a home improvement loan program and set it aside on an experimental basis to finance solar domestic hot water systems. We had no idea what the response would be, and frankly we thought that money would be sitting around for quite some time.

We were absolutely wrong. The demand for the money was so extreme that it was all committed within seven weeks. That has, of course, led us to do some very serious thinking about expanding our own home improvement loan program. While we had been created by the Legislature originally to solve a variety of housing problems, we had not ever been mandated until recently to do energy. Now, the Legislature has passed an amendment to our Act so that we now are authorized to provide financing for energy conservation.

We are now in the process of planning our next bond issue, which we hope to sell this Fall, if there is a bond market. This will have an energy solar component in it. All of our home improvement loans have always had an energy component, but they have been limited to people of modest income. We have had an income limit, and do still have an income limit, on the home improvement loans, up to approximately \$22,000 for a family of four.

What we are doing now, again on an experimental basis to see what the demand is going to be, is, we are making energy solar loans available to homeowners with a household income of \$45,000 or less. The kinds of improvements that will be available to such homeowners will be up to \$4,000 for energy conservation. Essentially, all of those energy conservation improvements are eligible for the Federal tax credit - insulation, corking, storm windows, thermostats, and so forth. And, in addition to that, one could borrow another \$3,500 for solar hot water systems.

Our experience with the solar hot water pilot program, as I said, was quite positive. We worked very closely with the Department of Energy in developing that program, as well as with the solar hot water contractors. And, I expect that there will be a considerable demand for this again. The problems that we are facing, the Committee should be aware of. They are common problems. And one is, can we sell our bonds in the bond market?

ASSEMBLYMAN STOCKMAN: We can't help you with that.

MS. GIBSON: The agency has been faced - as you are probably also aware - with fairly difficult Congressional constraints, which were placed on agencies financing housing, such as we. We have just about seen our way clear to do a home improvement bond issue, which is somewhat easier to do than a mortgage program, and we are getting that ready to go into the market, probably on the first of October. Then, of course, the other problem is the bond market, which seems to have disappeared on Monday. We hope it comes back.

That leads us to the last question; that is: "What will the interest rate be on these loans that we are trying to put together to provide these incentives to homeowners?" I guess on Monday, before I read the paper I would have said possibly thirteen or fourteen percent. I don't know what it is going to be. We will not know until we go into the bond market and see what the rate is actually going to be, but it is kind of incredible to have a low interest, or a below-market interest rate loan at fifteen percent. We may be looking at something of that sort, however.

That is essentially what we are able to do. Our impact, I think, has the potential of being great to that segment of the population which are homeowners and which are owner-occupants of their properties of up to four units. What we will be studying if we do get into this program this Fall, as I hope we will, is, we will be studying the impact of it very closely to see if there should be some modifications and expansion to it next year.

ASSEMBLYMAN STOCKMAN: Thank you very much.

The next witness will be Chaim Gold, President of Bumblebee Energy Systems, Inc.

C H A I M S. G O L D: Thank you very much, Assemblyman Stockman. My name is Chaim Gold and I am President of Bumblebee Energy Systems, Inc. For almost seven years, until my departure last March, I was with the New Jersey State Department of Human Services, most recently in part as Energy Advisor to Commissioner Ann Klein. I have been engaged in energy conservation research and development since 1975. The purpose of my appearance before you today is to demonstrate the results of that research, and to share with you some thoughts on how the legislature might promote technical innovation in energy conservation, to the benefit of citizens and taxpayers throughout the State.

I began my energy conservation efforts six years ago with an inquiry into controlling energy in large old apartment houses. I was interested in this field for at least three reasons: First, very little study and analysis had been given to these buildings in the past. Second, I had a friend who owned such a complex, located less than a mile from here, in downtown Trenton, who was willing to provide his support and, more importantly, his money to allow me to proceed. Incidentally, I happened to live in that complex at the time, and the price of failure would have been to have been roasted alive at temperatures in excess of eighty degrees for the duration of the winter. So, self-preservation was the mother of invention.

The situation which I found in these buildings was not only not unique, it was not even unusual. Let me give you some numbers. According to the New Jersey Fuel Merchants Association, the average apartment building in the State of New Jersey consumes approximately 900 gallons per apartment per year, including the generation of hot water. The building in which I was doomed to swelter was therefore at the statewide average, not above it. I have since encountered buildings, public and private alike, in which consumption routinely runs 1200 to 1400 gallons per apartment per year, and one case of 1600 gallons, enough fuel to heat a nine-room, five-bedroom house. After looking at reams of data over the last six years, which is far longer than anyone should be sentenced to do it, I think I can say with some assurance that the average apartment building in the State burns 50% more oil or gas than is required to keep the occupants comfortable; many buildings burn double the amount of fuel necessary; and a small but significant number burn from three to four times as much oil or gas as should be burned in a year.

By type of ownership, there are three kinds of properties in New Jersey. The vast majority of rental housing is privately owned. I don't have the exact figures, but it is certainly in the hundreds of thousands of units. The second category is Public Housing, concentrated in the cities and operated by local housing authorities under the oversight of the Federal Department of Housing and Urban Development. There are about 46,000 units of this type. Finally, there is subsidized housing, constructed and operated under the auspices of the New Jersey Housing Finance Agency, constituting approximately 29,000 units and built since 1968. These last two categories, public housing and subsidized housing, are especially deserving of this Committee's attention, since the residents of these properties, several hundred thousand people in all, constitute those members of society least able to look after themselves. Your action, to help to improve the energy efficiencies in these properties in which energy costs are typically 20% to more than 50% of operating costs,

is good social policy. More than that, it is also good tax business policy because operating deficits caused by these extraordinary energy costs must be made up by taxpayer dollars out of the public treasury.

I will have more to say about energy conservation policy later, but now I would like to show you a computerized energy management system, funded in part by the United States Department of Housing and Urban Development, which has been installed and operating since January here in the City of Trenton, New Jersey.

Now, the video display terminal, which is located above you, is connected to a telephone. On the other end of the phone line is a digital computer, located at the administration building of the Trenton Housing Authority, which is situated on the grounds of the Donnelly-Page housing project. Now, in order to reduce neck strain, because you can't see that terminal too well, the displays are reproduced on the last two pages of this statement, so you can follow along there. The system was originally installed at the 159 unit Page Homes and after four months of successful operation, the Department of Housing and Urban Development, which originally financed the project, approved the expansion of the system to encompass the entire 550 units -- about 25% of the Trenton Housing Authority's capacity.

Now, the terminal has been set up for automatic operation to demonstrate the system. There are five pages which you can view, each page being displayed for about a minute. First comes the title page, and again these are at the back of the statement, followed by an explanation of the property and the operation of the system. The third page displays a log of the times and temperatures on the property for at least the past day or two. You could pick up a telephone, dial into the computer, and find out if everything was normal last night. The next page provides the actual temperatures inside the apartments, which is useful for calming excited tenants who may think you are trying to freeze them out if the temperature in their apartment drops below 75 degrees. The last page is a summary of system operation, which is useful for assuring that everything is operating properly. This may ultimately turn out to be the computer's most important feature. I once asked the Superintendent of Maintenance of a Housing Authority why it seemed that the headquarters property operated so well, while the others ran so poorly. He responded: "It's because I am here and I am not there." With a computer to oversee the maintenance of the equipment, he can be here and there at the same time.

Now, I would like to give you some technical details on this operation of the system. There are 72 temperature sensors located in apartments throughout the six buildings of the Page property. There is an outside temperature sensor, plus sensors on the boilers, plus a clock inside the computer. Every fifteen minutes the computer scans the apartments, computes average temperatures and decides whether to increase or decrease the amount of heat being sent to the apartments. It also monitors the boilers and other equipment for proper operation, produces video and paper displays, and performs other housekeeping functions. This description seems deceptively simple, but it requires approximately one thousand lines of computer code to get the desired results.

And, it does get results. The system was turned on in late January of 1981 and after ten days of operation, oil consumption was down 24% relative to a year earlier, after adjusting for "degree days", which is the method of accounting for different weather conditions. After another ten days of operation,

oil consumption had dropped by another 34%, also after adjusting for the weather. For the entire month of March, oil consumption was down by 44% relative to a year earlier. From a base consumption averaged over the previous three winters of about 160,000 gallons, consumption next winter should be less than 100,000 gallons, a saving at today's oil prices of more than \$60,000.

I was pleased to receive a phone call last week from Dr. Gautam Dutt of the Center for Energy and Environmental Studies at Princeton University. Let me just say that some states have coal and some states have oil and we have CEES and its knowledge -- if we will only use it to its full advantage. And, I might say in passing that Senator Bradley has certainly been in the forefront of utilizing that knowledge. At any rate, I sent a substantial amount of data to Dr. Dutt several months ago. He called me to tell me he had examined it very carefully and in his opinion the computer system was, in fact, responsible for savings of from 40% to 50% in annual oil consumption.

Now, it is important to stress two things about these figures. First, Page Homes had consumed only slightly more than the statewide average figures for oil consumption. It was not a terribly inefficient property. Second, these savings were achieved while holding building temperatures at a relatively balmy 74 degrees during the day and 72 degrees at night. More wasteful buildings, and 70 degree temperatures under emergency conditions, would easily push these savings over 50%.

The bottom line on any of this is cost-effectiveness. There can be no doubt that in the appropriate circumstances, computerized energy management systems are the way to go. Other conservation measures, such as storm windows and insulation, typically have paybacks of from four to seven years. These computer systems have installed costs of from \$50,000 to \$150,000, depending on the size of the property involved. Savings will typically exceed costs in the first year of operation. Putting it another way, an investment in technology, dollar for dollar, is like putting oil in your tank, except that you do it only once, and it continues to provide heat year after year.

Now, since you people represent the public at the level of State government, let me tell you two stories which seem to represent both the good and the bad in the introduction of technology for energy conservation at the level of State government. It should provide some food for legislative thought.

Several years ago, some especially far-sighted bureaucrats in the Department of Higher Education attempted to obtain several large computerized energy conservation systems for State colleges. The college designated was Trenton State; the vendor selected was Honeywell, perhaps the largest name in the field; the price was established at \$800,000 and the State was earnestly assured that the system would pay for itself in three to four years, which is a thoroughly reasonable length of time. Of course, nobody could have foreseen the fall of the Shah, the rise of the Ayatollah, the Iraq-Iraq war, and all the other good things for which the Mideast is famous. The resulting doubling of the price of oil changed the economics to where the system paid for itself in about a year. That was the good news.

The bad news, and fortunately it is of a much smaller scale, occurred when the Department of Human Services, as part of a power plant modification program at an institution, attempted to have a purchase contract for a new boiler modified to incorporate a newly-developed microprocessor controller, which increases combustion efficiency. The device works by optimizing the

mixture of fuel and air going into the boiler. Now, in ten years every car on the road is going to have one of these contraptions, but now, at \$20,000 per boiler, they are only for big consumers. The savings are not spectacular, only about 2% to 4% of fuel consumed, but a small percentage of a million dollars a year is still a lot of money. Again, payback would have been less than a year. The argument for doing it was compelling; the argument against doing it was that while the boiler had been competitively bid, the modification should also go to competitive bidding, even though it was a product provided by the boiler manufacturer, to be installed at the factory prior to shipment. The Commissioner of Human Services had to appeal directly to the State Treasurer for a waiver of competitive bidding in order not to have the flea delay the installation of the elephant. This is the kind of foolishness which unreasonably inhibits the introduction of new technology and the conservation of energy, while incidentally giving government a bad name for poor administrative efficiency.

My purpose in raising these two incidents is to give you gentlemen and lady some idea of both the problems and the opportunities which await you in the field of energy conservation at the State government level. My recommendations to you fall into four areas: Public Housing Authorities under HUD supervision; subsidized housing under the New Jersey Housing Finance Agency Management; State agencies under the Governor's jurisdiction, subject to your oversight; and general state policies to encourage the consumption of domestic technology over imported oil.

You may wonder why I have chosen to begin with Public Housing Authorities, which as local agencies under Federal sponsorship have very little to do with State government. It is simply because the policies of the Reagan Administration today are to jettison support for anything in which it does not believe, and public housing is one of the many socially necessary programs which have been abandoned by Washington in this latest move toward fiscal insanity. A reduction in Federal operating subsidies, coupled with a curtailment of modernization funds, virtually guarantees that the quality of life will deteriorate for the 150,000 or so New Jerseyans who live in these projects. It is especially tragic because it is unnecessary. Since heat must be provided, maintenance will be reduced, maintenance workers will be laid off, and properties will decay. Must we always trade local jobs for imported oil? For a typical housing authority in which energy costs represent one-half of the operating budget, a forty percent reduction in energy represents a twenty percent reduction in the budget, obtained without reducing services. This simple piece of arithmetic has gone unnoticed in Washington; it should not go unnoticed by you. You should consider introducing legislation to provide for a revolving fund for investment in energy conservation. You have a statewide energy conservation bond fund approved last year by the voters. If perhaps \$5,000,000 could be made available for those projects with a simple payback of one year or less - and this is just one of several - it would assure that the most necessary and urgent improvements could be implemented in almost all public housing projects throughout the State by the end of President Reagan's first, and hopefully only, term. You would have to consult with HUD to assure that they would only seek to recapture the net savings, the savings after the cost of installation, not the gross savings. But, if they won't give you money, perhaps they will offer you support. And, of course, at the end of four years you will still have your \$5,000,000.

Now, the New Jersey Housing Finance Agency, on the other hand, is a creature of the Legislature and you have some very definite prerogatives with respect to their operation. Like most agencies, it has some highly qualified people whom I have been privileged to work with; and, of course, it has some real turkeys. Its most significant characteristic at this time is that it is the New Jersey newspapers' favorite Fort Apache, and so long as it is under siege, as well as trying to float bonds in a nonexistent bond market, to which Conny Gibson has just referred, they are going to pay a limited amount of attention to their \$35 million a year energy bill. You should encourage them to pay more attention to it. A revolving fund for energy conservation improvements makes a lot of sense here because they have reserves which could be appropriated to this purpose. Again, so long as the newspapers carry stories about how the elderly must pay sharply increasing rentals in order to cover escalating fuel costs, there should be some requirement for public accountability which requires project managers to show, consistently and on paper, that they are consuming energy both efficiently and effectively.

Now, consumption of energy at New Jersey State Institutions is a particular peeve of mine, coming from a State agency background. This is a direct issue for legislative oversight. The problem for once did not seem to be the lack of agency interest; our Commissioner was aggressively committed to conservation in its many technologies; agency staff was also highly committed, as were many individuals in other departments which run institutions. The problem here, at the State government level, is organizational and procedural. Conservation is treated with the same urgency as business as usual. I guess the good news is that Trenton State College got its computer. The bad news is why everyone else doesn't have one by now as well. It will probably take until the end of the decade to get them in all institutions, and frankly, that's unacceptable. This is a current technology. It is here today. It isn't something we hope to have by the end of the century. It is available commercially from different vendors, from different kinds of facilities, and you should take advantage of it because it is the best money that you will spend.

A recent effort to issue a cogeneration feasibility study for six institutions, a relatively modest effort, took a year, and the entire process was characterized by a number of the bidders as "inept." We will have an election in ten weeks and a new governor two months later. Today is not the time for action, but January will be. You should actively seek out those examples of missed opportunities and take steps to assure that they are not repeated.

Finally, let me take a parting shot at the New Jersey Department of Energy. Unfortunately, I did not see that televised program last night, but I want to say to that candidate, Mr. Kean: "Lay off Joel Jacobson; he's mine. I will take shots at him." I haven't always seen eye-to-eye with him on a number of issues. He has been obsessed with Mobil Oil while I have been obsessed with home heating oil, although the current administration in Washington makes Commissioner Jacobson look very, very good by comparison. His department has done a number of useful things, which apparently Mr. Kean has not bothered to learn. A statewide energy data base is especially important. Without data you can't make decisions, you are dead. The administration of the Schools and Hospitals Grants Program has been effective. And, his personal support for the Trenton Cogeneration Project was a major boost in its favor. The Department's direct efforts in conservation have been limited due to a lack of funding

much more than lack of interest. Overall, the few million dollars a year which this agency costs is a mere pittance by government standards, while it has provided us with conservation benefits which more than justify its existence. In the absence of the continued Federal funding which is vital to its existence, you should consider very carefully its modest requirements and make every effort to meet those requirements from State funds.

I have taken much of your time. Thank you for giving me this opportunity to present you with my thoughts.

ASSEMBLYMAN STOCKMAN: Thank you very much, Chaim, for your thoughtful and provocative ideas and suggestions. I think they will be helpful to us.

Mr. Lou Schindel, the New Jersey Solar Action.

L O U S C H I N D E L: Good morning, Mr. Stockman. Thank you for the invitation to appear before your committee.

First, I would like to introduce myself by noting that I was brought up with a light switch in my hand, said light switch was in the "off" position. Though there was little we could not afford, we never left a light on in a room, nor did we use a car unless there was a very good reason. My upbringing made me a natural for the calls of "Earth Day" and "Sun Day".

We in Maplewood started recycling in 1970 and we are still at it. On Sunday, May 3, 1978, I had the pleasure of hosting over 400 people at 5:15 A.M., if you will, at Eagle Rock in West Orange. Commissioner Joel Jacobson was our principal speaker. Yes, I have been deeply involved in the environmental-energy movement in New Jersey. Officially, I am a state employee, here on my own time - please note. I serve on the New Jersey Noise Control Council, the Ridesharing Committee, the Recycling Advisory Committee, and, soon, the Clean Air Council. A scorecard of my activities is attached. I am proud to note also that I was one of the founders of New Jersey Solar Action; though this is my statement, not an official New Jersey Solar Action statement.

Conservation is our concern today. May I enter these suggestions? I would ask that with all your power you attempt to preserve the offices of Energy, Conservation, and Alternate Technology at our Department of Energy. It is my understanding that several of the slots there are federally funded and that they are on the Administration's "hit list."

Based on the data in the 1980 State Energy Conservation Report, to which Commissioner Jacobson made reference, though the Office does not seem to take all of the credit, over seventy-four trillion BTU's were saved. Surely, this makes the Office of Conservation cost effective.

Just for the record, I would like to note that I am proud of my own efforts. I have not had to use oil to heat my hot water since May, thanks to my own solar hot water system.

Number two, though perhaps a bit beyond the jurisdiction of this committee, I would ask for a reformation of the Board of Public Utilities, starting at the top. My story is this: It is my conviction - and, as noted, my tradition - that the cornerstone of conservation is knowledge and facts - our utility bills do not give us facts - yes, knowledge and facts, as opposed to the baloney handed out by the energy industries and their allies in government.

Why, I said to myself about a year ago, should I pay a utility bill when the information on it doesn't show precisely what I am paying for? I asked my water company, Commonwealth, this question, with a copy to BPU. Before the water company responded, the BPU did: "We have your letter and will

follow up." This was signed by George H. Barbour, President. A few days later, a letter came from Commonwealth, which said: "We have a copy of your letter to the BPU." They don't have very good reading habits at Commonwealth. The letter was to them. Commonwealth sent me a copy of a tariff. Now, what is a tariff to the man in the street? One change that is made should be use of simple language, as with the insurance industry. Let's call it a rate chart.

I received shortly thereafter a letter from the BPU, signed again by a Mr. Barbour, but this was a different Mr. Barbour. Does the President of the BPU write with the left hand and the right hand? He said: "It is not fully practical to list all charges due to space limitations on the bill." That is hogwash. In the packet is a copy of said bill. On the bottom line, or bottom section of the bill, are four lines of lobbying effort by the Utility on the gross receipts tax. How is it that the President of the Board of Public Utilities, George Barbour I, or George Barbour II, I am not sure which one, is defending the Utility with hogwash?

In a later letter, the Board of Public Utilities stated to me that: "Fortunately, the BPU is one of a limited number of agencies where a consumer may seek assistance with a problem." I would ask assistance with clarification. When a senior member of this government allows others to use his signature, and when the same person uses false or stupid remarks about no space on the bill, and when for purposes of lobbying for his own group the message about service to the consumer is used, I say it is time for that person to go. I here ask for the resignation of George H. Barbour and suggest to you, as members of the legislative committees, that you engage in assisting your fellow taxpayers and start here to bring the BPU back to the taxpayers.

Today the energy situation is not a crisis. Tomorrow it may be. We, the people of New Jersey, must have a control agency working for us, not just the utilities. Above all, the leadership of this agency must be sincere.

I have a couple of other quick points. I have a quote from a Public Utility's President. It says: "We intend to encourage the use of customer-owned resources -- solar hot water, wood fire stoves, waste heat utilization, and cogeneration." Surely, these are not the words of Mr. Sonn of Public Service Electric and Gas. He and Mr. Smith have assiduously avoided any commitment to cogeneration for the many years I have been listening to them. This is the statement of Mr. Ellis, Puget Sound Power and light.

Point: I believe a prime goal of this committee is to put the utilities in the business of solving the energy problem, in the vein suggested by Puget Sound. And, in this I do not refer to tongue in cheek programs like PSE&G's solar hot water program. Though it may produce some valid results, I must be skeptical in light of their anti-solar propaganda. Here, of course, I refer to this wonderful book that has been in circulation for some time. In this PSE&G publication, the statement is made, for instance, that, "we suffered the failure of one of our test sites because there was a ground installation of the collectors." In another situation there were some difficulties because some valves were found to be defective. My question to PSE&G, which I have asked several times on public and private occasions, is: "How is it that I, as a part-time amateur in energy, knew from a test program in New England several years before that one is extremely cautious in siting ground installations for collectors"? And, number two, "when you are a multi-million-dollar corporation, you pre-test valves when you put them into the system." So, I think they have

a skeptical view of solar. Let the utilities use their money to finance citizen owned conservation systems.

I stated in the beginning that I was brought up with a light switch in my hand. I believe we have forgotten the importance of turning off a light. I believe we may have become addicted to gadgets in conservation, forgetting the importance of man as the solver of his own problems. It is not too late.

The feds seem to have abandoned behavioral conservation. You will recall the program for certification for set-back of thermostats, and so forth. I ask this committee to reinstitute it in New Jersey. An excellent place to start, nay not excellent by an essential place to start, is within the state government itself. By example, by directives, by programs, by constant education, and by simple acts by all members of this government we can save thousands of BTU's. The keystones to success are repetition and long term persistence. A nucleus of over 60,000 energy conservationists in a controlled group is a worthy target. I would ask the committee to shoot for it within the government.

A final note. I think we will agree that energy is the guts of the society, here and in all nations. A few have control over our sources and are squeezing the lifeblood out of us. In my judgment we have entered an era of fatalism: "what the hell difference does it make if we waste more resources; somehow, someone else will solve the problem." I cannot buy that philosophy. I close with a few words more akin to my own beliefs, and I would hope that these will become your beliefs: "We have not inherited earth from our parents; we have borrowed it from our children." Because I love my children, I cannot waste a watt, can you? Thank you.

ASSEMBLYMAN STOCKMAN: Thank you very much, Mr. Schindel, for your remarks.

I think we will be able to complete the testimony of all the scheduled witnesses by 1:00. Ordinarily, if I thought we weren't going to be able to do that, I might be inclined to do take a break now. But, in view of the pace with which we have been able to continue, I think I am going to continue the hearing and attempt to conclude it in that manner. So, our next witness will be Jonathan Novak from the New Jersey Solar Coalition.

J O N A T H A N N O V A K: Thank you. I am very happy to have this opportunity to address this committee for the purpose of legislation concerning energy conservation and energy efficiency, weatherization and solarization.

First, I would like to briefly explain my background, our work and the people's attitude, then I would like to address the seriousness of the situation on the county, state, and national level. Finally, I will address specific legislation and explain why it is the only effective means to energy efficiency and the political realities. All of my statements follow to specific legislation which will be shown at the end.

I have previously been an electrical systems engineer, working on large, national military electronic systems projects, such as Polaris and Poseidon submarines, Safeguard Anti-Ballistic Missile Perimeter Acquisition Radar in North Dakota, Pembass Remote Battlefield Sensor System, and most recently I have done electrical systems integration of all systems in the AEGIS Ship Combat System. The technology is not close to today's discussion but the systems engineering, business, and political experience in dealing with the Federal government and military is directly applicable.

New Jersey State Library

Now I am working with the New Jersey Solar Coalition, a not-for-profit education and research organization in Camden promoting solar and renewable energy, educating the poor, elderly, and needy on low cost/no cost energy efficiency and weatherization and researching new low-cost energy systems and technology. We teach and promote energy conservation at workshops, organizational meetings, and individually. We talk to many different types of people to understand what they think about energy conservation and why, so we can better market energy-wise decisions, products, and services. Here is what the people are telling us. People are interested in energy conservation to a limited extent. A large majority are completely disinterested except for a slight curiosity. Most people are just not motivated to adopt energy conservation measures because they believe the time and money that is required will not be effectively spent. People are financially not motivated to save energy. Those who are interested want something which will obviously save energy or money. People are extremely skeptical. They have been lied to and doubled talked with half-truths and misrepresentations from large and small companies to government leaders. People will only go to the trouble - and most regard it as very annoying - to caulk, or weatherstrip, or insulate, or solarize if they are completely convinced that it is cost and time effective and will save energy. People would rather install a windmill than caulk and weatherstrip even though weatherizing is perhaps a hundred times more cost-effective, because a windmill is completely understandable in reducing energy and it is fun. But, how caulking and weatherstripping and some solar technologies will save much energy is not understood. Very few people understand all the simple techniques for energy conservation, including active and passive solar, which are completely practical and have been for many years.

People are not motivated, and they do not have the information. These are the two most important aspects which must be dealt with legislatively, motivation and information. Many people who do not have the information and do not realize how effective energy conservation can be, just leave the area. They move south. The State and Camden County are in trouble.

Our group is involved in a Camden County Citizens Energy Advisory Group, which has studied the energy usage in Camden County. The Camden County Citizens Energy Advisory Group has done some careful and conservative study of energy usage in Camden County. Camden County, like the State, must import all its energy resources, and since the great percentage of energy costs are fuel, most of the energy dollars are then exported.

Using utility figures for gas and electricity and census figures for oil and population, we have conservatively found that almost one billion dollars leave Camden County every year. As President Reagan pointed out, that is a stack of dollars about seventy five miles high. These figures, by the way, are corroborated by a detailed national study by the Brookhaven National Laboratory.

Further, it is universally agreed among financial experts that a multiplier effect occurs due to required bank reserves and the ability of the injected dollars to circulate in the economy. The standard for this multiplier effect is four, but some argue it may be as high as seven. So, the total loss to Camden County is about four billion dollars a year.

The fuel usage breaks down to approximately 37% residential, 12% commercial, 14% industrial, and 36% transportation. Residential and transportation

make up 75%, which is primarily the average citizen. These figures are typical for other counties in the State. So, we have determined that any effective legislation must affect the average citizen but he is not motivated or informed.

On the State level, New Jersey is in a serious situation. New Jersey is not now viable at its present economic level and is losing business and population growth as a result. It is so bad that it is losing U. S. Congressional seats. Now, that is serious. The problems and distress are very real, but there are also real answers, which I will get to in a bit.

The problems have many reasons, but I believe New Jersey's Energy Policy is at the top of the list. New Jersey must import all its energy raw materials. We produce no energy, even nuclear fuel is purchased outside the State. New Jersey is a total net importer of energy and a total net exporter of energy dollars.

Let me provide some facts from the latest available U. S. Department of Energy Data on energy consumption. Report number BNL 50501-R states that New Jersey uses about $1. \times 10^{15}$ BTU's per year. That is about \$20 billion. That is mostly fuel costs and probably 85% to 90% of that leaves the State.

Now, a mass of studies has been pouring out of universities and foundations, including Harvard, Princeton, the National Academy of Sciences, the Ford Foundation, and the Center for Strategic and International Studies at Georgetown University, and they all say the same thing.

The cheapest, easiest, and most readily available source of energy in large amounts is the wasted energy we can conserve. And, half of what we consume is wasted. From my energy auditing experience and my own opinion, I would say we waste more than half. To New Jersey, this means we are unnecessarily spending almost ten billion dollars outside the State and when the multiplier effect to the economy is considered, this could be a difference of forty billion dollars to the State's economy every year. That is a stack of dollars which would equal the width of the American continent, every year.

Furthermore, from the study by the Brookhaven National Laboratory, referenced earlier, if each state's energy resource production is subtracted from its usage to find net usage, we find New Jersey is second only to New York in that usage, but New York has a much greater population - two and half times - so New Jersey has a higher net per capita usage. Delaware has a higher net per capita usage, but its total usage is only one-tenth that of New Jersey. So, considering total net usage and usage per person, New Jersey has the worst energy problem of all the States. Ladies and gentlemen, we are in serious trouble. New Jersey is like Japan and Europe, where all energy is imported. New Jersey is not like the rest of the United States, which have energy resources and production can be taxed. And, we cannot look to the Federal government for help. Since most states are energy producers to some extent, the preponderance of national political power is for energy consumption. The national political consensus is for producing and consuming. The northeast is but one of five regions of the country, and several of the other regions make net income and taxes from energy production, so State and Federal cooperation is unrealistic.

Now let's review where we are. The negative economic impact on New Jersey is tremendous. Possibly \$40 billion a year is lost to our economy every year. This waste is spread among every person in the State, but most people are not motivated financially and do not have the information required. Whatever

is to be done we must do ourselves because the Federal government has the opposite political will. The average person is not interested in expending a lot of effort to find and do the cost effective energy saving steps. He doesn't even know they exist. Energy is perceived as low priority and difficult to understand. There are better things to do.

Now, the only effective way to motivate every New Jersey soul is price. More expensive energy. The only effective energy legislation is to shift the State tax structure gradually over say ten years from income, sales, and property taxes to energy taxes. This is the only effective measure which will have a significant effect. Why tax and discourage employment, sales, and the owning of property? Every resident should be able to own one piece of property, tax free. He should not have to pay to work. And, elimination of sales taxes would boost the state's economy. Why should we be discouraging employment while also paying the taxes for everyone from Texas and Louisiana to Saudi Arabia? We are double taxed. We pay our taxes and their taxes too. It's time this stopped.

The people I have explained this to are for it, except for worry over a hidden tax increase. If a gradual shift from income, sales, and property taxes to energy taxes were accompanied by a net tax reduction, there would be broad public support, I believe. Some would say this is a regressive tax and the poor would be most heavily burdened. I have four answers to this:

The poor mainly live in cities which are more energy efficient because mass transportation is available and heating costs in row houses are less.

The large urban centers where the poor live will be helped most economically because they will be more popular due to their energy efficiency.

The low level skills and manual labor needed to retrofit the existing housing stock will mainly benefit the lower income group.

Specific help has been and will continue to be directed to the disadvantaged.

Don't let the rich energy brokers and other states and countries hide behind the low income people to make themselves rich.

The second area of motivation is the utilities and oil dealers. The utilities have done an excellent job under existing rules for supplying energy. Now the rules should be changed. These groups should be asked to develop several specific legislative proposals - as you have done - by which they would benefit from energy conservation, weatherizing, and passive solar. One example would be a sliding scale of profits for demonstrated customer conservation on a dollars per customer basis. The more conservation, the higher the allowable profit rate. The financing of small loans for building energy efficiency is a good idea but no one knows this is available. This program should be publicized and expanded to raise the limits and allow more types of conservation steps.

Just as important is getting strong energy efficiency information to consumers through utility mailers and local libraries. Special sections should be set up in area libraries where large amounts of energy efficiency information must always remain.

I have shown with well documented facts the programs which must be created. The question is, do the political leaders have the will to educate the public and form the broad coalition of support from groups who will benefit by opposing the strong energy special interests from outside the State? Thank you.

ASSEMBLYMAN STOCKMAN: Thank you very much for your ideas and suggestions, Mr. Novak. Certainly, that idea about shifting the taxes is innovative and one that we will give some thought to. Thank you.

MR. NOVAK: That is what has been done in Europe and Japan and it seems to work very well over there.

ASSEMBLYMAN STOCKMAN: The next witness will be Richard Brandt from the New Jersey Solar Energy Association. Mr. Brandt.

R I C H A R D B R A N D T: First, I would like to say that I am both honored and pleased to have been invited to attend and give comment at this hearing. I am going to keep my comments brief because there has been a lot said already, and quite a bit of that, of course, we do agree with.

Before beginning, however, I would like to just give you a little bio-data on myself. I am the Past President of the New Jersey Solar Energy Association, the current Executive Director of the Association. The New Jersey Solar Energy Association is not a state affiliate with the National Solar Energy Industries Association. I practice architecture. I am a partner and General Manager of Solar Warehouse, a wholesaler and manufacturer in the solar industry. I am a member of the American Institute of Architects, the American Planning Society. I sit on their energy committee. I am a former member of ASTM. I have written numerous articles, both in local and in national publications. I think that is sufficient.

The solar industry in the State of New Jersey is still an infant one and requires those needed supports as are customary to aid and stimulation of such an industry.

To date, 28 states offer various forms of economic incentives. By the way, New York, just recently - I believe it was three weeks ago - adopted and signed into law the personal tax credit inducement, an inducement which we do not currently have in the State of New Jersey.

New Jersey does not lack in sponsors of creative economic stimulus, but rather coordinated efforts for their being posted for discussion and eventual vote. Many pieces of solar legislation are languishing at this very time that if adopted would make New Jersey on a par with California and Florida in total solar implementation. The efforts of the specific states have led to dramatically increased adoption of solar and renewable resource measures throughout our nation.

In the coming weeks, my office will supply to you those bills that are currently awaiting discussion. Further, we will supply to you the scenarios that have occurred in other states, as prepared by the national SEA.

For the past year, aside from the New Jersey Mortgage Finance Agency program, studies have shown that 75% of those purchasing solar systems have paid cash. If our industry is expected to increase solar implementation, reduce imported oil, as well as other energy forms, and provide additional jobs, we must have the needed support offered other early industries.

Specifically, financing programs, such as the MFA, in conjunction with a State income tax and State corporate tax credits are a must. Please bear in mind that of the 28 states in which such programs exist, the maximum inducement extends all the way up to 100% tax credit. That is for the personal income tax. The suggested bills in the State of New Jersey do not come anywhere close to that amount.

As we will soon find our major utility companies offering solar equipment

on a large scale, the lack of means to permit many New Jerseyans to take advantage of this energy option will become apparent.

We should be working diligently now to avoid this debacle of plenty of product, installers, and desire on the part of buyers, but the lack of the important aspect of financing.

On another issue, we also hope to acquire the State's and specifically this Committee's support in our effort to make those recommendations to Washington in the area of modifications to the Windfall Profit Tax Act, which has seriously impaired this State's fine financing program, the New Jersey MFA.

New Jersey SEA looks forward in the coming years to work with your Subcommittee, as well as all members of our State government, to enable the greatest implementation of solar with the greatest fairness to the industry and consumers alike. Thank you very much.

ASSEMBLYMAN STOCKMAN: Thank you very much, Mr. Brandt. We look forward to hearing further from you. It sounds like you have had a lot of experience and expertise in this field.

I didn't introduce Mark Connolly earlier. He has probably done more work for this committee on setting up these hearings than anyone and I would invite you to feel free to communicate any information or material you have to him. He has spent a lot of time on energy conservation with the Subcommittee. Thank you.

MR. BRANDT: Thank you very much.

ASSEMBLYMAN STOCKMAN: Martina Carol from Camden County's Energy Office.

MARTINA CAROL: My name is Martina Carol and I am employed by the County Energy Office in South Jersey, where I conduct energy surveys of local government buildings. These surveys result in energy conservation recommendations. I am testifying today as a private citizen.

Everyone is aware of the effects that increases in the price of energy have had on the economy. High energy prices have eroded disposable income and lowered the level of personal savings. The low level of savings has limited the amount that the banks can lend out to the community. In a local government and non profit sectors, high energy prices have reduced both the quality and the quantity of services offered. Because I work with local government, most of my testimony is based on my experience in that sector. However, I believe that the bulk of my testimony is applicable to all sectors of the economy.

More than one municipality has informed me that unless this winter is a mild one, their municipal offices will close down because they don't have enough money to pay for the heating costs. While everyone is affected to some degree by increasing fuel prices, it is the low income and fixed income resident, such as senior citizens, that are hit the hardest, and these people are hit both directly, in paying for their own energy, and indirectly by the elimination of services that are perhaps crucial to their continued survival.

Energy conservation techniques, such as insulation, caulking, and weather stripping, as well as the installation of efficient heating and cooling systems, will do a lot toward solving the surface problem -- the problem of energy costs rising faster than income. It will keep the municipal offices I mentioned open for a few more years.

I see surface problems because energy conservation does not really address the fundamental problem facing the State. Even if energy conservation

measures reduce the heating costs of a building by 40%, it is likely that within five to ten years further increases in energy prices will eliminate much of the gain. In one sense, energy conservation is just buying time. While making a building as energy efficient as possible is both necessary and a good first step, it is not enough -- the real problem must be addressed.

The real, fundamental problem is that New Jersey, because there are few conventional sources of energy in the State, imports almost all of its energy. This means that out of every dollar spent by New Jersey residents on energy, only a very small fraction of that dollar remains in the State. The rest of that dollar goes out of the State, resulting in a serious balance-of-payments deficit. This export of energy dollars represents a huge drain on the State's economy.

There is a simple solution to New Jersey's energy problems. Part of the solution, as I mentioned before, is making every building as energy efficient as possible through energy conservation measures. The other part, the part that deals with the real problem, is the widespread use of indigenous renewable sources of energy. While there are few conventional sources of energy in the State, there are plenty of non-conventional indigenous sources of energy, such as the sun, wind, tides, and running water. When we have control over energy sources, we will have control over energy prices.

I came here today to talk about one method utilizing renewable energy. I chose this method out of hundreds of others because it is especially suited to use in existing local government buildings, and it is relatively inexpensive. It is also simple and requires little special knowledge other than typical construction techniques.

I am talking about vertical wall solar collectors, a class of collectors which includes Trombe walls and TAP panels. A vertical wall solar collector is basically a sealed frame supporting some sort of glazing material - glass or rigid plastic - which encloses an air space between the building wall and the glazing material. This collector is mounted on the south facing wall of the building. While the sun is shining, air inside the collector warms up. Hot air is pulled through openings in the building wall at the top of the collector, often assisted by a small fan, and it circulated through the building. If there is a surplus of solar-heated air, it can be ducted to storage, to be used whenever the sun is not shining. Cold air from the building is drawn through vents at the bottom of the collector to be warmed up in the collector and re-circulated through the building. The vents in the building wall can be closed at night to reduce heat losses to the cold night sky. This system can, with slight modifications, be run "backwards" to provide natural cooling during the summer.

My office surveyed over 100 local government buildings since last October. Among these were municipal and recreation buildings, police stations, fire halls, libraries, health centers, garages, and community centers. At least 30 percent of these buildings are suitable for a vertical wall solar collector retrofit. This 30 percent figure is conservative. It represents buildings which are optimally oriented towards the south and whose construction lends itself to an easy retrofit. There are many other buildings which are not sited or constructed quite so perfectly, but which are still candidates for retrofit, either with these collectors or some other solar application.

On the average, these collectors can provide about 30 percent of a building's heat load. This represents almost one-third of the heating needs. This one-third will be free of the influence of oil embargoes, mid-eastern wars, and deregulation. After payback is reached, this 30 percent of the heating load will be essentially free.

It seems to me that local government buildings are a good place to start a large-scale retro-fit program. There are several reasons why I feel this way.

The first reason is the survival of local government. The use of renewable energy by local governments will enable them to continue or increase the level of services offered to the community. In addition, money invested locally to builders, supply houses, and in budget items made possible by lower energy costs, will have a strengthening effect on the local economy.

Another reason why I feel that local government buildings are a good site for a solar retrofit program is visibility. Almost everyone visits the library, city hall, police station, or community center at least once or twice a year. When residents see solar energy actually working, they are more likely to start using it themselves. Vertical wall solar collectors are especially attractive when viewed in this light, because they are uncomplicated and it is easy to understand how they work. The high visibility of local government buildings enhances the multiplier effect in the community.

The final reason why I am urging you to start a solar retrofit program for local government buildings is that these buildings do not fit in any category that is benefitting from current renewable energy programs. Neither the federal or state tax credits apply to local government buildings, because they do not pay taxes.

A recent New Jersey State Senate Committee ammendment to the S-734 Cap Law, adopted on January 22, 1981, exempts from the Cap Law:

"Amounts expended to fund any increase in publick utility, fuel oil, gasoline, or heating oil charges which exceeds by more than 10% the previous year's final expenditure for such purposes."

It seems ludicrous to me that increases in energy costs can be exempted from the Cap, but funds used to lower energy consumption are not exempted. Perhaps you could amend the ammendment so that that 10% would be allowed if and only if conservation measures were first made.

ASSEMBLYMAN STOCKMAN: Martina, let me say that I have a bill in that would in some way try to reverse that rather poor energy conservatin policy that the legislature enacted, and I have to be frank to admit to you that I participated in the passage of that legislation. I think, frankly, it reflects a lack of adequate understanding and appreciation by the legislature of energy conservation policy, or a need for a stronger energy conservation policy. I remember when the bill came on the floor, there was a great deal of pressure for it from municipalities because of the practical problems they are facing with the cap laws. So, it was a very popular - an overwhelmingly popular - piece of legislation. It passed this House almost unanimously, and there was hardly a voice - and frankly my voice should have been one of the few, but it wasn't - raised to argue the contradictory nature of the policy that was built into that legislation. We are now trying to undo that a little bit, and I think, as I say, there is evidence for the need to educate the legislature

more about the need for a coordinated energy policy and so many other things that we do.

So, I absolutely agree with the suggestion you are making to us today. We are working on that.

MS. CAROL: The way it is now, it pays to not conserve energy because you can take it out of the cap.

ASSEMBLYMAN STOCKMAN: Absolutely.

MS. CAROL: I believe that energy conservation measures and renewable energy installations should be exempted from the Cap Law. I also feel that the State should provide funding for a solar retrofit program for local government buildings. I am urging you to do this because it appears that we can hope for little from the Federal government. The Federal solar program has been almost entirely dismantled. Any new solar program must come from the State.

Instead of trying to patch up the holes in the budget with larger and larger amounts of money, we should be investing in energy conservation and renewable energy -- investments that will permanently seal up those holes and strengthen the State's economy.

ASSEMBLYMAN STOCKMAN: Martina, thank you very much. I think you have some very worthwhile ideas. I am fascinated with asking you this question. You don't have to answer if you don't want to, but you obviously have some real experience in this area and you come to us from Camden. But, I note you indicate your testimony today is as a private citizen. I am wondering why your superiors, or whoever, wouldn't be enthused about your making this testimony theirs, because I think it is very thoughtful and valuable.

MS. CAROL: Well, my two direct superiors are here. One of them has testified today already and the other one will. They agree with it. The reason I am not testifying as the Camden County Energy Office is because I only learned of this about two weeks ago and to get it approved by the Freeholders would have taken, probably, about a month.

ASSEMBLYMAN STOCKMAN: I see. Okay, fine. Thank you very much.

Janine Bauer from PERC, in lieu of Ed Lloyd.

J A N I N E B A U E R: I am sorry I don't have copies of my testimony, but I will send it to you this afternoon. My name is Janine Bauer. I am a researcher for the Public Interest Research Group of New Jersey. PERG is a non-profit, non-partisan corporation, founded and run by New Jersey college graduates and law students to foster consumer and environmental protection.

I want to preface my remarks by saying that there is no doubt in my mind that this country and, indeed, the entire world will make a complete transition to an economy powered chiefly by renewable resources. The only question is when we will make this transition and whether it will be marked by chaos and revolution or by planning and financing. There are few, if any, politicians in this State or nation who have any idea what the post-petroleum world will look like, much less how to get there. Thus, I must commend this committee for its foresight on this grave problem of energy supply and the fact that we are going to run out of oil and gas some day.

The committee, having been organized, has sought information from every sector on a wide range of subjects, through hearings and other study, and appears to be acting on the problem rather than just reacting to it.

Before making PERG's specific suggestions for legislative action to promote solar energy, let me point out a few examples of solar's potential

to meet our energy demand which I find illustrative of the fix we are in. Over five years ago, Dugan-Bloom Associates, an engineering firm in New York City, was retained by the New Jersey Department of the Public Advocate during a request for an increase in electric rates by Public Service Electric and Gas Company. Dugan-Bloom showed in 1976 that 11 new residential, commercial, and industrial buildings in New Jersey could be equipped with solar water heating systems by 1985. By 1990, they showed that 18% of existing electrically heated homes and 50% of new residences could utilize solar space heating systems, and 75% of new commercial and industrial buildings could utilize solar space heating.

How much saved energy would this amount to? The Dugan-Bloom study showed that if the conservation and solar scenarios they developed were instrumented by the state, Public Service Electric and Gas's generating capacity to meet both the peak load and the annual energy consumption through 1990 could be met without the construction of any additional generating stations.

It is reasonable to ask whether consumers really want to buy and install solar systems. A recent poll made by General Public Utilities in their New Jersey and Pennsylvania service territory showed that an enormous solar market exists, and actually pinpointed where it exists. GPU polled 1.4 million residences in their territory and found that over 6,000 GPU customers are already using solar to heat their homes or water supply. GPU also showed that another 230,000 families wanted to switch to solar, at least for water heating. Why then aren't solar systems selling like hotcakes and what can the committee do to create that kind of atmosphere?

In our view, there are two problems with solar and they are closely related to each other. First, solar systems for either solar water or space heating are too expensive for most homeowners. A typical installed solar water heating system now costs \$3,500. Space heating systems can cost \$8,000 and up. Most homeowners could not afford to pay for such a project out of their savings and inflation has caused too much strain on their monthly energy budget -- their total monthly budget -- to allow them to make such an investment, even if they know how quickly it will pay for itself. The price of solar systems will not come down, or at least not significantly. Thus, the only way to create a marketplace where consumers will be able to purchase solar systems is to make low and zero interest loans available to them so that they can readily finance the purchase of these systems.

This brings us to the second problem, programs throughout the nation and in Mortgage Finance Agency's program here in New Jersey have shown that offering zero or low interest loans will create significant demand for solar systems where tax credits do not. Unfortunately, in addition to a poor bond market, the Internal Revenue Service ruled last year that consumers who use government loans or zero interest loans to buy such systems cannot also take advantage of the 40% Federal tax credit. This ruling, which I call the anti-double-dipping rule, has virtually knocked the bottom out of every government subsidized program in the nation. Solar sales have dropped off precipitously. Tax credits are good, but they do not provide the capital up front that people need to buy solar systems. Thus, we have a Catch 22 situation which must be remedied, hopefully this year by Congress. Until Congress overrules the anti-double-dipping rule, consumers will not be buying many solar systems unless they do it

through a privately-subsidized program or some other program, for instance like Atlantic City Electric's where they offer a rebate. Essentially it is a grant.

Thus, my first recommendation to this committee is to strongly urge New Jersey's Congressional Delegation to push a bill through the Ways and Means and Finance Committees of Congress and press for a floor vote this session. I believe there is a bill already introduced that would overrule IRS's ruling -- and I will get the bill number if you want it. I couldn't find it this morning.

My second recommendation to the committee is to immediately design and implement a zero interest financing program, either through the electric and gas utilities or through the sale of bonds or a revolving fund for energy conservation and renewable investments. In Minnesota, for example, the Legislature changed their pollution control bonding laws to make loans for conservation and solar investments eligible. California is about to pass similar legislation. Also in California, Pacific Gas and Electric, and nation's largest utility, now offers zero interest loans for solar investments and the program is working very well, except for the IRS rule.

My next major recommendation is that this committee should put more teeth into the Municipal Land Use Act, which was recently revised to include requirements for energy efficiency and municipal zoning board's multi-year master plans. While the bill is good, insofar as it goes, it does not go far enough to promote the construction of passive solar residences and commercial buildings for new construction. We are wasting a great deal of our future energy supplies because we are still building homes and buildings wrong. More passive features should be incorporated into new construction. Without wanting to unnecessarily mandate such behavior on the part of builders, New Jersey needs to take a very creative approach to this problem. It might consider the experiment at the Solar Energy Research Institute over a year ago. SERI was interested in promoting the construction of more efficient homes, so it sent an announcement to all Denver area builders to send their plans for the houses they were currently building into SERI. SERI received the plans from 160 builders from all over Colorado. SERI then revised the plans to incorporate passive solar features, changing the overall appearance of the houses as little as possible and increasing the cost of each house hardly at all. The new plans were sent back to the builders and they were encouraged to build these new homes. Some of the builders did so, and they were so popular with home buyers that a waiting list had to be formed to accommodate the buyers who wanted the efficient homes.

I suggest that this committee set up a meeting with officials from the New Jersey Department of Energy and the New Jersey Society of Architects to facilitate such a program. If the necessary architects could not provide this work pro bono, I am sure that some forward-looking foundation in New Jersey would provide the small amount of money such a program would need to be administered. I could suggest a few too, later.

I have some other suggestions which I believe would help promote solar buying in New Jersey. First, the legislature should pass a law requiring utilities to give one-time rebates to customers who purchase energy-efficient appliances, such as refrigerators, when they buy them. This would provide more of an incentive for consumers to buy efficient appliances, which now cost

more than inefficient appliances and would help guarantee future energy supplies for utilities. In effect, utilities would be investing in conservation.

Second, the audit done by the Home Energy Savings Program auditors on our utilities should be upgraded to include more information on solar and wind, no matter where you live in this State. People who inquire about a HES audit should be asked whether they would want their name to be put on a list of people who want to buy and install their solar systems cooperatively. Solar buying co-ops formed by buyers themselves, are now offering installed solar systems for \$2,400, when the same systems cost \$3,500 if bought and installed by a retailer. Unfortunately, people who want to buy solar systems and install them themselves or cooperatively, do not know other people who want to do the same thing. The State, through HES, should make these names available to those who request it.

The legislature must fund the New Jersey Department of Energy adequately. Because of lost Federal funds and other factors, the New Jersey DOE has had to close their Office of Alternate Technology this past January 1st. It is little wonder that we aren't making much progress in solar installations without even one office, one division, in all of State government devoted to promoting solar. The new Administration and the current legislation needs to make a much firmer commitment to solar by establishing and staffing an office within the New Jersey DOE.

Forth, the monthly energy profile done by the DOE is an excellent example of a document with which we can readily keep track of how much energy we are using and how much we are conserving. Unfortunately, the profile does not include data for the number of solar installations, or wood stoves, or hydro-dams, or windmills built and installed each month. Thus, virtually no one, except perhaps the solar businessman who is not doing very well, can tell you exactly how much progress we are making on solar in this State. These renewable components should be added to the energy profile data base and should be gathered and reported each month. To avoid any complicated reporting requirements, New Jersey DOE should simply print postcards with a three-question survey, asking such things as: how many solar systems did you sell or install this month? Were they active or passive space heater, water, or combination? Other -- wood stove, windmill, and so on. These post cards would be sent to the retailers, which New Jersey DOE has a list of, and retailers would be asked to voluntarily submit their reports each month by mailing back these postcards. This would provide some data, even if the response rate was low, from which you could extrapolate figures and see just how well we are doing, or how poorly we are doing in what we should be doing. This small item would cost very little and tell us very much.

The New Jersey Energy Master Plan should be amended to include simple declarative statements for its goals in both the conservation sections. It must also include a timetable for meeting these goals. A goal of installing 1,000 solar units per year, for example, is not unreasonable.

However, the Master Plan is replete with political rhetoric and devoid of specific goals and a timetable to meet such goals. The legislature should not accept the solar section of the Master Plan, written as it is.

Finally, New Jersey must reform its rates for electric and gas use to eliminate declining block rates and other provisions which mean that solar

must operate in an artificial marketplace where other forms of energy are subsidized but solar is not. For instance, the legislature should pass a law establishing the process for a certificate of need for all new generating plants before they can be approved by the New Jersey Board of Public Utilities. It is common knowledge that among energy professionals and officials in New Jersey, the State of New Jersey may need the Hope Creek generating stations but Public Service territory does not. This is folly and a waste of money.

The legislature should also pass Assembly Bill 1716 and Assembly Bill 3239, which would remove construction work in progress and plants which are not used and useful for six months from the rate base.

That's all I have to say. I want to thank you very much for holding this hearing and for inviting me.

ASSEMBLYMAN STOCKMAN: Jannine, you reference to the solar section of the New Jersey Energy Master Plan, is that with regard to the existing Master Plan or the new one that is about to come about? Because aren't they on the verge of republishing the Energy Master Plan? I wondered if you had any insight into the new one?

MR. BAUER: I have seen a draft of the new one. I am more talking about the old one because I am much more familiar with it, but frankly I didn't see the type of improvement that I wanted in the new one. But, since it is just a draft--

ASSEMBLYMAN STOCKMAN: Perhaps you could communicate that feeling to Mr. Jacobson and his people who are working on that.

MR. BAUER: I have.

ASSEMBLYMAN STOCKMAN: Good. All right, thank you.

Jerry Bernatt from the New Jersey Counties Energy Coordinating Association. Just for the record, I believe we have one more witness to testify after the present witness, and that would be Tod Brown. If there is anyone else who desires to testify, I would like you to speak to Mark Connelly because we don't have you on our list.

J E R R Y B E R N A T T: My name is Jerry Bernatt. I am the Co-coordinator of the Camden County Energy Office. I am here to testify as an employee of this office. My testimony will illustrate that there is a role for renewable energy in New Jersey and present suggestions as to how the State can encourage renewable energy. I shall begin by examining the potential for renewable energy in the State of New Jersey.

Solar Potential: Dugan -Bloom Associates, in a June, 1976, report prepared for the Division of the Public Advocate in New Jersey, concluded that 25% of all existing residential buildings and about 50% of all existing non-residential buildings could accommodate solar space heating systems now and that 50% of all New Jersey homes and businesses could be retrofitted with solar water heaters. They also concluded that all New Jersey buildings could economically accommodate solar hot water heaters.

According to the Development Planning and Research Associates' Report, the gross annual potential for solar in New Jersey is 470,000 BTU's per square foot, per year. There is a seasonal variation, of course, but the gross annual solar energy falling on the entire State is 99 quads per year. This report creates a scenario in which one of every three families and businesses install 400 square feet of solar collectors which are 50% efficient. If 40% of the energy collected is actually used, solar energy could supply 46 trillion BTU's

each year to replace conventional sources of energy. With broad-based support of solar alternatives, this potential can be realized in New Jersey by the turn of the century.

If the data in the two reports is combined, it seems that New Jersey's potential to meet our energy requirements with solar would be even more than 46 trillion BTU's per year if an aggressive retrofit campaign were undertaken and new buildings were designed with active and passive solar systems.

Wind Potential: Brookhaven National Laboratory has completed a study estimating the potential energy to be derived from wind generators in the Northeast. The study concluded that wind generation requires no exotic new materials; that similar components to those needed for the wind generators are currently manufactured in the region, for example, helicopter blades; that the facilities could be constructed on site; that no cooling water is needed, and that the cost of power would be two to four cents per kilowatt-hour. The study found the potential contribution ranged from .13 quads to .5 quads in the year 2,000.

COGENERATION POTENTIAL: One of the most widely discussed alternative methods for generating electricity in New Jersey is cogeneration. Estimates for the State's potential have ranged from 4,000 megawatts in a study by Robert Williams at Princeton University, to 5,250 megawatts in the New Jersey Public Interest Group's study of New Jersey's cogeneration potential.

This information illustrates that the role for renewable energy in New Jersey should not be ignored. It is not a form of energy advocated by extremists, but rather is New Jersey's most promising indigenous energy source.

To encourage the utilization of renewable energy by citizens in the State of New Jersey, this testimony suggests the State Legislature implement the following:

I 1. Financial Incentives for State tax credits, which are residential tax credits. In order to provide financial incentives for the installation of energy conservation measures and solar equipment in residences, the State should pass legislation which would provide tax credits against the State Income Tax for expenditures made for the use of solar and energy conservation measures in the home.

2. State tax credits for industrial. In order to encourage the use of renewable energy by industry, the State should pass legislation providing for a credit against the corporate business tax and income tax for the use of solar energy by industry. Such a bill has been pending in the State Legislature for some time.

I realize that this may be a bad time to talk about State tax credits, due to the potential impact of the Reagan budget cuts on New Jersey, but tax credits have been very successful on the Federal level and should be considered on the State level as well.

In order to provide financial incentives for the installation of solar energy by homeowners, the State Legislature should pass legislation or encourage localities to eliminate construction permit fees for the installation or alteration of solar hot water and solar heating or cooling systems.

3. Low interest loans and grants. The State Mortgage Finance Agency provides low-interest loans for homeowners for energy conservation and solar equipment. The State Legislature should expand this further by establishing long-term, low-interest loans for the purchase and installation of solar and energy conservation equipment in commercial and multi-family dwelling buildings.

This is particularly important since there are no conservation incentives offered for these sectors. These loans should be available to builders as well as owners of apartment and commercial buildings. The State should encourage banks to offer reduced interest loans or mortgages for energy efficient homes and additional reduction for solar homes.

4. Life-cycle cost analyses: In order to provide for the most energy efficient products the State should require public agencies to include in the design phase of any construction or renovation of a major facility, a life-cycle cost analyses of its energy consumption. This is currently being done at the State level, but not at the local level of government.

5. Marginal cost pricing: The absence of marginal cost pricing - that is having those that are responsible for utilizing the most electricity pay for the cost of the increased demand - in utility rate structures, as set by the Board of Public Utilities, raises utility rates for those who use renewable energy.

The State BPU should design rate structures that take future problems into account by replacing the current structure with marginal costing. This would correctly signal customers concerning costs to the utility of added consumption and the benefits of conservation. Under this form of pricing, consumers who decide to use more electricity must pay the costs of increasing the energy supply and building new power plants. Faced with these higher costs, renewable energy and conservation suddenly looks very attractive.

6. State guarantee of renewable mortgages: The State should pass legislation providing government subsidies for mortgages for retrofitted systems and newly constructed renewable energy systems. The State could guarantee these renewable energy-related mortgages as a means of lowering the rates. This is an inexpensive way of promoting renewable energy since the government pays nothing unless there is a default.

7. State use of its bonding authority for renewable energy: The State also has bonding authority which could be used to make low-interest loans for renewable energy eligible for bonding funds. New Jersey could also legislate the sale of General Obligation Bonds which could support several ambitious renewable energy projects around the State.

8. Utility companies retrofit homes: Utility companies offer energy audits for \$15 to residents in New Jersey, but offer nothing to help finance the measures recommended by these audits. The State, or the Board of Public Utilities, should require utility companies to retrofit homes, particularly of those who cannot take advantage of tax credits, or pay for those measures recommended by the audits themselves. The retrofits would be paid through monthly utility bills which will not have to be increased due to the energy saved by these retrofits. Or, a lien could be placed on the home and the measures could be paid for at the time of the sale of the home. The incentive for the utility companies is the need not to build additional power plants due to this conservation program.

II. Consumer Protection and Standards: The State must promulgate workable standards to protect consumer interests and provide guidelines for manufacturers and installers of solar and renewable energy equipment. Specific measures which I feel should be promulgated are delineated in New Jersey's Master Plan of 1978, and include:

1. Promulgating solar equipment and manufacturing and performance

standards which will require all solar equipment sold in New Jersey to have passed specific testing criteria and carry a certification to that effect.

2. Also, require all persons engaged in the commercial installation of solar equipment to have successfully completed a course of instruction at an institution certified to conduct such training by the New Jersey Department of Education or to perform work under the supervision of an individual who attended this training.

III. Educational Programs:

Professional people, homeowners, politicians, community leaders, and the construction industry for the most part, do not understand renewable energy. This lack of education makes it difficult in obtaining bank loans, insurance, and mortgages.

This is the greatest barrier and most difficult to overcome. Most people don't know that the direct solar radiation shining through a window can reduce the energy needed for heating in the winter. To make things worse, the Reagan Administration is reducing Federal conservation and solar programs by 80% -- programs which provide education in conservation and renewable energy to the consumer, to industry, homeowners, the low-income, local governments, apartment owners, non-profit institutions, etc.

In order to ensure the continuation of most of these programs, the State and its local governments should lobby Congress for an Energy Block Grant which would earmark a specific sum for energy programs within the State and create a consolidation of existing State categorical grants giving much greater flexibility within each State on such programs as the Energy Extension Service, the Institutional Buildings Grants Program, and weatherization. Implementation should be delegated by the State to local government where perceived that local government was most capable of implementation at the local level. The State should earmark one portion of the grant for fuel assistance and weatherization for the low income, based on the percentage of this sector in a locality. This is necessary to ensure that politics does not get in the way of assuring that these people survive a cold winter.

More specifically, the State should see that these Federal funds and its own State funds are utilized for the following:

1. Provision for technical and non-technical assistance to individuals and businesses considering solar energy, including information on costs.
2. Preparation and distribution of informational brochures and displays on renewable energy.
3. Establishment of a speakers' bureau on renewable energy.

Other ways to promote the use of renewable energy and to provide information would be through newspaper coverage of solar demonstration projects, science museum exhibits, the development of an instruction manual for do-it-yourselfers, programs on educational television, and awards at a well-publicized ceremony for the most energy efficient house in the State.

The State should also foster the training of personnel employed in the solar and renewable energy industry by encouraging vocational-technical schools, colleges, and trade unions to offer courses in all aspects of solar and renewable energy systems and by conducting or sponsoring detailed, technical workshops or solar system installation for the homeowner.

Additionally, the State should provide an educational program for

home builders about active and passive solar energy design and technology as well as educating real estate appraisers regarding solar energy development so as to facilitate loans. This is especially important due to the passage of Assemblyman Dalton's outstanding bill requiring municipalities to amend their Master Plans to include conservation and renewable energy.

As energy costs continue to skyrocket, the State of New Jersey must be in the forefront in providing such incentives for renewable energy. Indeed, incentives such as the ones mentioned heretofore will allow the earth's limited resource base of high-quality fuel to be stretched a little further. They will enable our descendants to share in the earth's finite stock of fossil fuels. Energy conservation through renewable energy is itself a form of productive investment, yielding much more rapid and substantial real changes in the energy balance of the State and the nation than almost any given investment in energy production. Also, it stimulates employment innovation, and solidly based economic growth.

But renewable energy is a diffuse source; it has no clear constituency in the way that oil, gas, coal, and nuclear do. Thus, the State needs to be its champion by implementing suggestions such as those mentioned in my testimony. Only in this way can renewable energy become economically attractive to the citizens in the great State of New Jersey.

ASSEMBLYMAN STOCKMAN: Thank you very much, Ms. Bernatt, for your thoughtful comments, suggestions, and ideas for us to give consideration to.

Kevin Vallely of the Atlantic City Energy Office.

K E V I N V A L L E L Y: Thank you for allowing me the opportunity to speak here without being prepared. But, I am concerned about energy. I have been working with the City of Atlantic City for approximately two years now. I came on in the middle of the gasoline crisis in 1979. That was my first formal entry into energy, and shortly after that, after people suffered, went through gas lines, and went nearly crazy, we find that the oil companies had enormous record profits - third quarter profits, fourth quarter profits.

Since that time, I have been involved in energy delivered locally in our City, mostly with our local utilities. Now, I am sure the utilities in New Jersey must be the biggest recipients - buyers - of the oil that comes into New Jersey. And, as Commissioner Jacobson has said time and time again about the oil companies and the greed and what is going on and the controlled prices and the controlled shortages, I just see that now is the time when we have to take a step in the direction you are already looking at. I think anything to do with conventional energy at this time, any new building at all tied in conventionally is a big mistake. Whenever we even talk about energy right now, we are talking about pay-backs - a payback period - which just means that it is an investment. Any other conventional application there is no payback with. All we are going to keep doing is to keep paying for those fuel sources, which - as has already been testified to here - New Jersey has none of.

What I would like to suggest is, every area has its resources; we just have to do a better job of utilizing them. We have terrific sunshine in New Jersey. We have terrific winds in New Jersey in the coastal areas. We have the most powerful energy source in the world with an ocean out there. We have new technologies, and I think New Jersey must encourage these technologies, and I think it has to come from the government first. We can't expect it

to catch on any other way.

I started my career in the government. I worked for the Federal government. I worked for non-profit agencies, delivering Federal funds. And now I am working for city government. And, I am at the point where I see an area where government needs most to be involved. I have never seen an area where government should have been involved in as I have this energy situation, this energy picture. At the same time, we are cutting back on every energy alternative. Every funding, every program is cut back to where we are left with strictly conventional energy sources -- of which I would like to say they are all the developing technologies. We have turned everything around and we are calling them conventional. Our conventional energy was solar and wind. It has been existence long before these newfangled gas heaters and oil burners and heat pumps.

Now, we have ways of generating energy, without even discussing the conservation program, which have been proven, through gasoline, to work -- except that is the wrong way to prove it, by forcing high prices on people. Now, I think we have to plan out all these things. We know where all the waste exists. A study was done in 1977 in Newsweek Magazine showing that the greatest sector for waste in our whole country is the waste from the utilities. The utility sector wastes more than any other sector. When they are generating their electricity, we are losing two-thirds of that oil to heat losses. They do not do anything with it. They have many disincentives to energy right now, and many of them can be found in utilities and in the utilities' rate structures: not allowing people to run backup equipment or standby equipment, wanting to charge higher rates. Any attempt made to switch has been thwarted by the utilities.

Now, I know there is a much needed legislative reform already underway. But, it is going to take a big job by this energy committee, long hours, and much more public input to put together a comprehensive energy package which allows energy conservation to prosper here in New Jersey, where we can see the economic benefits of it.

From what I heard today, \$40 billion leaves this State every year for energy. Well, we certainly have to be able to recapture that market, and we do have natural resources, and we do have to be able to help. And, I am mostly concerned with the government's involvement. While it is fashionable to say now that government shouldn't be involved in private industry, that it should stay the hell out, I think that the government, in some cases, is warranted and must take the lead role. And, I think energy is a prime example of this. But, it is not happening for us at the top, so we are going to have to do it here locally. I know we have to do it that way in Atlantic City because we can't depend on anybody else any further. But, it sure would be a lot nicer if we had the State behind us, if we all got together on the same sort of program. So, when government is building and it is suggesting the kind of building that is going on in communities, we can just make it a law: We want energy efficient building; we want energy efficient communities. It is that simple, but it also that new to the government -- the whole idea of energy, formal energy offices, is only a couple of years old. The way things are going now, communities are being told, "Don't even bother getting involved in energy."

Again, I think now is the time for the State to be contacting municipal governments and suggesting that they get steadfastly involved, more and more,

in the energy needs of their community. I get concerned with the prices. I go to public hearings. Natural gas is going up. Electricity is going up, and all they tell us is that it going to keep going up and keep going up because they have to keep expanding. Well, again, I don't see any way that we can keep tying into these conventional energy sources. I think the government has to, right now, encourage, through its own building, all new alternatives to conventional energy sources, while at the same time make a thrust at this legislative reform for all the things, and all the recommendations that you have already heard to date. As you said, sometimes your enacted bill looks good and then we find out later on it wasn't all that well thought out, or there was something else -- we found a disincentive. I believe that goes on so many times. So, I think we really have to have a complete legislative review and listen to these recommendations and do everything that we can to at least stabilize the cost right now, because we are putting people over the brink.

I suggest if we do nothing at all-- The utility companies and the oil companies are going to go out of business very, very shortly, because I know what is going to happen: The people coming along with the new, better ideas are going to be listened to. But, I would rather not see all these millions of people hurt in this squeeze right now. I saw it last year and it is only going to be worse again this year. That choice that more and more people are making between food and fuel, I think is unconscionable now. I think we have our technology. We have dedicated, energetic people. And, we have to be able to work out a better deal for them right now. That's about all I have to say.

ASSEMBLYMAN STOCKMAN: Thank you very much, Mr. Valley.

Our final witness is Mr. Tod Brown of Solar Cast, Incorporated.

T O D B R O W N: Good afternoon. My name is Tod Brown. I am principal Solar Cast, Inc., in Dover, New Jersey. We are a design engineering contracting firm in energy management. I am also the active specialist for Northeast Solar Energy Center. We set up technical assistance areas in the northeast to support contractors and professionals in the field. But, today I am representing the National Association of Solar Contractors, and explicitly trying to bring to mind some of the points that we have to consider with the election of alternative energy sources.

Solar is not an infantile industry. Solar energy has been around much longer than most of the other resources that we have used; in fact it was. In many cases, solar at this time has been a way of life or a lifestyle that people have appreciated on their own for their own needs and requirements, and it is not something that they have gone to solely for the economics. Many times it was possibly a toy, or in another area this is what they were committed to and this was their lifestyle -- to find a self-sufficient life.

Long-term goals and incentives need to be set up. We are looking at a 1985 deadline in tax credits. At that point, systems that are being sold today for financial purposes are not going to be able to be sold at that time. That 40% tax credit is going to be a major obstacle for people to look at when buying solar. Without that tax incentive, we may not sell anything. Right now it is a key.

Another point, approximately 10% of all the public is even aware of the 40% tax credit and how it is actually applied. So, we are looking at

very small amounts of people right now who even know about it, and the ones that do are utilizing it for the financial incentives.

Whatever goals and incentives are planned and set up for this State, they must be long-term. We cannot have a dead-end issue, like the '85 tax credits, which essentially will start up maybe a booming industry in solar and then essentially cut it off at one point without any kind of future applications of it. The tax credits of '85 are one area. In New Jersey, tax exemption of sales taxes and property taxes is another area. These things are not projected any further than the original time they were set up for.

The application of solar energy and other renewable energy sources is very simple. It is not an extremely difficult application to understand. In most cases it is just a matter of education that is necessary. And, time and time again it has been education that has been lacking for the individuals to even apply, to at least understand what it is that we are trying to promote here. Every time someone goes to do a sales call, or any kind of educational program, it takes a lot of background information just to bring the people up to a level of understanding what we are trying to do. Education cannot be emphasized any more than any other program that is trying to be implemented in this State. Education is the key. The media is the way to get the message across, and we have to go through as many channels as possible to get the information out to the public. Otherwise, they cannot make a decision, and if they do make a decision, at least it is going to be an educated decision. They at least have the facts to help them decide which direction they want to go towards.

Now, conservation which includes solar, wind, heat recovery, reclamation, energy management, etc., is not doing without. It is not that we have to do without, it is that we have to better manage what we have. I guess that has been spoken about today by all the other speakers prior to me speaking here. There are many areas for conservation, whether it is from bio-mass, or whether it is just from the utilization of the energies that we have or the equipment that we use that is not efficient at this time -- motors, fans, HVAC systems, and so forth.

One major area though that is really holding back the solar industry in this state is the up-front capital. I am not sure of the exact reasons -- well, I do know some of the reasons. But, the point is, financing and tax incentives have been the major areas that have improved the sales and the marketability of solar and renewable systems. As the New Jersey Finance Agency explained this morning, it took seven weeks to move approximately, I guess it was 500 systems. That was a remarkable feat and it was done through the 40% tax incentive and the low interest loan program. There is no doubt in my mind that a program of the same nature would not develop a larger application of solar and renewable energies in this State.

Again, as I mentioned, heavy educational emphasis is necessary, but first the facts have to be decided upon as to what you are going to educate about and what programs are going to be available. So many times the DOE and HUD programs came through that were complete flops. The HUD \$400 tax rebate was a pure example of that. It took about three years to actually use up 1700 grants completely. This was a program that came out. They waited around before it went out. People go stale on the idea. You have to set up the program and then educate. Don't educate without knowing what direction you want to go towards with it.

One area that needs a lot of education is the area of codes and the building construction requirements. Some of the codes and the requirements that building inspectors do require at this time are posing more of a problem than a benefit. They require certain system components or certain system designs. They base these codes, basically, upon a national need, as opposed to a local need in the area we are in. In New Jersey the requirement systems are not necessarily the same requirements as in Southern California. So, we have to specifically orient what our technology requires for the State and requires in the expertise of individuals in the field around us, in this particular region. I think we have to utilize not only some of the national efforts that have gone towards developing codes and requirements for this state. These are the people who know what has been going on in the most recent past, for instance the last five years.

Northeast Solar Energy Center and the National Association of Solar Contractors have done a number of evaluations throughout the northeast and report on the systems and the evaluations of the performances available so we can tell what has been done, where the improvements can be made, and exactly what to expect in the overall installation of these systems. Education of contractors has been found to be needed. Whether certification programs are set up for contractors or just education bases - seminars, and so forth - are set up for contractors, the information has to go through homeowners, contractors, and through the professionals in the industry who at this point are leery of even going into the field. Engineers feel solar energy is a liability in many cases. We have done surveys, through phone and through mail. Utility surveys have been done and I want to have a gentleman speak on some of the programs that they have done, after I have finished speaking.

At this point the general public interest should include solar and the utilization of solar, along with a new car, a vacation, a video system, and maybe bicycles for a husband and wife team. This is where solar is at right now. It is merely a toy, or another new purchase that they are going to make, and it has to be changed around. I know economics is a major point of interest that everyone holds, but there are other interests in utilizing renewable, such as solar, interests other than just pure economics right up front.

Life cycle cost analyses of most renewable resources will at least show a return investment that is reasonable within the five to ten year range, not for commercial, but possibly for the residential market. Other incentives may make the commercial market interested in the program of using renewable sources of energy.

At this time, I would like to introduce Mr. Richard Esteves from General Public Utilities. He is manager of conservation and loan management there. The survey that was performed by the utility and some of the new programs that they are doing I think you will find very much interesting. Thank you very much.

ASSEMBLYMAN STOCKMAN: Mr. Brown, just one question. Have you had any input, or has your organization or organizations had any input into the New Jersey Energy Master Plan, which is being revised, with regard to solar?

MR. BROWN: There has been very little done from the National Association of Solar Contractors with regard to that.

ASSEMBLYMAN STOCKMAN: You might want to communicate with Mr. Jacobson or Chuck Richman, because they are in the process of revising the New Jersey

Energy Master Plan, which will have a very real impact on energy policy for the State for at least five years to come. Perhaps some of your ideas or expertise could be very helpful them. I can't imagine but that they would be happy to hear from you on this.

MR. BROWN: Thank you. I think I will look into that now that it is evident it will be useful. Thank you.

ASSEMBLYMAN STOCKMAN: Okay. Thank you.

May we have your name again, please?

R I C H A R D E S T E V E S: Rich Esteves. I am Manager of Conservation for General Public Utilities. I want to apologize. I did not intend to speak today and I speak on behalf of myself. Several people have mentioned the survey which GPU had done concerning the liability of solar systems. I conducted that survey and several others related to it. I haven't had a chance to give Mark a copy of that, but I brought one with me. We did a similar survey on customers who were already using coal or wood-burning stoves as an alternative, and this is also available.

Briefly, let me tell you that we found an extremely high interest in both solar systems and in auxillary heating systems using coal or wood for the entire GPU system, which takes in about half of Pennsylvania and New Jersey. One resident in six indicated that they were planning or seriously considering the use of solar domestic water heating the next time they changed their residence or changed over their water heating system. In the State of New Jersey, it was much higher than this. The results show 20% of existing customers in existing housing would use solar water heating and 31% of those in housing less than two years old would like to use solar water heating.

We found, not surprisingly, that those people using oil or electric power for water heating were especially interested; whereas, those using natural gas were not as interested. This follows the natural cost lines.

We also found that with respect to the wood-burning stoves, some of these were asked specifically if they used this as a regular supplement or as their prime heating source. We had a separate question for fireplaces and other things. One residence out of twenty, or 5%, are currently using wood or coal stoves as a major supplier of space heating in our service territory. Let me warn you that our service territory does not include Newark, Trenton, Camden, or any major urban area. It is primarily suburban to rural. I found that quite significant.

We also found something very distressing, and that is when we looked at their utility records, we found that there was a major dropoff in usage immediately after they got the wood burners, and then it crept up slowly to some point. In informal interviews, we found that people got tired of cutting their own wood and that they were also distressed over the cost of purchasing wood on the outside. We have not found this pattern to such an extent in our Pennsylvania service territory, where there is a lot more low-cost wood available. We do believe that where wood, and especially anthracite coal, is going to be available, we are going to see significant intrusions of supplemental heating and wooden coal stoves entering in and replacing oil and electric systems.

Some people have approached us about using these exclusively. Unfortunately the building codes in the States of Pennsylvania and New Jersey require another heating system besides total passive or total renewable systems; you must have

one of the "standard" heating systems in the home. This is a significant barrier because it means you must duplicate the cost of your heating system if you want to use a renewable heating system.

As I indicated before, I am not here with prepared testimony. There were a number of points which were brought out this morning which were of interest to me and which may have been of interest to you in your considerations. I would like to quickly go through them. I realize you are pressed for time.

One of the prime things was the use of tax credits. As far as the utility system is concerned, a solar system or a renewable system only shows up as far as we are concerned as conservation. We are very interested in conservation for a variety of reasons. We believe that any tax credits that are available should be as equally available to conservation systems and our reduction systems of one type as another. And, we are strongly in favor of anything that encourages one. We would see it as a distortion though of the marketplace to favor one type of conservation over another. If there is to be a 20% tax credit, or whatever it might be for a solar system or wind system, it should also be available for significant insulation standards, replacement of incandescent bulbs with other systems, and what have you.

We find that there are a lot of institutional, artificial barriers to conservation, and one quick example that may be something that should be worked with is the fuel assistance program and the weatherization programs. Unfortunately, these are run by two separate agencies. We have made efforts to have a one stop shop and have been unsuccessful in a number of counties in doing this. In our largest county, Morris County, you must travel approximately 25 miles in order to get from the weatherization office to the fuel assistance office and they will accept applications only in person at the weatherization office. This has posed a significant difficulty to many of our customers. The recommendation to simplify this is that anyone who applies for fuel assistance payments should automatically be offered the opportunity for weatherization and be able to sign up for it on the spot.

It is not as bad here, but in Pennsylvania it becomes even worse. They don't even give each other the names of the applicants from one to another because they are concerned about confidentiality.

There is talk about marginal pricing. It is extremely difficult to get to marginal pricing, but there are methods that start moving in that direction. One system is available now on a small scale. It is on-peak, off-peak price and time-of-use pricing, or something of that nature. I will give you a quick example. It costs Jersey Central over 15¢ a kilowatt hour a unit to produce electricity and deliver it during the summer peak periods. And I am talking about weekdays and during the day during the summer -- over 15¢ a unit. After 8:00 at night on weekends, it costs an average of 5¢ or less. We have to sell it at one price -- 8¢, roughly. We have a time-of use pricing that says to the customer: "If you are willing to conserve during the on-peak period when it is very expensive for us, we will look at splitting the prices with you." And, the system now says that for those people who are willing to do so, we will sell them off-peak electricity for about 4¢ or 5¢ a kilowatt hour. If they use it on-peak, it is going to cost them 10¢ or 12¢ a kilowatt hour. This is a system we feel is very beneficial for a number of reasons. One, those that are causing the price increase by using the power during the peak periods are those who are going to have to pay for it. It is not punitive

in the sense that you are restricting their use. If they want to use it at that time, it is up to them, but they have to pay the price and not be subsidized by the other customers.

This is particularly useful, as Tod has pointed out, with looking at solar systems, because the time the price is highest is during the summer months and during the daytime, times during which the solar system is particularly cost effective. And, what you are doing is, you are replacing the most expensive power with solar and using as back-up or auxiliary only the cheap power.

We did a quick analysis and it improves the cost effectiveness of a solar domestic system, such as Tod uses in his manual, by somewhere between 32% and 44%. It has the effectiveness for those people who can use it, of improving the payback period from about six years to about four years. It has the effect of about a \$900 rebate on the original cost of a \$3,500 unit.

The concept of a zero interest loan is a good one and we are looking at it. However, we think we have come up with another alternative which we now have before the DPU, and that concerns the time of use pricing again. We are recommending to them that we will parallel bill the customer, using the current existing rate as the standard rate and bill him for whatever kilowatt hours he uses. We will also provide the customer with the water heater insulation jacket and load controls and other things and bill him on a parallel basis on the time of use for each. If there are any savings between the two rates, the company will keep it and use it to retire the cost of the equipment which we have given to him. When the customer has "written off" the expense of providing that equipment to him, he will have his choice, or will go on the cheaper-time-of-use rate. So, what we have, in effect, is a zero interest loan in some aspects; however, it is paid out only if there are savings, savings which Jersey Central has promised to them. Right now, as I say, this is before the Board of Public Utilities. We are hoping for a quick resolution. We met with the BPU staff on a number of occasions and with the DOE staff and they seem very amenable to this.

If this works, we can look at doing this in a number of other areas. For example, we have curtailable rates and off-peak rates for commercial-industrial customers. We can provide them with the equipment and double parallel bill them so that they will never pay higher than the rates they were paying before and yet they will receive the benefits of this once it is paid off.

The other consideration is that the utility company can afford investments in conservation because it means aborting construction of new power plants. In theory, that is correct. However, as I mentioned to you before, there are barriers and one of them is that the utility company is not supposed to charge the customers for anything that is not currently being used. So, I may be able to invest in a utility company five hundred dollars in conservation equipment today, which will save me from having to build a power plant that might have cost two thousand dollars for the same amount of production. Or, if I have to spend the five hundred dollars today in order to avoid paying for a power plant which is to be built in 1990 and will be charged to customers over a twenty or thirty year period, from 1990 to 2,010 -- when you start figuring it on that basis, you have to come back and say, "Are these customers today, who are not directly participating in the conservation because it is going to a neighbor, perhaps, going to benefit as an individual family from the savings that are going to take place beginning ten years from now and lasting another

ten or twenty years"? On that basis, there have been a number of projects which have been proposed and which have had to be turned down. That is why we are very much in favor of a number of suggestions here concentrating on fast pay-back items. There are a lot of things in the conservation field that will pay back in less than five years.

I will give you one quick example. If I were to take four million dollars, I might be able to build a very small power plant. With that same four million dollars I would put in a thousand solar domestic water heaters and save five hundred thousand dollars a year. However, with that same four million dollars, I can buy two hundred thousand water heater insulation jackets and save seven million a year. In terms of priority, I would have to buy the water heater jackets. Then I would buy the solar domestic water heaters. And, then, as a last resort, I would buy that power plant. But, there has to be a priority of items that have to be done on a pay-back basis, because the people who are paying for the conservation are the people here today. The people who are paying for the new power plants are not going to be here for a number of years, and our first priority is to make sure that the equity that comes about takes place today.

I have been ranging around primarily because a lot of other things have come up. If there are any quick questions from a utility standpoint--

ASSEMBLYMAN STOCKMAN: Let me say that I have found your remarks interesting and I think helpful to us. The hour is late, but I would ask the question that I asked earlier of one of the utility witnesses, and that is how you feel the reality of the approach to compensation of the utilities tradition, on the basis of their fixed assets - their large plants - impacts on the true incentive within these utilities to push for conservation. I know the general proposition is that conservation means less capital outlay and theoretically it is to their advantage. And, I might say, parenthetically, that I get the impression your utility is probably among those that I am familiar with in this area -- one that seems to be approaching in a positive way new methods for energy conservation.

Do you see anything that State government, legislatively, can do, perhaps through the rate structure, through the Board of Public Utilities, or any other manner, to deal with this problem? I don't want to say problem, let me say reality.

MR. ESTEVES: There are a number of small institutional barriers, as I have mentioned. But, the reality of the situation is that that public utility, in theory, does not benefit from becoming larger because even if it were true - and I don't believe it is true - that the utility were guaranteed a rate of return based upon a number of power plants now, all that means is that we have to go out and get another \$1,000 to invest in that power plant. The profitability of a utility would be set. Only in terms of the mind-set that bigger is better, which is really turning around a good deal now-- It is not important that there are more profits, it is important that the profits for the money you have invested are high. And, in that respect, a utility no longer has an advantage in going for bigger.

ASSEMBLYMAN STOCKMAN: That is the mood and the climate in your experience within utilities today?

MR. ESTEVES: Today is a very short time, I want you to know that.

A utility, like a State government or like many other things, is composed of individuals, some of whom have been around a lot longer than others and may have had different ideas in the past. Okay? I think that as an institution, that people in the utilities are moving away from the idea, very significantly, that bigger is better. In our own case, we have no plans of constructing additional capacity through the rest of this decade, and if we could figure out a way of avoiding having to construct capacity in the 1990's, we would like to do so very much. We are looking to invest large amounts of money in conservation and load management to avoid that.

As far as helping us do that, there are some institutional barriers, as I said. One of them is that a utility cannot readily own, nor should it own, customer conservation equipment. But, for us to go into your home and put in insulation, for example, and borrow that money, it is costing us about 20% to borrow money now. People think we get it fairly cheap, but we don't -- at least mine doesn't. You can get that money yourself for a lot less, but may not have the incentive or financial interest that we as a utility do because you are only paying the average cost, or 8¢ a kilowatt hour; whereas, we are trying to save 10¢ to 15¢ a kilowatt hour. So, your pay-back is not as great as ours, but there might be some way through the rate structure, or other fashion, to give you the rewards of conservation that we would have while you are paying for it.

ASSEMBLYMAN STOCKMAN: All right. Well, the hour is late. We have been sitting for a long time. Our reporters have worked pretty hard and I think it is time to call this hearing to a conclusion. I want to again thank everyone who has participated in this hearing, or attended today. I can promise you that we have listened carefully to everything that has been said. It has been recorded and it will be provided to the members of the Committee and to Senator Bradley's office. We anticipate that out of these hearings will hopefully come some recommendations and some actual legislative proposals. And, you can feel that you participated to the extent that they make sense to you. Thank you very much again.

I want to thank Rose Brunetto for joining with me at this hearing. Perhaps she wants to say a word also.

MS. BRUNETTO: Just a word. I just want to thank the witnesses, as well as thanking the committee for the invitation. As you know, Senator Bradley has been committed to energy conservation for a very long time. It was no accident that he sits on the Senate Energy Committee. He sought to do this because he looks upon it as a most crucial issue of the '80's.

Now, he is particularly appreciative of the efforts of this committee, and your leadership in particular. In inviting us to join with you, you have, I think, presented to the public intergovernmental relations at their very best, because this is a problem we are going to be able to do less about at the federal level now with the budget cuts. We are going to look to the State, and we are certainly going to do everything that we can to help. I thank you very much.

ASSEMBLYMAN STOCKMAN: Thank you very much, Rose. That completes the hearing for today.

(HEARING CONCLUDED)