100
2-6-79

CONF-7805139

GIVE PEG DR. NO
UC-13

Proceedings of the Northwest Regional Energy Conference

May 31-June 1, 1978
Seattle, Washington

DR-2170

Co-Sponsors:
Central Washington University
U.S. Department of Energy

9509190
MASTER

December 1978

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

CONF-7805139

Proceedings of the Northwest Regional Energy Conference

May 31-June 1, 1978
Seattle, Washington

950 9190

Co-Sponsors:
Central Washington University
U.S. Department of Energy
Assistant Secretary for Intergovernmental and Institutional Relations
Office of Education, Business and Labor Affairs

Edited by:
Anne S. Denman, Ph.D.
Associate Professor of Anthropology and
Special Assistant to the Dean of the Graduate School
and
Dale R. Comstock, Ph.D.
Professor of Mathematics and
Dean of the Graduate School and Research

December 1978

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

This material was prepared with the support of Department of Energy Grant No. EW–78–G–06–1086. Any opinions, findings, conclusions, or recommendations are those of the authors and do not necessarily reflect the views of the Department of Energy.

Table of Contents

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

Preface

If any issue is important today in conditioning interrelationships among the world's societies, it is energy. Nations like our own must leave practices of the wasteful past behind. Environmental, resource and capital constraints are rapidly combining to create future limits on energy use; yet as many of the papers included in this volume point out, large segments of the public still do not recognize the significance of the choices which must be made.

Our study and planning for the energy future may well be the most exciting intellectual enterprise of today. It is also an awesome responsibility to understand and deal with alternatives for meeting our future energy needs *before* we are entangled in possible—but avoidable—catastrophes.

The concept of a Northwest regional energy conference to be held this spring was discussed at Central Washington University in the late summer of 1977. The proposed conference was outlined in a letter to Senator Henry M. Jackson in October, 1977, just two weeks after the U.S. Department of Energy came into being as the newest cabinet department of the federal government. Senator Jackson endorsed the concept and forwarded Central's proposal to the Department of Energy. Sam Hughes, Assistant Secretary of Energy for Institutional and Intergovernmental Affairs, supported the proposal and worked closely with the University through the Region X DOE office in Seattle. Conference planning took place from February through May of 1978.

The Conference was directed toward two main objectives. First, a major portion of the proceedings were to focus on the policies, programs, and priorities of the new U.S. Department of Energy, and their relationships to the Pacific Northwest region. Second, the conference was to explore specific energy issues of regional significance and provide an opportunity for regional feedback on energy policies.

The conference was held on May 31—June 1, 1978, at the Seattle Center. The 542 registrants included representatives of state and local governments, public and private utilities, business, industry, academic institutions and citizens' groups. Participants were particularly enthusiastic about the conference's role in introducing the Department of Energy and its leadership to the Northwest and in increasing DOE's awareness of the region's energy problems.

All presentations were recorded at the time of the conference, and subsequently transcribed by staff at Central Washington University. Participants' remarks appear here essentially as delivered, although some minor changes were made to ease the transition from spoken to written language, The careful reader will note two extraneous topics which occupied conference

participants outside the meeting sessions: the balmy Seattle weather which prevailed for the two days of the conference; and the National Basketball Association final playoff game between the Seattle Sonics and the Washington Bullets which had taken place on the evening of May 30, and which elicited some friendly rivalries among participants.

The speeches and discourse of the conference recorded in these Proceedings will, hopefully, shed some light and understanding on the substantial problems ahead of us. As Senator Jackson said in his keynote address to the conference, there is an "enormous reservoir of competence" in the United States. If we can marshal these competencies effectively, the diverse elements of our energy future can be balanced in ways which combine efficient use of resources, environmental quality and economic well-being in response to the individual and societal needs of the world's peoples.

August, 1978

Dale R. Comstock
Anne S. Denman

Acknowledgements

The first Northwest Regional Energy Conference, and these Proceedings, reflect the efforts of a great number of people. Although it is not possible to accord proper recognition to everyone involved, a few contributions were particularly significant.

First of all, a special note of appreciation is due to Senator Henry Jackson and DOE Assistant Secretary Sam Hughes for their encouragement, support and assistance in moving the conference to reality.

DOE's Regional Representative Jack Robertson and his staff were very supportive and responsive to any and all tasks in making the conference a success. In particular, Randy Hardy coordinated the conference for DOE Region X, and Lee Johnson and Kathy Coronetz were responsible for public relations and media activities. Bob Lindsay and Judy Tokarz of DOE Richland Operations assisted in pre-conference planning and conference arrangements for DOE representatives.

President James Brooks of Central Washington University provided strong encouragement and support, and was an active participant in conference planning and meeting sessions.

CWU staff assistance included Jerry Jones, Britta Jo Hammond, Darwin Davis, Bill Whiting, Charles Vlcek, Rich Dietz, Linda Stephens, Gail Jones, and staff of the Duplicating and Mailing Services Center.

Laura Wilson and Franki Storlie of the CWU Office of The Graduate School and Research provided outstanding service in conference arrangements, registration coordination, and in transcribing tapes and preparing these proceedings.

Finally, a great debt is owed to those participating in the formal program and to all those who attended and contributed to the exchange of ideas.

Keynote Session

Wednesday, May 31, 1978, 9:00 a.m.—10:00 a.m.

Presiding: President James Brooks, *Central Washington University*
Introduction: President John Hogness, *University of Washington*
Speaker: Honorable Henry M. Jackson, *United States Senate*

James Brooks

On behalf of the United States Department of Energy and Central Washington University, I am pleased to welcome you to the Northwest Regional Energy Conference. We are delighted not only with the size of this attendance, but with its quality. We hope that by the end of this conference you will be delighted by what you have received here. We have tried to put together what will hopefully be the first of a series of regional energy conferences throughout the country. We structured this conference to allow the Department of Energy to explain its operations before academic, business, and government entities who also have major responsibilities in the field of energy.

We believe it is appropriate for the first conference to be held in the Northwest. As you know, our region has been a leader in energy development. In addition, now is an appropriate time for us to re-examine the energy needs and perspectives of our region and explore ways in which national policy can meet those needs in a coherent and integrated manner.

Our conference was not designed to become a series of debates on issues. We hope that will not happen. Many Department of Energy representatives are here to exchange ideas with us, to deepen their appreciation of Northwest energy concerns and promote greater understanding in our region of the purposes, missions, and programs of the Department of Energy. As participants, we have a unique opportunity to exchange information with them and to provide input on major regional and national policy development. We urge you to make the most of this opportunity.

Now it is with a great deal of pleasure that I introduce a colleague and friend, the President of the University of Washington, John R. Hogness.

John Hogness

We are fortunate to have with us today the man with the answers concerning national energy goals—The Honorable Henry M. Jackson, Chairman of the Senate Energy and Natural Resources Committee. As a Senator from the State of Washington, Scoop is also in a unique position to relate those

national goals to the needs of the Pacific Northwest. He was born and reared in our neighboring city of Everett, and I am proud to say attended the University of Washington, earning a bachelor of laws degree in 1935.

1978 marks Senator Jackson's fortieth consecutive year as an elected official, and as a matter of fact, today is his birthday. He first plunged into the political fray when he was elected Prosecuting Attorney of Snohomish County at the age of twenty-six. In 1940 he was elected to Congress, going on to the Senate in 1952. Scoop is the author of the National Environmental Policy Act and of other landmark conservation legislation establishing the Redwoods National Park, the North Cascade National Park, an the Land and Water Conservation Fund. As Chairman of the Energy an Resources Committee, he has, for the last four years, provided leadership in every major piece of new energy legislation including research and development, strategic reserve, emergency allocation, and reorganization.

Ladies and Gentlemen, it is my very great pleasure to present to you, Senator Henry M. Jackson.

CONGRESS AND THE NATIONAL ENERGY PLAN (NEP)

Henry Jackson

Thank you, John. Jim, we want to thank you for marshalling all of the fine assets that we have available to us during this conference, and I want to personnally thank Secretary James Schlesinger who is being very modest, as one of your colleagues in the audience. And about half of the Department of Energy is here; if there is a malfunction over the weekend I think the northwest part of the country will have to assume some of the responsibility.

We do have a great opportunity during the course of this conference for give-and-take with knowledgeable people, which can set an example for other areas of the United States—since this is the first regional conference in the country. Just as an example, we have a Nobel Prize winner sitting in the front row. Walter Brattain, stand up; I'm very proud of you. Incidentally, like my mother-in-law, he was born in China, but grew up in Walla Walla, Washington, graduated from Whitman, got his doctorate at the University of Minnesota. He ended up in Bell Labs and along with a couple of colleagues was the co-discoverer of the transistor. And when he retired from Bell Labs he did a noble thing I think our two presidents here would appreciate; an that is, he did not come back to Whitman to provide all the answers, but instead he undertook to teach—and his basic course was "Introductory Physics". I think it is that kind of modesty and greatness that accounts for the enormous reservoir of competence that we have in the United States of America.

As we plunge into this series of dialogues and discussions, we should not take the position that somehow we are not able to cope with these problems. If any people can do it, it is the United States of America. I want to thank each and all who are here during this conference for their participation, and for their diversity, because it's so important that we have all

points of view. In the long run, the good ideas will win out over the bad.

This conference, may I say, comes five years after the Arab oil embargo dramatized our dependence on high cost foreign oil and raised the spector of energy shortages. Today we are more dependent that ever on foreign oil. Almost 50% of the oil that heats our houses, drives our cars, and fuels our factories came from abroad last year. The cost of that dependence is high, as you know, in terms of inflation, unsettled economic conditions, and serious threats to our security. We have no reason, and indeed no right, to assume that we can continue to use the lion's share of world oil. Beyond this, we are confronting the probability that world oil production will begin to decline before the end of this century.

Given the lead time involved, it is none too soon to develop new energy sources now for the future needs. People always ask me, "When is Congress going to enact a national energy policy?" Well, my response is that Congress began more than five years ago laying the foundation for an energy policy. It was in 1974 that we approved a multi-billion dollar research program to develop other energy sources, then known as ERDA. In 1975 we authorized a billion barrel strategic oil reserve to protect against future embargos. In 1975 we also enacted the first automobile-efficiency standards to cut the waste of gas guzzlers. In 1977 we created the Department of Energy to manage the nations's energy programs and plan energy policies. And in 1978 we will enact a major part of the President's energy program.

The record of these past five years makes clear that energy policy is not created overnight by legislative command or executive fiat. The process is slow, painstaking, and indeed frustrating. Secretary Schlesinger is my expert witness on this point. The fact is that consensus is not easily achieved because there are basic philosophical differences over the response we should make to our energy problems.

Despite these differences, much progress has been made since President Carter made his energy proposals to Congress last year. We have reached general agreement on a conservation bill which will spur efforts to cut energy waste through such measures as home installation incentives and appliance efficiency standards. We have endorsed a coal conversion program to accelerate moves away from oil and gas by utilities and large industrial users. We have approved a utility rate reform bill designed to modernize rate structures and cut peak loads. And we have finally agreed on a natural gas pricing policy that will provide certainty and incentives for investments to produce more gas and which should increase supply about one million barrels a day out of the little over eight million barrels we are importing every day.

Now I would be the last to say that we do not have much to do and a long way to go. If national energy needs are to be met in the future, we have a lot to do. We are told, for example, that present oil imports could double by 1990 to sixteen million barrels a day in the absence of further action to reduce demand and increase conservation. The impact of higher prices has already reduced energy demand and future price increases will further this trend. Whether the President imposes import fees or increases oil prices under existing law, oil consumers will be facing higher prices in the future. Demand will also be affected by regulation, whether through efficiency

standards for automobiles and appliances, new building codes, or other means.

President Carter's leadership, coupled with the impact of higher prices, has helped build a consensus on the need for strong conservation efforts. But conservation alone cannot meet the energy needs of the next generation. While we save, we must also produce.

We must now develop and implement a coherent supply strategy which clearly defines the roles of industry and government and commits them to a partnership in energy production. Such a strategy must also provide state leadership in policy planning and energy development.

The essential elements of this strategy are at least four in number. First, we must develop with a sense of urgency the new energy sources like solar that will help replace fossil fuels in the 1990's and beyond.

Second, we must buy time for this development by using our fossil fuel resources as fully as possible. This means giving priority to essential OCS —outer continental shelf—development to augment declining oil reserves. It means using our vast coal resources in environmentally acceptable ways.

Third, we must break the logjams that are preventing synthetic fuels development. The federal government should be ready to support the first generation of plants to gassify and produce oil from shale. We ought to be working with our Canadian friends to develop, for example, Alberta's oil sands, commonly referred to as tar sands.

Fourth, we must restore the viability of our nuclear industry, recognizing the vital contribution of nuclear power to energy needs in the next generation. But we cannot expect the public to accept nuclear power unless we are prepared to respond effectively to legitimate concerns about the problems of waste disposal and nuclear safety.

This kind of supply strategy won't come easily. It won't work at all unless we can deal with the institutional paralysis which has plagued energy development in this country. The truth is that our institutions have not responded well to the energy crisis. We are bogged down in prolonged environmental disputes on such major issues as western coal development. We are trapped in a network of conflicting policy objectives. Witness, for example, the current impasse over the transportation and marketing of Alaskan oil. Too much of our energy planning is *ad hoc* or piecemeal.

I am convinced that the federal government must indeed play a new, more positive role in energy production. Too many federal agencies can delay or hinder energy development. Few can encourage it. Coal is a case in point. While Congress established the Department of Energy as a focal point for federal energy efforts to meet national energy needs, responsibilities are still fragmented. Coal transportation problems are managed by another department; coal mine health and safety by a third; surface mining regulations by a fourth; and Clean Air Act compliance by a fifth. Aside from the Energy department, none of these agencies has a mandate to help produce coal. On the contrary, their interests may run counter to this goal. The President's express commitment to doubling coal production is meaningless unless government plays a major role in assuring that this production can take place. We cannot assume that simply providing incentives, whether in

the form of tax benefits or higher prices, will have this effect. The same is true for the development of other energy sources as well.

Three years ago I proposed a National Energy Production Board to mobilize the materials, manpower, and financial resources required to speed the development of our fossil fuel resources. Derived from the War Mobilization Board of World War II, it was also designed to identify bottlenecks that unreasonably delay private energy development and propose action to remove them. Organizational solutions certainly are no panacea for energy problems. In some way the government is going to have to play the role of an energy production board. This is particularly true with respect to coal where the power to regulate and restrain coal production and use is spread through a number of federal agencies.

A positive federal role in energy production must also extend to the federal-state relationship. It is essential that the states be fully involved in the development of energy policy, particularly where their resources or their environments are at stake. The state's partnership role has been increasingly recognized by Congress in energy legislation ranging from coal to OCS development. Now at the same time we must also look to the states for leadership in energy development. States must be prepared to recognize and respond to a national interest in energy decisions. We cannot continue to accept a situation in which the states are unreasonably delaying or even prohibiting essential national energy development. This particularly true with respect to the siting and construction of major energy facilities.

Finally, we must develop a new relationship between government and industry. Over the next decade we need to make a trillion dollar investment in energy. We must build multi-billion dollar plants to gassify coal. We must build a new generation of nuclear and coal-fired power plants. We must push outer continental shelf development and high-cost frontier areas. We must test our ability to tap our vast oil resources. We must construct multi-billion dollar energy transportation systems. We must work to expand the potential of new sources like solar energy.

None of these goals can be achieved in an atmosphere of confrontation and mistrust between the public and the private sectors. This is why I emphasize the need for a new partnership between industry and government in energy production. We must be willing to experiment to use the resources of government and industry more effectively. We are facing the need to build energy projects of enormous size with unprecedented capital requirements. Now how, for example, can we join the public and private sectors to finance projects that will bring Alaska's gas to domestic markets? How do we create a synthetic fuels industry with private management and federal support?

These are difficult questions. Whether we respond with proposals for joint ventures or loan guarantees or even COMSAT-like corporations, we must be creative in seeking solutions. And we must respond not in terms of labels or ideologies, but on the basis of what will work. Our energy problems may constitute a crisis, but to me they pose an enormous challenge to business and government, to science and technology, and to our political leadership at every level of government. I think we can meet that challenge. Thank you.

QUESTIONS

Senator Jackson: Now we'll follow the rules of the Senate in the question period. This is to say, your questions need not be pertinent or relevant to anything I may have said.

Fred Schmidt, Professor of Physics, University of Washington: You spoke of needing a new generation of nuclear plants. Could you specify more clearly what you have in mind—a new generation of breeder reactors or light water reactors?

Jackson: I'm referring, first of all, to the need to standardize our reactors so that we avoid the multiplicity of design which has created a lot of problems. And looking down the road, we need to come up with the right kind of design for the breeder so that we can meet this issue head on which our partners in the western world—France, Germany, Britain, and Japan—are pursuing rather vigorously. Our biggest immediate problem is how we handle nuclear waste. I think it's a resolvable problem, but we need to focus and really work hard on it and it can be solved. We are making progress in that regard.

Barry McClain, Seattle resident: Is it going to take more of an energy crisis to get people to conserve energy?

Jackson: We consumed last year an average of 18.3 million barrels of oil a day—half of it under boilers. The next big chunk, automobiles, was roughly 42%; and the rest, miscellaneous. We do know that, realistically, the pricing mechanism does not apply effectively to gasoline. Gasoline prices are inelastic in the market place, and in that respect, we've had almost a doubling of the price of gasoline in the last four or five years without any diminishment of demand. And I must say that from a political point of view the real solution must come with stronger moves on the part of Congress for Detroit to produce more fuel-efficient automobiles. You raise the question of crisis. For a politician it's hard to make these moves unless there's some sense of urgency. When you read the Gallup poll and find that 50% of the people of this country are unaware that we are importing oil, I begin to wonder what we're doing. Hopefully this conference and regional conferences like it around the country can bring out the basic issues. And frankly, the biggest problem is that most people believe that there is no such think as an energy crisis.

I feel that we have to make our effort here in conservation in two main areas—first, to move oil out from under the big boilers in this country is a major task; and the natural gas pricing effort will, as I indicated in my remarks, save a million barrels of oil a day when the program is fully under way, out of the eight million we're importing. We have to go after the boilers on one hand and after the automobile on the other. Now the tragedy is that Detroit is not responding with the competence and knowhow that they have available. They're just not doing it. Automobile imports are increasing: last year I think 19% of all automobiles sold were foreign makes —people wanting to buy more fuel efficient automobiles. I think Detroit has to wake up to the fact because as prices continue to rise the American

people are going to be more selective in looking for those particular devices that will save fuel and energy. That process is already under way.

Rob Walton, Washington State Senate Energy Committee Staff: My question concerns the status of the National Energy Act. Like many others, I am concerned with the quality of that Act. I understand that there are some Conference Committee agreements that have not yet reached the statutory language stage. I have heard several comments that when we go back and try to apply statutory language to those early agreements, there might be some difficulty in reaching consensus. Can you tell us about this?

Jackson: There are five basic provisions in the President's program. First is Conservation: all of that has been finished except the question of the Metzenbaum amendment relating to fuel efficiency standards, which I strongly support—that increases it over the 1975 act to a minimum of 18½ miles per gallon by 1980. The second is Coal Conversion: there are only a few minor areas in that particular bill that need to be attended to in terms of statutory language. The third area pertains to Utility Rate Reform: a lot of it does include other amendments, but that's well along. The fourth is Natural Gas Pricing which we just completed; that does have a lot of statutory work remaining. I would say there's no reason why that cannot be completed in three weeks. The fifth part of the package, which I do not handle, relates to taxes. The big fight there will be over the wellhead tax, but I expect a tax bill to come out of the conference. There is no reason why the program can't start moving through the Congress—all five pieces—in the month of July. I anticipate there will be an attempted filibuster against the Natural Gas Pricing Bill. By a very curious combination ideologically, the far left and the far right are merging together in a common effort—nothing new about that.

Walton: One example was the subject of cogeneration; it was reported that there were people unable to agree on the previous agreements. Do you know if there are any troubles with things they've previously agreed on?

Jackson: There may be questions raised, but there certainly are no major disagreements. Questions will be raised when you get forty-three members of the House and Senate together in one place. That's bigger than the State of Washington Senate, am I not correct? They've got thirty-nine, and we've got forty-three. Obviously, just the fact that they're there will raise a lot of questions.

Tom Martin, Washington Society of Professional Engineers: I am concerned about the fact that we are talking so much about moving oil out from under the boilers of our utility plants and the fact that nuclear, of course, becomes a very vital way of doing this. Yet how can we break the logjam on the development of new nuclear plants and on the breakdown of our supplies of nuclear plant facilities with the sort of immediate interference that we seem to be running into in trying to develop our necessary energy sources?

Jackson: The answer, of course, is expedited procedures both at the federal and state level. I can only address it at the federal level. The President sent up legislation which does not come before my committee; it goes to the

Committee on Environment and Public Works. My own personal view is that we need the adjudicatory process—that's essential. Due process involves two fundamental points: notice and hearing. But it's not due process when you set up a scheme and a system where you can have judicial filibusters—appeal, appeal, oppose, oppose—because we have so many routes that you can follow at the state and federal levels. If you're out to stop something, you can do it through the systems already established.

Now, what do we need? We need the adjudication process, but we need it expedited. We need notice and hearing—that's essential. But we need one-stop licensing; we need a system of one appeal instead of appealing and appealing and appealing, which ties up the operation. Now that's no easy achievement because there are a lot of politics, a lot of opposing views in all of this. I think the mood of this country is finally recognizing that the rate payer starts to pay the bill for delays—and that's what's happening. You start building the plants, and millions and tens of millions, in the case of some utilities hundreds of millions are tied up, and who's going to pay for it? The rate payer. I don't think we can afford that kind of inefficiency.

We *can* do the job. I'm the author of the National Environmental Policy Act, and when I see what the courts have said about it, I don't recognize my child. You know, it's just ridiculous: we did not contemplate an "either or," we believed in the conjunction "and". It's economic growth *and* quality life in a good environment. Too many have imposed the disjunctive. In fact, there's too much of the disjunctive in the country. You know, there are too many people who feel that it's their position and no other, and we don't need to do this and this. Well, that's fine; they have the right to exercise those views and thoughts, but there should come an early and final adjudication of the contesting views. That's my position. And that process will be under way with the President having sent up some specific reforms. Write to your Congressman, not to me; I'm getting over a thousand letters a day —write to the other senators. [laughter] You don't need to write to Maggie; we work together in the Senate, so I can speak for him on this subject, I think.

Dennis Rader, Environmental Management Consultants: You mentioned in your speech that the goals of the energy policy that you are outlining can't be achieved in an atmosphere of mistrust and confrontation between public and private sectors, and that we need a new partnership between industry and government. Now I'd like to know how you can expect that this kind of a trust can be developed and maintained when the government and industry have consistently lied to the public and covered up many accidents both in the nuclear industry and the nuclear weapons industry since its conception. I can quote the SL1 reactor accident at Idaho Falls, Pump River accident in British Columbia, and the reactor accident in Detroit, not to mention numerous public reports on potential dangers which the nuclear industry has covered up.

Jackson: Well, mistakes have been made; there isn't any question about that. I must say that the problem with nuclear power plants is that it is tied, I

think, to a certain psyche in this country on the part of some people. They're out demonstrating in front. To many it's part of the military industrial complex philosophically; it's something that's against peace and tranquility. Yet from an environmental point of view it's the cleanest form of energy with the solution of the problem of waste disposal. I've been in the environmental movement a long time and of course enjoy hearing from those who indulge in what I call "retroactive righteousness." I would point out to you that when we tried to build hydro-electric dams, the objection was made—in our own community— that it would do violence to the environment and we ought to build nuclear plants and coal-fired plants. So when we started on the coal-fired and nuclear plants, then we had opposition saying that we ought to build hydro plants. You know, it's a yo-yo game.

Now there are those who honestly believe that we do not need any new power plants. Well, I think the way to resolve that issue is to run for office on that program. We *do* need additional power; we *do* need to conserve, and I think conservation must have the highest priority. But what are the alternatives to the terrible price that we're paying for imports with the problems that are attendant to moving in with big tankers and the oil spillage that occurs? On the nuclear side I would be the first to say that mistakes have been made, but I would also say that there isn't any conspiracy to try to keep from the public, information it should have. If a big chemical plant blows up and kills a lot of people (I remember the Texas city disaster of over 500), not much is said about it, but if there is a bit of spillage in which no lives are lost and no one is seriously affected, it's a headline. That's part of the problem we face and I recognize it, but it relates to the whole question of nuclear. "Nuclear" is a bad word. When you mention "nuclear," it sets off a chain reaction on the part of many people.

Bader: What is the government going to do about the consistent cover ups that keep happening?

Jackson: Well, I don't agree with you on that, you see.

Bader: It just happened in Bremerton last week.

Jackson: That's not a cover up at all. I just disagree with you, and I hope I still have that right. I don't know of a more conscientious man, a more sensitive man in the handling of fissionable material and all of the related matters than Admiral Rickover, considering the fact that there are over a hundred nuclear power reactors in operation and there has not been a single fatality to my knowledge.

Bader: That's an outright lie.

Jackson: Well, I think we've had enough on this subject. I'll take one more question. I'm glad you got an answer, sir.

Bader: I didn't get the answer, but happy birthday, Senator.

Jackson: Thank you.

Diane LeResche, Office of the Governor of the State of Alaska: My question asks for an opinion on your part. As the federal government requires energy development production, who can be the responsible party or parties for the social environment, for ameliorating the major social impacts encountered at the state and local levels? Should it be the federal government, state government, industry?

Jackson: In the Coal Leasing Act, we did provide certain funds on coal leasing that are available to the state and the counties. I think that as we move to develop the resources in Alaska, we will just have to see how it works and how the program will impact on the economy and on social institutions in Alaska. I don't have an immediate answer to your question. As you know, the people who built the pipeline did provide certain help to the State of Alaska. Well, if they didn't, it's the fault of the State of Alaska, because they did have that authority under existing law, under the constitution, is that not correct? Those are things that we cannot give precise definitive answers at this point.

Of course in Alaska, the big development like Prudhoe Bay, as you know, are on state-owned land. Now what is the State of Alaska doing, if I may ask you, with respect to Prudhoe Bay? I was the author of that provision in the Statehood Act, when people opposed statehood in 1957-58 because Alaska could not possibly pay for the cost of state government. You may recollect that it was in that year, 1957, that oil was discovered for the first time in Swanson River; and I had a sneaking feeling there might be a lot of oil in Alaska. The late Senator Clinton Anderson and myself sponsored an amendment in which Alaska was given the right to select 104 million acres—that's a good piece, bigger than most states—out of a total of 375 million acres. Wisely, prudently, and obviously with great understanding and foresight, one of the first selections was Prudhoe Bay adjacent to the Naval Petroleum Reserve. Maybe you moved too soon, I don't know—but you did collect $900-odd million on the sale of those first leases; so that as far as federal impact, I think the federal government has been pretty generous with Alaska, far more generous than any other state that has come into the Union, to my knowledge. And that was a good beginning, but that does *not* mean that we should not look down the road and see what happens in the development of the resources of Alaska and how it's going to impact socially and economically. In addition, the natives, with whom we made a settlement which was the basis for the Alaska Pipeline Act of 1971 and which leaves us with the D-2 lands to be resolved, received 44 million acres of land plus a billion dollar settlement. I wish we had solved all of our native problems in the lower forty-eight states in the same way. We do have a few remaining issues to be resolved here that are social, economic, and shall we say political, starting from a judicial decision, but we're going to watch it closely. Thank you very much, ladies and gentlemen.

National Perspectives on Energy Issues—I

Wednesday, May 31, 1978, 10:15 a.m.—12:00 noon

Presiding: Ron Bair, *Mayor of Spokane*
Alvin Alm, *Assistant Secretary for Policy & Evaluation, DOE*
Don Beattie, *Assistant Secretary for Conservation & Solar Applications, DOE*

Ron Bair

It is a great privilege to be over here on the other side of the state. They tell me great things about the weather in Seattle, and I want you to know Spokane is enjoying about the same kind of weather this morning, and today. The only difference is that you are a lot less secure in Spokane than you are in Seattle, due to the fact that you can *see* the air you breathe over here, and you can't in Spokane; and hopefully, we *aren't* working on that.

Flying across the State of Washington this morning I noticed how beautiful it is and the thought of how fortunate we all are to live here crossed my mind. But I also noticed how fragile we look from 25,000 feet—fragile in the sense of what we are capable of doing to our planet. The possibility certainly exists that we can destroy it, but we can also enhance it. This conference is a matter of a positive future—thinking philosophy about what this world and this state will be like during the next ten, twenty, and fifty years. That is how I view this conference, and I deem it an honor to have been asked to be here.

Alvin Alm is Assistant Secretary of Policy and Evaluation in the Department of Energy. He served since January, 1977, on the White House Energy Policy and Planning staff where he was involved in the development of the President's National Energy Plan and other energy policy matters. From 1973 until 1977, Mr. Alm was Assistant Administrator of the Environmental Protection Agency of Planning and Management. Between 1970 and 1973 he was a Staff Director for Program Development of the Council on Environmental Quality where his responsibilities included staff coordination of legislation and administrative initiative. Mr. Alm was a budget examiner for the Bureau of the Budget from 1963 until 1970 and a management intern and contract administrator with the Atomic Energy Commission between 1961 and 1963. Mr. Alm has received a B.S. degree from the University of Denver in 1960, and an M.P.A. from Syracuse University in 1961. It is a pleasure to present to you, Alvin L. Alm.

AN OVERVIEW OF THE NEP, PROGRAMS & PRIORITIES OF DOE

Alvin Alm

Thank you, Mayor Bair, ladies and gentlemen. When Mayor Bair commented on the air quality in Seattle as compared to Spokane, I was reminded of when I got up this morning—I had thought, coming from Washington, that this air lacked a lot of character. At this time of the year our air has a great deal of character.

I am going to talk very briefly about national energy policy and the directions the Department has been, and the directions it is going. It is difficult to follow Senator Jackson. His knowledge in energy policy matters and tremendous contributions give you insights that are difficult to add to. But I will do the best I can in the short amount of time available.

I have found that national energy policy can be an area of tremendous diversity of opinion and contentiousness. It reminds me a little bit of a story of a football coach with his new quarterback; the coach gave the new quarterback four plays to run since he hadn't called plays before. The first play was to go into the center of the line, the second play was to go around the left end, the third play was a long pass to the wide receiver, and the fourth down the quarterback was asked to punt. So they lined up for the plays. The first play went into the line and got about a yard, and the second play went around the left end, and got a couple of yards. On the third play the quarterback faded back, threw a long pass, and was successful. He went down to the two-yard line. They lined up for the fourth play, and the quarterback called a punt. At this point the coach was absolutely livid and when the young quarterback came back he screamed at him, "What were you thinking when you called a punt?" And the quarterback said, "I was thinking what a stupid coach I have."

This is somewhat symbolic of the problems you have in national energy policy. In terms of context, in the development of a national energy plan we took a look at what we saw as the nation's energy future. The key concern was the question of where our oil and gas resources stand, what the productive capacity is, and what is the long-term resource availability. In the area of production, the world now produces about 60 million barrels of oil a day. From our analyses we have concluded that increases beyond 70 to 75 million barrels a day are highly unlikely. The implications of this fact are very important. What this means is that assuming generally moderate growth rates and assuming no dramatic change in the ratio of energy use to GNP, the world could be running into capacity limitations, sometime in the 1980's. I don't think it is critical whether that period of time is 1982 or 1985 or the late 80's or the late 1990's, but unless world economic growth rates decrease significantly, to a point close to world-wide recession, we are running up against a capacity limitation.

Now the U.S. and the other industrialized nations of the world have options. If they can reduce demand and increase supply, they can (1) have energy for their own needs, and (2) allow this world productive capacity to stretch out. If the productive capacity of the world can be stretched out through conservation and greater production, we can go through this transi-

tion and continue healthy economic growth. If we fail, the U.S. and all the nations of the world are going to face economic conditions significantly different than they face today.

The National Energy Plan dealt with four of the major issues the U.S. has to face. First, we had to reduce the rate of demand growth. The target set in the National Energy Plan was to reduce demand growth from the current 3½% a year to below 2% a year. In the last year the relationship between GNP and energy growth was about 50%—in other words, energy use increased only half as fast as GNP. I don't think that rate can be continued, but it illustrates that energy growth need not be tied to economic growth, and that has very important implications for the future.

Secondly, it is critical that we replace oil and gas use now and in the future with coal and more abundant energy sources. To do this the Administration proposed both regulatory measures and a tax on oil and gas use.

Third, we need to create the incentives for greater production of conventional oil and gas. The Administration proposed a massive restructuring of gas pricing and also proposed new oil incentives to increase oil production in the U.S. The Natural Gas Bill, after six months of constant conferring, has finally been agreed to in principle. This breaks a twenty-five to thirty year deadlock in natural gas policy, and is something that we think is critically important to the nation.

Finally, we need to lay the groundwork for the development of alternative and so called unconventional fuels—solar, wind, biomass and the like. The National Energy Plan creates a framework for future energy development.

The NEP is far from a permanent answer or any ultimate solution to the things that we need to deal with energy problems. The NEP itself recognizes the need for further supply initiatives. The Department recently has submitted to Congress a series of supply initiatives: to increase the use of oil shale through the use of a limited tax credit of $3 a barrel; to provide oil shale the same entitlements treatment as is now provided imported oil; and to increase production of high BTU gas through favorable tariff treatment for the development of high BTU gas plants as well as the use of loan guarantees wherever necessary to assure that high BTU gas plants can be built. The Department also requested further funding for design of two synthetic liquid plants as well as increased funding for unconventional gas recovery. These initiatives complement the Department's broad-based research and development efforts.

As we move toward the 1980 budget, we have a number of mechanisms in place or underway that will give us a better feeling for how to develop the national supply strategy Senator Jackson discussed. We have underway a national energy supply strategy which will look at a wide range of energy needs like liquids, gases, and electricity, and other energy fuel types. It will also look at end-use requirements and results in a series of steps the nation needs to take. These steps will vary from short-term production efforts to getting rid of institutional constraints. Certainly a national transportation network is critical, and particularly a transportation network that will move

the Alaskan natural gas to northern tier and other inland markets where it is needed. The Department is also undertaking a domestic policy review of solar energy. We will be looking comprehensively at the contribution that solar energy can make to the nation's future and new initiatives that can promote greater use of solar energy.

As we move ahead we are gaining more knowledge on how to deal with comprehensive energy policy. Before DOE was created, our two constituent agencies tended to deal with entirely different time frames. FEA dealt with problems mainly up to the 1985 period. ERDA on the other hand, dealt with issues beyond 1985. What we are doing in DOE is melding the two constituent groups together so that we can use a wide range of tools to dea with energy policy over the short and longer term.

In looking at any particular technology, one needs to look at a wide range of mechanisms that can bring that technology into commercial use. These mechanisms might include price changes, such as the oil and gas user tax; they may include regulatory treatment, such as the treatment we are now providing oil shale; they may include loan guarantees such as we are now going to be providing for high BTU gasification; they may include tax credits such as we're now willing to provide for oil shale; or they may include traditional research, development and demonstration projects. The point is that we now have the wide range of tools to deal with energy problems.

In the future we'll be developing supply initiatives that deal with the most critical constraints. Our programs will no longer merely fund a large number of technologies, but rather will pinpoint those technologies that will be most critical and then carry them through in a concerted way. This means that given the total budgetary constraints, those projects that can be deferred will need to be deferred as we deal with our highest priorities.

Finally, as I think of this overall energy construct, the nation needs to give a much greater degree of attention to the energy problem. It is true, as Senator Jackson indicated, that it is sometimes difficult to get people to focus on a problem that they see being ten, fifteen, twenty years away. But the fact is that the decisions we make right now, will be the kind of world we live in in 1985; they cannot be deferred. A power plant right now can take up to thirteen years from planning through construction, so that we face a very critical period, and we must move quickly.

We have an opportunity to weather the energy transition. If we plan wisely, if we develop the technologies that we need, we can weather the transition with very little economic impact. Indeed, if we're wrong, if there is no energy problem, then the activities, the programs that we're pushing now will have been a small price to pay for the insurance. But if we're right about the nature of the energy problem, and the nation does *not* move ahead, the costs of failing to move ahead could be catastrophic to our economy and to our way of life.

QUESTIONS

Ray Norwood, Washington Natural Gas, Seattle: I applaud the Department's interest and dedication in advancing the state of the art in coal gasification.

The only question I have is, how is it going to occur if the product of those coal gasification projects has to be incrementally priced, because I guarantee there'll be no market for it if it has to be sold only to the industrial sector?

Alm: We've got a particular case right now, and that's the American Natural Gas Association petition before the Federal Energy Regulatory Commission. The Department will recommend that the price of the gas be rolled-in. In terms of incremental pricing, in general, the Natural Gas Bill requires only that high-cost gas be incrementally priced to industry and only up to the level of comparable fuel, presumably #2 fuel oil. So I don't see that the incremental pricing provisions of the natural gas legislation will be a hindrance, and in terms of the department's general policy, we favor rolled-in pricing for the BTU gasification plants.

Jane Elles, Energy and Man's Environment: You mentioned the problem of raising public awareness. What is the Department's policy and what suggestions do you have on raising the awareness of the public in making them cognizant of the problems we face?

Alm: I wish Sam Hughes [DOE's Assistant Secretary for Intergovernmental Relations] were here because this is Sam's full-time job. From my point of view, I think that the Department needs to do a much better job in involving the public in energy policy itself. I mentioned the national energy supply strategy. We plan to have advisory groups of the public as well as advisory groups of particular interest groups. In the development of the solar domestic policy review, the Department will be holding twelve regional hearings, and we will be getting broad public input. This is one mechanism to lay out the problem to the public and ask for their advice in terms of solutions, and we hope to do a lot more of this. Beyond that, I think we've just got to do a better job of articulating the problem at not only the federal level but at the state and local levels and by interested private groups.

Barbara Zepeda, Washington Democratic Council: I'd like to ask, what is the present Administration's logic in cutting back Amtrak service to save one billion dollars in six years total when we use up one billion dollars a week in imported oil?

Alm: It would be foolish of me to comment on what Amtrak has done. It's sometimes foolish to talk about what your own department does, but no less some other agency. I will say in general that rail transportation is a highly fuel efficient type of transportation compared to alternatives, and the Department is generally supportive of efforts to improve and expand rail service.

Boyd Russell, Lincoln Electric Cooperative, Davenport, WA: In your presentation I noticed you dwelt very little upon such things as the breeder reactor, the relatively new licensing process, and nuclear fusion. Would you care to elaborate upon those subjects?

Alm: I was leaving some of those for my colleagues, Dr. Thorne and Dr. Deutch. I will comment very generally about nuclear policy and let them get into the more detailed issues. In the development of our national strategy,

we recognized that the light water reactor would play a very important role in the overall electric energy picture. The NEP talked about that need and I think in fairly strong terms. I think everybody here knows the Administration's position on the breeder reactor. We feel that the program decision need not be made now; in terms of Clinch River, that was a project that would demonstrate very little at great cost.

The Administration, though, is putting a great deal of emphasis in the area of nuclear power. First of all, we have a Waste Management Task Force which is a major effort and which we finally hope can come to grips with the waste management problem. Senator Jackson mentioned that this problem was probably the biggest single problem in the whole nuclear area dealing with light water reactors. Secondly, as Senator Jackson mentioned, the Administration has submitted a licensing bill that is designed to reduce the total construction period from twelve years down to six or seven years. We are putting a great deal of effort in nuclear power. One *can* separate the future of the light water reactor from the breeder reactor and reprocessing at this time. In terms of the light water reactor, we're moving ahead very quickly. On the other two areas, we've obviously deferred decisions.

Roy Webster, Pacific Northwest Waterways Association: In view of the hearing that you chaired two weeks ago here in Seattle and in view of Senator Jackson's recent comment that perhaps we should look at Japan as a possible alternative for distribution of our Alaskan crude oil, could you bring us up to speed on what the Department is doing in terms of moving the glut of the oil off the West Coast to the refineries inland?

Alm: I wish I had more to report after two weeks. The Department has looked at a range of alternatives for dealing with the California crude surplus. These alternatives include more favorable entitlements treatment for California crude. We have looked at two alternatives that have been suggested by a number of groups within the State of California. One is export of residual fuel oil abroad. Secondly, there have been various proposals for export of crude oil, and third, we're also looking at possibilities for providing incentives for transportation of California crude to Gulf Coast refineries. We hope we can make an announcement on this issue either late this week or early next week, after we've had a series of congressional consultations.

Elizabeth Shug, Summit School Seattle: You were talking about conversion—converting from fossil fuels, or the form of energy we have now, to nuclear power or other such forms of energy in the future. Isn't it more economically sound and more feasible to convert to a system that will not run out in the future? I see nuclear energy as another finite system that will eventually run out, whereas, wouldn't it be more sound to put money into solar systems because when the sun goes, we all go?

Alm: First of all, I think, it's *very* sound to put money into solar systems. One part of our supply initiatives I did not mention was the fact that we added a hundred million dollars to the 1979 budget for the purpose of expanding work on solar energy. The second point I would make is that as one looks

at the period 1990 and beyond with the rather imperfect crystal balls that we have and others have, it's imperative that the country develop the widest range of technologies possible. If the economics of solar energy are equivalent to those of other sources, then you obviously have got on top of that, the general environmental advantages of solar. I think what this Department is trying to do is to develop the capability to exploit a wide range of technologies.

T. MacElroy, Environmental Resource Center, Olympia: Given the spiraling costs of nuclear power and Senator Jackson's statement about the need for an unprecedented capital investment, can you elaborate a bit on how you see this as being a time of transition with very little economic impact, given the goals of the DOE at this point?

Alm: There's no doubt that the investment costs for new energy resources will be very high. The marginal cost of energy is much much higher than the average cost in terms of electricity, oil and gas. What I was really referring to is that if the world hits a capacity limitation where the demand for energy is greater than the supply, then you don't simply run out of oil. What happens is that the market will react with higher prices. Those prices could easily double in a decade. If that happened, and I'm talking about doubling in *real* terms, not in inflated dollars, that could have a very significant impact on economies all over the world. It would tend to reduce the rate of growth, and this is particularly dangerous if the price increases hit rather rapidly. If the price increases, on the other hand, were to be phased-in gradually our economy and other economies could adjust to the change. But that was the main point I'm making. If we don't have domestic supplies, if we're not able to reduce our demand on the world oil market which is currently 25% of the total, the price increases we might face could be catastrophic worldwide.

Ron Bair

Our next speaker is Donald Beattie who is the Acting Assistant Secretary for Conservation and Solar Applications for the Department of Energy. Previously he served as Acting Assistant Administrator for Solar Geothermal and Advanced Energy Systems of the Energy Research and Development Administration and as Deputy Assistant Administrator in the same office. Mr. Beattie joined ERDA upon its establishment in Jaunary of 1975. He has been Director of the Advanced Energy Research and Technology Division at the National Science Foundation where he worked in solar and geothermal research and development programs. Mr. Beattie was with the National Aeronautics and Space Administration from 1963 to 1972. There he was responsible for systems design, development and implementation, and planning and analysis in connection with the Apollo and other NASA programs. Prior to his federal government service, Mr. Beattie served for six years as a geologist in South America. He's a native of New York. Mr. Beattie received his Bachelor of Science degree from Columbia University in 1951, and his Master of Science from the Colorado School of Mines in 1958. It is a pleasure now to present to you, Donald Beattie.

NEP: CONSERVATION AND SOLAR APPLICATIONS

Donald Beattie

Thank you, Mayor Bair, ladies and gentlemen.

Conservation and solar energy are now a part of our national awareness as a real means of alleviating our energy problems. In April of last year, as we heard this morning, the President elevated conservation to a top priority status. It became a cornerstone of the National Energy Plan. On Sun Day, May 3, just a few weeks ago, which was a Wednesday, the President announced the initiation of a domestic policy review of solar energy. Thi review will provide an important forum, I believe, for everyone to mak known their views on this energy source that has such tremendous potential, and we hope that those of you who have views will join us here on June 12 and share your opinions with us.

Activities in the Department of Energy Conservation and Solar Applications area are aimed at moderating the nation's energy demand by improving energy end-use efficiency and increasing utilization of conservation and solar technologies. Programs formerly with the Federal Energy Administration, Department of Commerce, and Energy Research and Development Administration have been integrated and targeted toward both technical and nontechnical solutions in achieving objectives in the major end-use sectors: transportation, industry, and buildings. For example, our program for residential and commercial buildings is formulated around increasing energy utilization efficiency, providing for options to substitute energy forms such as coal for natural gas, and providing for technologies which decrease the need for energy to satisfy human needs. Since 32% of all energy consumed in the United States is in the building sector, the major objective of our program is to significantly reduce those consumption figures without affecting the way we live.

Specifically, we believe we can accomplish the following objectives: We can increase the energy efficiency of existing buildings by 20% by 1985 and 30% by 2000. We can increase the energy efficiency of new buildings by 35% by 1985 and 60% by the year 2000. We can increase the efficiency of community systems through recapturing 1% of wasted energy by 1985 and perhaps 10% by the year 2000. We could conserve 50,000 barrels per day of oil equivalent by 1985 through recovery of energy from municipa wastes. And, finally, we can increase the energy efficiency of appliances by 50% by the year 2000.

The potential for energy conservation in the industrial sector is also high since it consumes an estimated 37% of our total energy needs. Unfortunately, during the past few decades of abundant and low-cost energy, energy wasteful industrial processes became commonplace. The energy efficiency of industrial processes is generally low, in some cases as low as 10 to 15% in direct heating processes. It is estimated that 30 to 50% of industrial consumption could be saved by universal application of existing, emerging and advanced energy conservation technologies. The anticipated energy savings from the industrial sector conservation program is estimated at three quads

annually by 1985 if we carry out these programs, and perhaps more than eight quads annually by the year 2000.

How do we plan to achieve these goals? First of all, we are administering a voluntary industrial energy conservation program. This program began in 1974 as a joint undertaking of the Department of Commerce and the Federal Energy Administration and some key energy intensive industries. It demonstrates what can be done on a voluntary basis by concerned people. I'm happy to report that through a continuing cooperative relationship with American industry, we are seeing very real results. The thrust of the program has been first and foremost to save energy and this it has done. Over he period from the base year 1972 to the end of 1976, the participating ndustries have recorded an average percentage improvement in industrial energy conservation exceeding 8%.

How will the National Energy Plan affect the voluntary industrial energy conservation program? We don't expect any change in the basic provisions of the legislation under which we've been operating, except for the number of companies reporting. This change would require all companies using at least one trillion BTU's annually to report, and instead of the 474 companies presently reporting, more than 900 would be required to report.

The energy conservation accomplishments by industry thus far are very impressive, but it is only a start and there is a tremendous distance to go, not only in terms of achieving energy conservation targets but also in terms of broadening the participation and conservation actions. The 1980 targets call for an improvement averaging 18.4% over the 1972 base year. The same industries that had just achieved the 8% that I mentioned must improve by almost double by the 1980 period. This is going to be particularly difficult, I think, since most of you realize that the first actions in energy conservation are the easiest ones and yet we have not quite reached the half-way mark.

In parallel with the voluntary program, the Department has begun a program to cost-share with the industrial sector a number of research development and demonstration efforts. The federal stimulus should increase the rate of expenditures on energy conservation by the private sector and will significantly accelerate the introduction of new high risk, high potential programs with energy savings far in excess of other alternatives. Federal participation will assure wide dissemination of results to all industries arge and small.

We are quite concerned, as you know, with energy inefficiency in the transportation field. More petroleum derived fuels are used in the transportation sector than in any other energy consuming sector in the United States. Petroleum consumption in this sector has continued its virtually unconstrained increase since the oil embargo. Data for 1977 indicate that total transportation sector energy consumption has increased by about 13% since 1971 and now amounts to 26% of all energy consumed in the United States. The Department of Energy Transportation Energy Conservation programs seek technical, operational, institutional, and behavioral changes to achieve significant petroleum savings.

Specific major objectives include development of new automotive engines, for example gas turbines and the Sterling engine. By the mid 1980's we hope to have new automotive engines ready for industry commercialization. These engines will have a multi-fuel capability. They will be 30% more fuel efficient than current conventional engines and should meet the most stringent proposed emission standards. At the same time, we are working to develop alternative fuels and non-petroleum base fuels for use in both conventional and alternative automotive engines. We are looking at new blends of conventional gasoline with such products as methanol, and synthetic fuels from coal and shale. We also have under way an electric and hybrid vehicle research development and demonstration program to create an alternative to conventionally-powered vehicles that use gasoline and other petroleum based fuels. Research and development will lead to more dependable and acceptable electric passenger vehicles and light-weight utility vehicles. Our effort is intended to stimulate public interest, encourage and assist manufacturers, particularly small businesses, and help the public become familiar with these new vehicles.

You've probably heard a lot recently about appropriate technology. Let me explain briefly what we at the Department mean by appropriate technology. Appropriate energy technology makes the best use of renewable energy sources, local materials, and labor skills to conserve energy and non-renewable fuels. Appropriate energy technologies should be simple and efficient in their use of energy and other resources, easy to install, operate, and maintain, and compatible with community regulations. The application of appropriate energy technology emphasizes decentralized technologies and, in many cases, contemplates employing scaled-down industrial type technology. In relationship to the end-user, or the ultimate consumer, appropriate energy technology satisfies local needs, increases community energy understanding and self-reliance, and is environmentally sound and should result in durable but recyclable systems or products.

Our first pilot program for appropriate technology was carried out recently in Region IX. Over 1,100 proposals were received in response to our announcement that grants would be available for furthering appropriate energy technology ideas, and 108 grants are in the process of being awarded. A few of the typical awards are $9,800 for a semipassive dry air solar heating system for a library, $20,000 for a solar-powered mini-utility system to provide space heat and hot water to 10–14 existing residential buildings in a city block, and $9,000 to produce methane from animal wastes that is piped to boilers and hot water heating on the farm, replacing imported oil. Next year we plan to expand the program nationwide, starting with New England and the Midwest regions.

Finally, let me turn to our solar programs. Responsibility for these programs is vested with two Assistant Secretaries. Bob Thorne, who you will hear from later today, has the responsibility for the major R & D programs. Solar Applications is charged with commercializing these technologies and, thus, we attempt to stimulate and work with industry, state and local governments, and the consumer to develop and introduce economically competitive, environmentally acceptable, and operationally safe solar energy systems.

Our plan is to meet a significant portion of national energy requirements at the earliest possible date by the widespread use of solar energy. One particular objective of the National Energy Plan is to have two and one-half million solar installations on homes by 1985.

Solar heating, both passive and active systems, is the technology closest to being economically competitive today, and to spur its acceptance, the Department of Energy and HUD have joint responsibility to conduct residential demonstrations in the private sector, and the Department of Energy with the Department of Defense have responsibilities to conduct residential demonstrations in the federal sector. HEW is demonstrating solar heating and cooling systems in private hospitals and other health care facilities as a part of our commercial building demonstrations. And NASA and the National Bureau of Standards also play major supportive roles in this program. Dissemination of the results from the demonstration program, of course, is key to its success and widespread distribution is under way. For example, the National Solar Heating and Cooling Information Center now runs eight nationwide, toll-free telephone lines, and in the sixteen months that it has been in existence, has received and processed almost 200,000 inquiries.

By the end of fiscal year '78, there will be approximately 170 commercial solar projects and 150 residential projects representing some 5,000 buildings and housing units. In terms of solar installations around the country, our informal surveys and compilation of data from all available sources indicate approximately 40,000 instalations have been made or are under way. The size and type of all the buildings are not precisely known, but it is clear the level of activity in the private sector is significant.

What is the status of the technology? It is safe to say that solar water heating is competitive today against electricity in most areas of the country. The Pacific Northwest, I guess, is the major area where we can't show that it's competitive. The technical feasibility of space heating has been established and in certain areas of the country is economically competitive. Passive systems should be competitive in almost all parts of the country when incorporated in new construction. A solar commercialization plan is currently under development. It will define further government action, the responsibilities of the private sector, a timeframe, and the capital requirements needed to achieve market competitiveness for all solar technologies.

In regard to the health of the solar energy industry, it should be recognized that although it was practically nonexistent in 1974, it has grown to $200 million per year in three short years. State governments have been responsive and helpful. Some thirty-one states have passed tax incentive laws and additional states have tax legislation under review. This, coupled with the federal tax incentives proposed by the National Energy Plan, should provide a strong foundation for continued growth in the industry. We in the Department of Energy will continue to assess the status of the technology and hardware and the growth of the industry. We will work to overcome barriers to commercialization and continue to provide support where the need exists within the framework of our authorized programs.

In the months to come we look forward to being involved in additional activities spelled out in the pending legislation that supports the National Energy Plan. We will assist the Internal Revenue Service with tax credits for various conservation and solar measures and equipment. A residential retrofit program run by the states and utilities will make conservation information available to homeowners along with financial assistance for the installation of insulation, storm doors and windows, and other energy-conserving devices. The proposed Schools and Hospitals Grant Program, along with a similar program for local government buildings, should materially assist in making these facilities more energy-conserving. We can anticipate changes in the appliance efficiency program requiring the development of minimum energy efficiency standards for a wide list of appliances. In addition to these programs, there will be several programs aimed at increasing the use of solar energy systems in the private and public sectors of our economy, and we expect to have a major role in implementing these programs.

I believe, and I'm sure you agree, that we must pursue a variety of energy alternatives that will eventually reduce the use of non-renewable sources. Whatever the alternatives, they must be economically sound, they must be environmentally realistic, and they must be socially acceptable. The programs I've discussed very briefly today are designed to achieve those results, and with your participation and constructive critique, I'm sure we will succeed.

QUESTIONS

Rich Seifert, Consumer Affairs Advisory Committee, DOE, Region X: I still don't understand why of all the Assistant Secretaries, the one for Conservation and Solar Applications is the only one that is still Acting. I regard that as a subtle if not direct slur on the postion of solar energy and conservation interests in the Department of Energy. Could you enlarge on that and give us more clarity on why it is the case?

Don Beattie: The movement of many of the nominees has been very slow through the Congress. We have just had three Assistant Secretaries confirmed in the last few weeks. The Assistant Secretary for the National Defense Programs is still not confirmed and the Assistant Secretary for Conservation and Solar Applications, as you point out, is not confirmed. The nomination of Omi Walden for this position has been before the Congress since the end of January, and questions relating to that nomination are being looked into by the Administration. I am personally hopeful that that will move quickly. It is not an easy job to sit for eight months in an Acting position, but there have been many circumstances that have contributed to the delay in that nomination.

Seifert: My second question is about the Appropriate Technology Program. I would like to congratulate the DOE on that process. It seems to have been very successful in Region IX, but you mentioned that it is only going to occur in two other regions next year. I was under the impression that it was going to be brought to the entire nation—to every region—next fiscal year?

Beattie: What I said was that we will go nationwide next year. We will start in the Northeast and the Northwest and then move to the rest of the regions. One of the programs that received additional funds, or which we hope will receive additional funds based on the announcement that the President made on Sunday is the Appropriate Technology Programs, which would receive an additional $5 million and help the nationwide program. But we do plan to go nationwide in fiscal '79.

Gordon Gray, University of Washington: One of your principal programs for stimulating the commercialization of solar energy in the regions around the country, particularly in our region here, has been the development of a regional plan, and the ultimate goal of establishing what we call in our region the Western Solar Utilization Network. This was on track and proceeding well until approximately the middle of this past month when it somehow got off track. Could you give us a status report on the regional program here in the Northwest?

Beattie: What Mr. Gray is referring to is four regional solar centers that are being established around the country. We presently have designated the Northeast, Mid-America, Southeast, and the West as being the regions that will have such centers. The Center is hopefully still on track. There was a recent decision in the Department as to where the responsibility would be for administration and management of those programs. The four regional centers were given to the Assistant Secretary for Conservation and Solar Applications. We had the management of all four of those centers in Washington just a week ago. I think your question deals with how the Board of Directors will be set up to manage the Center, and we are discussing that now with all parties concerned; I expect it to be resolved within the next few days. So that particular part of the program should not be held up in any way, as far as I can see.

Unidentified questioner: Could you state what transportation projects or programs there are?

Beattie: I mentioned the two major R & D Programs which are in heat engines, Sterling engines and turbine engines, and electric and hybrid vehicles. We have a number of other activities under way. Some that I think are most interesting are ones that require the fewest amount of dollars, and those are programs to raise public awareness of how to use transportation systems. We are kicking off in Denver this Sunday, a National Fuel Energy Challenge for automobile owners to provide them with information on how to drive and service their cars to get the maximum energy efficiency that is possible right now. To give you an example of how important that is, if we can get just one additional mile per gallon out of each of the cars that we are using today, that savings is equivalent to the total amount of fuel presently used by aircraft. This points up that very small savings in the automobile transportation area are very significant. We have programs around the country now to try and make drivers more aware of what they can do with their private vehicles. I also mentioned the activities we have under way looking at different fuel sources. We have recently com-

pleted a review of alcohol fuels within the Department and we plan to promote alcohol fuels in the years ahead. As perhaps Mr. Bardin will discuss later today, there are activities underway that will allow regions to reduce the taxes on fuel blends using alcohols to make them more competitive with present fuel prices.

Fred Schmidt, University of Washington: There's one form of solar energy which seemingly has received little attention by DOE, namely an indirect form of solar energy—heating by means of heat pumps. This is a very economical method and I wish you would comment on why DOE apparently has not addressed this much more vigorously.

Beattie: We do have programs under way in solar-assisted heat pumps tha are part of our solar R & D program. Are you talking about heat pumps in general?

Schmidt: All heat pumps are solar-assisted because the air has been treated by the sun.

Beattie: Right, I stand corrected. We do have other programs under way on conventionally-powered pumps and those come under our program in Buildings and Community Systems. If you'd like information on that, you should call or write to Dr. Maxine Savitz and she'll explain what we have under way.

Luncheon

Wednesday, May 31, 1978, 12:00 noon—1:30 p.m.
Presiding: Robert Cross, *Administrator, Alaska Power Administration*
Speaker: Robert LeResche, *Commissioner of Natural Resources, Alaska*

Robert Cross

I have the pleasure of introducing the Alaska portion of the program at this Northwest Regional Energy Conference. My name is Bob Cross. I'm Administrator of the Alaska Power Administration up in Juneau, Alaska. That's one of the finest places in the world to live, by the way. My office, APA, is a northern extension of the Energy Department. We operate the two federal hydroelectric projects up in the state, and do some work in planning towards future water and power development along with a lot of other people who are interested in that aspect of the State of Alaska.

Those of you who have seen biographies of the speakers will note that Bob LeResche filed his disclosure sheet. You must read very carefully to determine that he's an old muskox herder. Bob, I do note that your current job is Commissioner of Natural Resources, and you're probably administering more different kinds of natural resources than any of your compatriot commissioners in the other states. It must be a tremendous, exciting job. Probably fewer headaches if some of those resources were off in another state. Bob, I've known you and your work as Director of Governor Hammond's Division of Policy Development Planning, and I know some of your work earlier with the Alaska Department of Fish & Game. I think your training as a biologist is one of the best viewpoints to approach some of the energy problems that we're facing. It's a tremendous pleasure for me to introduce you as an excellent Alaska spokesman to speak to this conference on Alaska energy issues. I give you Dr. Bob LeResche.

ALASKA ENERGY ISSUES

Robert LeResche

Thank you, Bob. I can freely admit that several of my colleagues in industry are not as convinced as you are that biology is the proper background, but several of my federal colleagues at this table, I think, also suffer from similar problems of unusual training. Believe it or not, Governor Hammond is not here today because he spent too much time in the last couple of weeks installing a small hydroplant at his homestead in Lake Clark. I think it's significant that I'm standing up here sandwiched between

an excessive number of "Feds", both physically and on the program. In response to that I'm not going to pass up the opportunity to speak from a clearly state-oriented point of view.

I'm not going to talk specifically about Alaska energy issues *per se*, but rather about incentives and disincentives. Or, if you will, the care and nurturing of a producing state. What are the responsibilities, I'm going to ask, of an individual state to the nation, and the responsibilities of the United States to its members insofar as energy production is concerned? And what are the benefits we states can expect from the nation, and the benefits the United States can fairly expect from us in terms of energy production? The answers to these questions we all know will virtually singlehandedly determine at least Alaska's future as a state and as a place to live and will have, like it or not, a very significant effect on our country's success or failure during the next several decades.

Ironically enough, this crucial relationship is as yet virtually undefined. That's one of the reasons we're all here today. It is as though we are only just now making our acquaintance with the federal government and as though the federal government is only just now realizing that they have in the states fully functioning political entities with which to deal in the world of energy. Many relationships are unclear today, and the way in which they gel will determine what is to follow for all of us.

Before I proceed, I would just like to point out one anomaly created by Alaska's representing the "states' " interest here today. Alaska does, of course, share much with all our sister states in terms of our relationship to the federal government. We all suffer similar, if not identical, frustrations, and we all lose or gain from federal decisions in much the same way. Nevertheless, it would be unfair not to point out that, in terms of energy matters, Alaska is indeed a unique state.

We are a unique state in several ways. As you know, we have virtually the entire suite of energy resources: those sought most presently, oil and gas; those to be critical in the short to medium term, coal; and those with long-term potential such as uranium, geothermal, tidal, and the rest. Next, we are clearly the state least capable of dealing, at the present time, with excessively rapid development in some areas. With very significant exceptions, we have virtually no infrastructure and we have small local populations and cultures that have never in the past had to confront that which they will have to confront in the next twenty or thirty years. Third, we are right now the most heavily producer-oriented state that has ever existed in this nation. We are 440,000 people with 30 billion barrels of oil, 48 trillion cubic feet of natural gas, and 130 billion tons of coal. We are also energy consumers, of course, but the broad public interest in Alaska will be for a long time that of an energy producer. And with the federal government being the single most important arbiter of energy demand as least in character if not quantity, that puts us in a peculiar relationship.

Nevertheless, it would be a big mistake to consider us as the classic producing state such as our sisters, Texas or Louisiana. Our relationship to the energy industry is still very immature—take that how you will. And most Alaskans have so far refused to give up what they consider our Alaska

character in order to be indistinguishably allied with energy producing industries. We are a seller of resources to these industries, a regulator of these industries, and a sufferer or beneficiary as the case may be, of impact from these industries. We have welcomed them as new and essential partners, but we have very carefully agreed to keep our special interests separate.

With these things in mind, I'd like to briefly discuss the necessity to reconcile national and state perspectives in energy production and consumption, and to suggest factors that must be present on both state and federal sides if this reconciliation is to occur. First of all, let there be no question whatsoever that these perspectives must be reconciled. Our future as a nation and as individual states clearly depends upon this. Secondly, it is clear that the ultimate power in most of these issues *does* rest with the federal government. I'd get strung up at home for admitting that, but any intelligent state has to recognize it as a pragmatic, long-term fact. Just as important, however, is the fact that any intelligent federal government must clearly recognize that success or failure of a federal program within our system hinges in large measure on the goodwill of the state or region involved and that this goodwill clearly can be stretched to the breaking point by insensitive or irrational federal actions, attitudes, or procedures.

Thus, both governments have a choice to make. Do we want brinkmanship with its attendant uncertainties, long-term dislocations, and unpleasantness; or do we want structured, caring cooperation which can make everyone's life easier and every program more successful?

Now the answer to this question should be clear, but I'm not sure that actions to date very clearly illustrate that it is. From my point of view, the state's good faith in long-term dealings with the federal government on energy matters rests on several things. First, we must see ourselves as an integral part of a coherent, national energy strategy. It is technically difficult and emotionally impossible to fully cooperate with a program that seems ad hoc and politically expedient more than it seems reasonable, rational, and long term. Certainly the President's Energy Plan and recent Congressional action have been a major step forward in this regard. Nevertheless the sense of direction and comprehensive handling of the national problem must be translated into programmatic levels of the Departments of Energy, Interior, and Commerce if the states are to truly feel a part of something that makes sense. We must be brought to a greater level of confidence that regional production, transportation, and supply questions are being treated comprehensively, that conservation and production are being correctly balanced, and that, in short, if all the myriad of federal programs proposed were suddenly in place, we would in fact have a smoothly functioning national energy program. As some of my examples may illustrate, no state in its right mind has this type of confidence today. And to be an enthusiastic member of a team, one has to believe that the team is something a little better than the "Bad News Bears".

Secondly, any enthusiasm the state generates for a national program certainly rests on calculation of whether or not this program costs or benefits the state. This should go without saying, but it has not always. Somehow,

our state at least, is seen as selfish when we even make such calculations, and, in fact, some of the calculations have computed negatively against all conventional wisdom. The point is that the federal government's bottom line should always be that a region or state should come out at least even, and preferably positively, over the entire calculation of costs and benefits, including both monetary and nonmonetary considerations as defined by the affected state. In many instances a slight adjustment of federal policy such as, for example, a rescheduled lease sale or a lifted restriction which can occur with virtually no cost to the United States as a whole, can turn the balance in the state's cost/benefit calculation to the benefit side.

Third, the state must perceive that it has sufficient access to resource produced within its borders to generate the amount and kind of industrial growth that it desires. This would seem a basic right, but due to many quirks of federal regulation and past action, people of Alaska at least are very paranoid about shipping energy outside that we would prefer to use within our own state.

Fourth, and more specifically, the state's good faith clearly and logically rests upon the feeling that it is receiving a fair price for its onetime assets—its energy resources. This does not mean the OPEC price—let me be clear—but it certainly does not mean the $2 to $3 per barrel netback that is presently threatened for Prudhoe Bay crude oil. Anything less than a fair price for a one-time-only commodity is nothing short of a subsidy by one state to others.

Finally, to operate in good faith, a state must genuinely feel that it is both informed about and involved in, key operational decisions made by both Congress and federal bureaucracies. We must not only believe we are part of a coherent plan that is working, but must feel that we are listened to when decisions about specifics and adjustments are made. We must be kept informed of decision points and actually invited into the decisions. As my examples will show, there has been a rather checkered history of state-federal relationships in this regard.

On the other side of the coin, states themselves have certain obligations to the national interest. The most basic of these is, to in fact, deal in good faith if all these conditions are met and to do so consistently. If the federal government can sometimes be seen as wishy-washy, states on occasion have been little short of schizoid. To make it all work, states must behave in a more adult manner than some have in the past.

First, states must bite the bullet and lay out clearly and coherently what their conditions for cooperation are over the long term rather than seeing each federal concession, if indeed any occur, as an invitation to ask for more. Second, states must be competent in the energy field on a technical and not just on a political level. Our nation's energy problem is one that must be solved on a rational level, and to achieve just consideration, states must be capable of dealing on that level. Third, states must no more demand that the United States be Santa Claus than they let it get away with being Scrooge. Excessive demands for money or perquisites obscure the critical fact that certain realistic aid or consideration is, in fact, essential. And, finally, states must try on their parts to be consistent and directed in their

policies and demands. This involves not only attempting to create that conflict in terms that will hold up in the state legislature, but also requires that individual states work together where possible to bring mutual requests to the federal government.

Has the federal government created all these necessary conditions and thereby achieved wholehearted cooperation of the states regarding national energy perspectives? I'll look at four examples, briefly, of Alaskan issues and perhaps shed some light on how effectively the necessary cooperation of states is being nurtured today. The first of these examples, which some gentlemen at this table will love to hear me mention, is a recently well-known but essentially arcane example—the so-called West Coast Crude Oil Surplus. How does the federal government handling of this problem either encourage or discourage state cooperation in overall federal energy policy? As you might guess, this is perhaps the worst example I could choose. Unfortunately, it is also an extremely important case from many points of view.

First, the handling by the "Feds" to date of this very important national distribution problem has done little to convince either Alaska or our sister producer state, California, that we are indeed being asked to participate in a coherent workable national energy policy. Here we stand together watching a gasoline shortage develop on the West Coast hand in hand with a residual surplus, while the East Coast suffers residual shortage; watching Elk Hills, the federal oil property, expand production while California production is being shut in and Alaska production is being severely devalued; watching the netback wellhead price for Alaska's crude drop monthly to a low reported in March of $2.80 a barrel, reported by Exxon for their Gulf Coast sales; watching imports to the West Coast market continue essentially unabated due to refinery configurations and long-standing commercial relationships; and wondering why the federal government which has known of this potential for more than a year has yet to even give us the methods by which to solve the problem ourselves, much less solve it themselves. Since California and Alaska first attempted to take the bull by the horn several months ago, we've received some very positive action, most notably and most recently from Senator Jackson's committee.

Nevertheless, it is very difficult to discern any real sincere urge by the federal executive branch to solve this problem in a timely fashion. We have the necessary figures and we have the outlines of solutions in mind. Mr. Elm this morning ticked off the solutions. These solutions being both short-term—exchanges with Japan, further juggling of entitlements, import fees, quotas, shut-in of Elk Hills, etc.—and long-term—east-west pipelines, retrofitting incentives, and perhaps other entitlement treatments. We've called upon the federal government in every way we can to join with us to coherently address this problem in a timely manner, and I hope we can find a handle soon, but I *do* wonder what is the future for our highly touted national energy policy, if it could not even solve this simple and predicted distribution problem.

In addition, this West Coast situation has taught us to suspect any calculations we may have done in the past regarding the positive or negative overall

impacts on our state of certain projects. Here we are, having endured the negative impacts of construction of the Trans-Alaska Pipeline and sitting back ready to reap what we consider our just rewards, suddenly confronted with a wellhead price far below what anyone ever suggested in the past. Again, it is hard to be overly enthusiastic about future contributions to the nation's energy shortage when confronted with this expectation-reality gap.

Finally, while poor in terms of a coherent plan and fair value received, this example unfortunately is not even a very good one in terms of cooperation and involvement in decision-making. True, we have been asked to testify at various hearings and present our views along with private sector producers and other states, but neither California nor Alaska has been asked to really sit down with the executive branch and take a directed look at working out the problem. We are encouraged by the Senate's recent solicitation of facts, that such a mutual taskforce is nearly at hand, but meanwhile, as Mr. Alm demonstrated this morning, the DOE is playing its cards very close to its pinstriped vest.

Overall, it might be helpful for everyone here to look at the surplus from the point of view of Alaska state officials who must make production and leasing decisions over the next several months and years. As you may be aware, Governor Hammond recently announced a Five-Year Oil and Gas Leasing Plan which might be described as a high-to-moderate production plan. This includes the sale of very promising acreage east of Prudhoe Bay this autumn, a very large joint sale with the federal government in the area offshore of Prudhoe next year, and regular sales throughout the five-year period. This schedule was derived as part of a very honest attempt to sustain our oil and gas industry, to keep the pipeline up to capacity, and to do our part for the nation's energy balance.

Let's just say that at this point it's becoming more and more difficult for us to make the argument that we should lease any more acreage that might add to production and pipeline throughput and exacerbate the West Coast surplus problem with no assurances that the federal government is capable of dealing with the problem or even giving us the tools with which to deal with it ourselves. Further, the very good selfish argument can be made that we simply sit on our resources until the seller's market develops once again. In addition, Alaska at present exercises no market demand pro-rationing system, as certain states do. This year especially, in our state legislature, there have been several proposals to develop such a system and, in fact, to codify the economic waste method of regulating in-state oil and gas production. Once again, the longer we are tossed scraps such as $2.80 and $3.07 a barrel for Alaska crude, due to a locational anomaly in the U.S. market and outdated regulations, the more tempting it is to enter into such solutions on our own behalf.

The second example I'd like to toss out today is, so far, a simpler one but a fascinating one, nonetheless. This is the example of the Alaska Natural Gas Transmission Line, and it is a much more optimistic case than the one previously mentioned. The State seems to have been treated much more favorably in many respects in this case than we have in the West Coast surplus example. We were certainly thoroughly involved in the decision-

making regarding routing of the gas line although we were not determinative in the end. It appears at this date as though we may have achieved a fair price and a positive cost-benefit picture regarding the effective production in transportation on our state, depending on some decisions still to be made, of course. There were certainly some very nervous moments regarding pricing, such as the rather bizarre attempt to treat Alaska severance tax incrementally, in contradistinction to all other state severance taxes. But these appear to date to have been resolved fairly and equitably.

The interesting thing about the gas pipeline decision, however, is not really a headline decision but rather the assumption that accompanied certain other decisions. The Northwest Pipeline Route was chosen by the federal government, I think, in large part in response to representations made by the various pipeline companies involved. Namely, that Northwest was the only one that maintained it could finance the project totally on a private basis. The federal government made it very clear that, despite the natural gas shortage, and despite the fact that Prudhoe will likely produce 27 or so trillion cubic feet, they wanted no part of either consumer or federal government guarantees of financing of the line. Again, we are faced with an internal confict in federal policy. The nation desperately needed the gas but Congress refused to pay for it, even indirectly.

With the final setting of a gas price, the Northwest project will have cleared its first major hurdle, but many remain. One of these is State of Alaska participation in funding through issuance of a billion dollars in industrial revenue bonds which we will propose be made federally tax exempt. Here is a perfect opportunity for the federal government to demonstrate that they do, indeed, want Prudhoe gas to be produced for lower forty-eight consumption and we are hoping this will occur. Certainly with nothing more than an authorization act and hands-off attitude, the federal government is merely paying lip service to the nation's need for Alaska gas; and, once again, potentially making it difficult for a state government to take a responsible national perspective by giving it too little to show for such actions.

The third example I'll mention only briefly, but it is a very important illustration of the excesses to which a narrowly construed national policy can go from the state's point of view. This is the late, great, accelerated federal OCS leasing schedule which has recently been very benefically ameliorated by the Administration. This was an example of an admittedly overall coherent and workable policy from a national point of view, but one which through its insensitivity provided a clearly negative overall impact on the State of Alaska and excluded us almost totally from decision-making. This policy resulted not only in our litigation, but also in our lack of cooperation on leasing state lands during the period in question. I think any dispassionate analysis of the events of 1975 and 1976 will show that the overly aggressive, one-sided approach actually hindered more than it helped, the national goal of increased domestic energy production. And I think a look at events of the past year or so, and this is more important, will show that a more benign approach resulting in things such as the joint Alaska-United States-Beaufort Sea sale is much more beneficial in the long run.

My last brief example illustrates again the need for early joint planning on energy matters for the benefit of the nation as a whole and is an example taken hopefully from the future. Alaska has, conservatively, 130 billion tons of coal. With markets as they are today, our coal is certainly not producible, with the exception of small amounts for instate consumption. Nevertheless, the new federal energy program, as you all know, is designed to increase coal demand tremendously in the nation as a whole. Clearly, then, this new change in federal policy could have a major effect on our local and regional planning as well as on Alaska's statewide proprietary planning regarding our vast coal resources fit into the national plan for coal consumption. Now policy stops. It has been impossible for us to get any indication of where our vast coal resources fit into the national plan for coal consumption. Now we certainly have no preconceptions about this, but do feel it would be most beneficial if we could reach some sort of general, mutual understanding regarding what national expectations for Alaska coal might be over the next thirty to fifty years. Again, a little bit of talk in the next five years will be worth a lot of shouting twenty years down the line. The good faith commitment by the nation's producing state hinges on the perception of a genuine desire on the part of the federal government to talk these things through now rather than arbitrarily regulating them later.

Now, in conclusion, I could always say that even though the signs are right, and I mean that—they *are* right from our point of view—the proof of the pudding is not yet in. I feel that all responsible state governments are extremely glad that the federal government is moving toward a comprehensive and responsible federal energy plan, including a balance of production, conservation, and research elements. I think that all responsible states are very glad that such things as the Coastal Energy Impact Fund, the Inland Energy Impact Legislation, the OCS Lands Act Revisions and similar changes are now in the works. I think that most reasonable states are pleased the Federal Energy Department is now in existence.

Nevertheless, I'm afraid that responsible states remain ambivalent, at best, toward the federal government and toward these new programs as they will actually function; and I'm afraid that a lot of human energy will have to be devoted conscientiously over the next several years to establish the confidence and standing relationship that is a must if we are to proceed together into the next decades. States want to help if there is a little something in it for them, both in terms of minimized disruptive impact on cherished lifestyles, enhanced availability of energy resources for in-state use, and fair prices for resources owned by the people of the states. And states want to help if they can know for sure that they will be treated as partners, not pawns, in decisions regarding the rate, intensity, and return from energy development in our nation. And states want to help if they can be sure that national and regional problems such as the West Coast crude oil surplus will be solved competently and in a timely way, and not be left to fester in outdated red tape. States do want to help, but we do ask these things in return. Thank you.

QUESTIONS

Unidentified questioner: You made obvious the fact that the gas line could be financed privately, but then said that the state came up with a plan to issue a billion dollars worth of bonds to back the building of the ALCAN gas line. Why was that decision made?

LeResche: You do have a misperception about the state revenue bonds. That is private financing; it would be done under the rubric of state tax exempt bonds, purely private money guaranteed only by revenue from the pipeline. That's considered a private funding source as opposed to federal government guarantees or consumer guarantees.

Unidentified questioner: Why wasn't that done with the oil pipelines?

LeResche: There are several people here who could answer it better than I, but essentially the natural gas industry and the oil industry are two different beasts entirely. The natural gas industry nationwide is capitalized at $300–600 million. They frankly don't have the resources by which to guarantee the $10 billion loan.

Unidentified questioner: Do you have a ballpark figure on what you think a fair wellhead price for crude oil might be?

LeResche: Two dollars and eighty cents, as I mentioned, is the lowest price we've had reported to date. We're averaging now something like $4.80. The whole thing, as you all know, depends on the marketplace that the oil finds, as well as pipeline tariffs, tanker tariffs, etc. But certainly at this time the state should have something above $6.80/$7 a barrel, not down around $5 as we are collecting. More than half our crude is being sold in the Gulf Coast rather than in the West Coast now.

Robert Cross: Bob, you are a very effective spokesman for the State of Alaska; thank you very much.

National Perspectives on Energy Issues—II

Wednesday, May 31, 1978, 1:30 p.m.—3:00 p.m.

Presiding: Don Frisbee, *President, Pacific Power and Light*
David Bardin, *Administrator, Economic Regulatory Administration, DOE*
Robert Thorne, *Assistant Secretary for Energy Technology, DOE*

Don Frisbee

This is the first afternoon session of the Northwest Energy Conference, and during what some of you may think of as the siesta hour, the speakers and myself are dedicated to keeping you awake and lively. That is a challenge I am sure. You can help too by developing and asking provocative questions during the question period following each presentation. I'm here strictly as your moderator and to seperate any twosome that wants to fight, although that would be fun, too. Normally, I'm Don C. Frisbee, representing Pacific Power and Light Company which is a multi-operation, utility operation, here in the Pacific Northwest. Our interests are so broad that despite our Portland-based roots, we can come up here and root enthusiastically for the Seattle Sonics. We sincerely hope you Seattleites and we Portlanders are proud of the end result and I think we will be.

An editorial comment: I have found ample reason in the course of this morning and the noon hour to feel encouraged about the outlook for this country. It seemed to me that forthright, positive and statesman-like presentation of Senator Jackson, the very constructive and progressive programs we have heard about from Department of Energy personnel in the energy field, should give us all a better feeling than perhaps we came to this meeting with, about the future of economic activity and energy supplies in this nation. It may be that it is no longer appropriate to remind you of the story of the fellow who was asked which problem he thought was the greater—ignorance or apathy. He responded by saying. "I don't know and I don't care."

Our first speaker, David J. Bardin, is Administrator for the Economic Regulatory Administration, and his responsibilities would frighten any ordinary man. He is responsible for programs to convert industries from the use of oil and gas *to* coal. He is responsible for improvements in electric utility efficiency (I am not sure we need them, but we are delighted to have him). He is responsible for the importation of oil and natural gas, for the enforcement of petroleum pricing and allocation regulations for planning, relative to energy emergencies.

Mr. Bardin is a lawyer, graduating from Columbia in 1956. He spent eleven years with the Federal Power Commission, serving in his last two

years as Deputy General Counsel through 1969. He then assisted the Attorney General of Israel on legal matters relating to public utilities and administrative and environmental law. From 1974 to 1977, he was active in governmental affairs for the State of New Jersey, including environmental and energy concerns.

He is the first and so far the only Administrator of the Economic Regulatory Administration, having been appointed to that position at the time DOE was established in October of last year. I don't know that the initials of the ERA have anything to do with it at all, but he and Mrs. Bardin are parents of four daughters, and the keepers of two cats. We will ask Mr. Bardin to explain the significance of the latter in his biography. His subject is "The National Energy Plan, Utility Rate Reform, National Provisions, and Relationships to the Pacific Northwest." You may note from your program that that is the longest title any speaker has. Perhaps it is symptomatic of why the electric utilities are among the least understood and the most maligned industries among our United States complex. Mr. Bardin, I urge you to help the utilities out in the next forty minutes. You are on, Sir.

UTILITY RATE REFORM—NATIONAL PROVISIONS AND RELATIONSHIPS TO THE PACIFIC NORTHWEST

David Bardin

It is terrific to be back in Seattle to talk about two cats. Don, you are right on everything you said, particularly about the problems of the electric utilities; but our family has three boys and one girl, and two of them are Bullets fans, but one of them is a Super Sonics fan. So we can't be all bad.

We even have good news about the utilities. You know, last year one of the pieces of good news on the large nuclear power units in this country is that they worked better, that is to say, their availability was on the line more, they brought up the capacity factor in the utility industry in this country by more than a couple of percentage points. The result was to overcome the normal inflation so that the actual cost of nuclear power in this country did not go up in 1977 as compared with 1976, despite the inflation. That is an example of *how* we can work better, how we can solve problems.

Today we are gathered to discuss energy choices that face the leaders of our country and of this region. They are leaders in legislative, executive branches, in business, in the academic community, who are basically working for America, basically working for us. It is our federal government, our state government, our economy, our communities. I feel deeply honored to share in your deliberations in this very exciting first regional energy conference, which I hope will be of many more throughout the country and repeated conferences here in the Pacific Northwest.

In many ways this region seems unique. I could refer to such marvels as the Columbia River, not to mention the recently tapped oil treasures of our Arabia to the North, about which we heard at lunchtime. Would that we could tap more such marvels, and unearth more such treasures. In many

ways this unique region is also a trail blazer (and I don't have in mind a reference to that other, sub-sonic, basketball team), for this region now faces transitions of the kind which may increasingly confront all parts of our country. This region's economy is highly electrified, consuming almost twice as much electricity per capita as the national average. That record of electrification builds upon nature's renewable hydro-power bounty and it reflects man's past readiness to build great works. As a legacy of the past, daring to build—some would call it recklessness but I'd call it daring—this region now enjoys the lowest electricity prices in the country. Energy users here consume almost a quarter of their energy as electricity, whereas nationally that would be about 10% of the end-use consumption; and whereas hydropower generates only 14% of the electricity nationally, here the electric utility systems have generated over 90% of their electricity by means of that renewable source of energy in recent years.

But changes are afoot. After years of abundant cheap hydro-electricity, this region increasingly relies on far costlier supplements of thermal power. The National Energy Plan, including the utility rate provisions I shall discuss today, seeks to prepare our country for an analogous global transition—from oil and gas, once cheap, now costlier and costlier, once in seemingly endless supply, but now expected to dwindle—to more abundant energy sources such as coal and nuclear and to renewable energy sources such as conservation and solar. Planners in this region have been grappling with the issues of transition from hydro to thermal supplies and grappling with the transition to conservation and more effective conservation. So what better time or place to discuss utility rate provisions of the National Energy Plan than here and now, with responsible leaders who recognize the difficult choices, choices that we dare not duck as a nation or as a region.

What are the reasons for federal interest in electric utility rate-making? They are basic strategic interests. The electric utility industry nationally consumes 27% of our energy consumption in this country. The efficiency of thermal generation is such that roughly one out of three BTU's of fuel is converted to electricity so it takes 27% of our total fuel BTU's to produce 10% of our national end-use energy consumption.

Second, electric utilities have heavy capital needs. Over the next ten years the entire electric utility industry of this country may need $300 billion to $400 billion to invest in new plant and in new capacity. That is assuming a 5½% annual growth rate in kilowatts and in kilowatt hours. Capital like oil and natural gas, is a limited resource and it should be husbanded and used wisely and effectively. We need capital for many other purposes including conservation, including synthetics, including renewable energy resources.

Also, there is a growing concern over fairness of rates. In part, that is the normal consumer reaction to rising costs. In part it's a reaction to perceived subsidies, whether they go to the North or South or the East or the West.

Electric utility rate design addresses all three of these areas. It deals with energy usage by trying to consider end-use—both the amount of use and the time pattern of the use in the daily cycle and the annual seasonal cycle.

The effects of rate design have long been recognized. At the turn of the century when the interest was in promoting more and more use and rapid expansion of electricity, we designed in this country rate structures which would get more customers on line to use more. In more recent times gold medallion rates have had a distinctive effect. Industrial demand rates shape the industrial users of electricity in the daily cycle by giving the industry an incentive to use electricity more evenly throughout the twenty-four-hour day rather than just peaking on one shift.

Rate design issues deal with the question of the capital efficiency of the electrical utility industry. Improved load factor system-wide, improved utilization of the existing power plants can mean a lower need for total installed capacity than otherwise; and we in the Department estimate that it could save the country's economy, between now and 1985, some $13 billion of capital cost, if we made effective use of the time-of-day principle of electricity pricing. There is also the question of fairness. Changes in electric utility pricing may achieve a closer approximation of true costs and satisfy our sense of a need for fairness in dealing with the various classes of consumers of electricity.

The federal involvement has evolved. Prior to 1976 there was regulation of the wholesale rates of electric utilities, of the investor-owned sector, by the Federal Power Commission. There was also a consciousness-rasing at retail by a number of demonstrations, but in 1976 Congress passed Public Law 94–385 expanding the funding for demonstration projects, and presentations and interventions by the federal government in state processes.

As a result of that Congressional authorization and subsequent funding, the activity level to date has included sixteen demonstration projects, that is to say experiments by various jurisdictions, in new ways of designing rates. That has included one grant to the State of Washington, amounting to over $400,000, under which the Energy Office worked with the City of Seattle, with Clark County P.U.D., and with the Puget Sound Power and Light Company. We have set up ten pilot projects to actually begin implementation of changes, including a grant to Seattle City Light of over $300,000 for that purpose. We have funded twelve consumer offices, including one in Idaho under the Lieutenant Governor's Office (a grant of close to $200,000): consumer offices by which state government will help consumers and consumer groups in the state to understand electric utility issues better and participate in them. The Department or its predecessors have intervened in twenty-five state cases to present particular concepts of utility rate design which would help modernize the rate structures if appropriately adopted with due consideration to the geography, economy and characteristics of the service area.

Finally, we have begun to fund the National Regulatory Research Institute, an academic and practical research body set up by the Association of State Regulatory Commissions to help investigate and train for new kinds of electric utility rates. The National Energy Act has considered proposals by President Carter and alternatives passed by the House and the Senate to deal with these issues. As Senator Jackson mentioned this morning, the conferees on the National Energy Act have agreed on the principles of the legislation with regard to electric utility rate design. This agreement, which

is a compromise—it is not quite as tough as the proposal that the Administration sent up, it doesn't involve quite as much of a take-over our federal government of the roles of our state governments, it involves a more persuasive process, more room for innovation by the states—this compromise is based on three objectives which would be written into the federal law and become part of the body of law which will be administered by each of the state regulatory authorities.

These are the three objectives: conservation of energy and capital is number one; second, is optimization of the efficiency of use of facilities and resources; third, is equitable rates to consumers. In order to carry out these objectives or to help realize them, the new federal law would require a consideration of eleven specific techniques with regard to each of the largest utilities in the country: investor-owned, publicly-owned, or cooperatively-owned. This consideration would normally be handled by the State Regulatory Commissions, but where we have the public power agencies which are not subject to state public service commission review, it would be handled by that agency itself subject to check in the courts. The procedures are a little different with regard to one set of principles or another; there may be three years in one case, two years in the other, in which to review these matters. The requirement for public hearing (evidentiary hearing) is different; but in each case the state agency must ask itself whether the utility should be making greater use, or lesser use, of one or another of each of these techniques. The ultimate decision is to be reached by the state agency, subject to court review, rather than by the federal government.

The first issue has to be with time-of-day rates. We have found nationally in experiment after experiment that economies or efficiencies in the use of existing plant can be achieved by using less power at peak periods and by shifting part of the load to off-peak periods. The technique is productive. However, it's relevance is not as great in some places as in others. So long as this region remains predominantly a hydroelectric region, I would think that the time-of-day concept will have less immediate benefit here than it would elsewhere. However, looking ahead to a day when this region may be a predominantly thermal region, I would hope that the state regulatory agencies and the public power districts and municipalities will seriously consider the applicability of the time-of-day principle long *before* you feel the crunch. If, for example, New York City had considered that principle ten years ago, or even twenty years ago, when they didn't yet absolutely need it, they might have had a rate structure in place which would have avoided for them some of the very extreme peak demands on generating capacity which have caused financial problems to the utility as well as rate increases to the customer.

The second area is that of seasonal rates, high season and low season in terms of peak use, and trying to get a better mix for the use of facilities. Third, is the basic principle of cost-of-service pricing, in which the actual prices that we pay as residential, or commercial or industrial consumers are tailored more closely to cost. The fourth set of techniques are those of interruptible rates and load management. Load management is an actual control by human discretion or pre-programmed machine discretion to take certain

machines or fans or equipment off the line at hours of peak need. Interruptible rates are rates which are designed to charge certain users appropriately for their willingness *not* to receive electric power at certain times. Here in the Northwest, the discussion of the direct industrial service customers such as the aluminum companies who in many cases are willing to receive power subject to interruption on, say, fifteen minutes notice, would clearly fall under that category of suggesting a need to measure the value of interruptability and appropriate cost in economic terms and recognize it in a lower rate level.

A fifth rate review issue concerns the ban on declining block rates which are not cost justified. It seems to me that here is an *extremely* important principle for this region of the country with its great hydroelectricity dependency. You have a treasure of low cost power in this region. You are confronted with new thermal power which will cost five and ten times as much as the low cost hydro. It makes *no* sense to encourage additional consumption of electricity by giving the consumer a discount for the last kilowatt hour for consuming more and more kilowatt hours to meet his needs.

Sixth is the concept of the life-line rate—the inverted rate which takes account of some of the domestic needs which are defined as relatively inelastic and unresponsive to price, the absolute needs of all people in a society and economy which runs on electricity for a minimum amount of power. That minimum amount would be sold at a low price and only the excess power over that minimum would be sold at higher prices. California and some other states have turned to the life-line form of rate.

There are five other matters which concern us: the ban on master-metering systems in which all of the units in an apartment house or in a commercial development are charged on a monthly rental basis rather than in proportion to an actual metered use of kilowatt hours; review of the automatic adjustment clauses which appear more and more in electric utility billing systems; improved consumer information; restrictions on advertising; and standards for service termination.

Under the new National Energy Act, the DOE will be authorized to intervene on its own motion in state proceedings and to appeal decisions to the state courts in accordance with state law if it has previously intervened. The Department of Energy would be authorized to assist states with the grants to public utility commissions of up to $40 million a year nationwide, would increase the funding for the consumer office grants to $10 million a year, and would create funding for innovative projects of $8 million a year. The new law would provide for voluntary guidelines to be developed by the Department of Energy in consultation with the state and the public. These guidelines might influence the way in which the states administered the utility rate modernization, but would not dictate how the answer had to come out.

The act also provides for a Customer Conservation Service by the utilities. All large utilities—that would include seven investor-owned utilities in this region, eleven publicly-owned utilities, and one cooperatively-owned utility—would be responsible to educate residential customers, to perform energy audits upon request, and to broker the installation and financing, including allowing repayment through billing of conservation measures. The Congress

regretably has also put some restrictions on utility participation in conservation efforts because of the fear of anti-competitive practices, restrictions on financing installation by utilities subject to certain case-by-case exceptions that the Secretary of Energy may approve, as well as the grandfathering of existing programs. These prohibitions, if they are too tightly drawn, may well require a Congressional adjustment next year, but I do want to call your attention to the fact that we have at least two projects in the Northwest which are being watched with interest. Seattle City Light is developing a program directly in line with the principles in the National Energy Act including a pilot project which is now underway.

Pacific Power and Light has a proposal pending before the Oregon Utilities Commissioner which would have the utility finance conservation, insulation retrofit for up to tens of thousands of homes in its service area in Oregon. The financing would be repayable by the homeowner when he sells his house, and in the meantime would be borne by all of the customers in the utility service area. Individual decisions to insulate would be based on a specific determination that it will be cheaper for all the consumers of electricity to save the electricity that insulation would produce, than to go ahead and have to build new capacity sooner. The filing before the Oregon Commissioner indicates that the utility believes that its incremental cost—its cost for new thermal capacity—would be on the order of forty-two mills per kilowatt hour, many times over what it costs now on the average, and that some savings through insulation will cost the utility service area far less and would therefore be economically beneficial to all of the customers. This proposal is being watched throughout the country because of its potential not only for the insulation services, but conceivably for solar energy, solar hot water heating or even space heating retrofits, in gas as well as electric service areas, and maybe other matters such as cogeneration.

Let me emphasize that there is no magic formula for electric utility rate design, and no magic answer on how to achieve the right balance of conservation, efficiency and fairness. It is going to take individual utility executives, elected officials, and state regulatory agencies to strike the proper balance in each case, but we are convinced that there are substantial economies to be realized for our country as a whole and for this region; and we look forward, therefore, to strenuous and effective attempts to implement substantial changes.

The fact is that if we were building our homes from scratch, or electric power plants from scratch, or oil refineries from scratch, or our automobile industry from scratch, knowing *now* what we know about the recent past and suspecting now what we suspect about the immediate future, we would do it differently. We would have more insulation, we would have more joint use of energy, we would cogenerate, we would use steam to generate electricity and then use that same steam for other heating purposes. We have inherited in place a mass of plants and institutions which are not readily attuned to the need of the hour; and the challenge to the genius of public and private leadership in this region and elsewhere, is how to make that transition as quickly but smoothly and less undisruptably as possible.

I know that you have a burning issue here involving the Preference Clause, and in forty minutes it is very easy to duck that issue, and probably wise to do so. There are legitimate concerns with which people are grappling in this region about the role of industry and the role of residentials, about the existing preference customers and potential future preference customers, about investor-owned utilities versus publicly-owned utilities. You have to strive for fair answers; you have to strive for answers which are compatible with the economic health of this region. You have to consider the national context of what has been preferred in the past and what may be the national policy preference in the future.

But above all, and somewhat distinct from your specific starting point on the Preference Clause, it seems to me that whatever answers you come up with as a region and whatever answers Congress ultimately comes up with, we have got to make sure that the decisions which are made—incremental power on the next power plant or decremental power through conservation which can delay somewhat the immediate need for the next power plant—that these decisions face up to the real cost of bringing more capacity on the line. Whether we are managers of public power or managers of private power, consumers of one or the other, public officials at the local, state, or federal level, we must face up to the bold fact, if it is a fact, that the next unit of capacity is going to cost five or ten times as much—forty-two mills per kilowatt hour—and not kid ourselves or kid the business community on which our economy depends for jobs, or kid our constitutents, that there is cheap power somewhere there indefinitely down the road.

Energy has gotten more expensive, it is getting more expensive, and to keep faith with our kids, whether they are rooting for the Super Sonics or the Bullets or even the Trail Blazers, we have got to show *now* the daring of facing up to the true costs that are going to confront us and for which our successors will have to pay. Thank you very much.

QUESTIONS

Unidentified questioner: In connection with the government's position on the ban of master-metering of apartment buildings by electric utilities, does the government have any position and has it taken any action concerning the banning of master-metering of other energy sources such as natural gas and oil in apartment buildings, since presumably the same economics and, therefore, inefficiencies would occur with these other energy sources?

Bardin: You're absolutely correct. The concept of the ban would presumably focus first on new construction. It would be much harder to retrofit existing buildings although it may be necessary also. In the case of natural gas, the legislation doesn't go as far, but it does provide for looking into the master-metering question just as it does on the electric side, and for an overall review of natural gas rate design. We do not have in place an effective program for dealing with master-metering for fuel oil, but it's obviously an item of unfinished business.

Unidentified questioner: With the present amount of capital in the United States, how long will the U.S. last in paying for oil and gas?

Bardin: Last year we spent $45 billion buying foreign oil, and this year, $45 billion—it's the prime ingredient driving our balance of payments deficit. With the Alaska pipeline coming on the line, we have a couple of years respite during which it is not going to go up. That's one of the reasons it seems to many of us that there's a lot of oil around, but that's not going to last very long. We have got to attack it with petroleum substitutes, with conservation measures, with more nuclear, more coal, more alternative energy sources. This is a very strong and rich country. I expect we shall survive, but we shall survive with increasing difficulty.

Allen Jones, Cosmic Forces: I wonder if you're aware that Washington State law prohibits discriminatory pricing in utility rate structures. My question is, do you believe that the provisions which you've mentioned—the seasonal rates, the lifeline rates particularly, and the inverted rates—represent discriminatory pricing, or do you think this is consistent with them?

Bardin: I don't believe that the proper application of time-of-day, seasonal, interruptible rates, and the rest represent unduly discriminatory pricing. The law in virtually every jurisdiction, state and federal alike, prohibits undue preferences and undue discrimination, but the test of what is "undue" tries to look at the true economic incidents. If we do a favor to one individual, that clearly is an undue discrimination. We just like him, or he has red hair, or he's a Republican or a Democrat. That's no basis for doing it. But if we correctly and conscientiously analyze the economics, we may find that one kind of use is imposing costs on the entire electric utility system—for example, the air conditioning use in the East and the South has been a tremendous burden—that's what I was referring to with New York City. Twenty years ago nobody forecast the sudden rise of air conditioning, and then it took off. It is used so heavily that now peak use is in summer rather than in winter in most of the electric utility system service areas in the country. It has imposed burdens; we have to have new generating plants to meet that summer use. Now it's perfectly legitimate on those facts, all other things equal, to charge more for summer use or somehow focus in on that question. The other sides of the coin is that if you have an industry that can really be cut off, it is providing a storage function or the equivalent of a storage function. It's like a battery on the whole system. If, during peak periods, aluminum electrolysis doesn't have to operate and you can really turn it off on short notice, then that's a big advantage to everybody else and some appropriately-measured discount is in order. In the State of Wisconsin they put in time-of-day rates and one of the interesting consequences was that an oil pipeline that actually runs from Canada into the Midwest, ran its pumps in its Wisconsin sector more at night and less in the day time. The effect was to use that whole oil pipeline operation as energy storage. You know, electricity itself can't be stored, but water behind a dam can be stored; use of the pumps is a storage of the potential energy. In Israel they integrate the operation of the national water carrier that handles more than half of the water supply of the country with the electric utility grid. When they are on peak hour of electric utility need, they cut back on the water pumping; again you have a fit of these two economic activities. That is what we have to do in an era of expensive energy and expensive capacity

—expensive new plants—in order to come through with an economically tolerable as well as economically sensible end result.

Fred Schmidt, University of Washington: I have lived a long time as you can see, and during my entire life the price of energy has dropped in real dollars. In 1946 gasoline cost 18¢ a gallon. Right now it is about 3¼ times that much, but the value of the dollar has dropped by a factor of five. When I came to Seattle the price of electricity was one cent per kilowatt hour. It is still one cent per kilowatt hour in Seattle and that is because the hydro power dams were built so long ago that they have been paid off. If I make the correction for the drop in the value of the dollar, then my electricity today is really only costing two-tenths of one cent per kilowatt hour. If we were to build Grand Coulee today, how much would electricity cost in contrast with nuclear powered electricity built today?

Bardin: I don't know the answer. Does somebody else? I have a very strong hunch. [Inaudible discussion with the audience ensued on comparative operating, construction, and fuel costs of hydro, nuclear and coal power.] This discussion illustrates a number of useful points. There are differences in your results depending on given situations. Grand Coulee, given its location, given the optimum opportunity, built today would not cost as much per kilowatt as the twentieth or fortieth potential site in the Columbia River system. The best sites are used first. The advantage of coal versus nuclear will vary depending on where you are in the country. In the Northeast you build coal near the mine mouth when you are looking at economics alone, and you build nuclear when you are further from the mine mouth and near an abundant source of water. I don't think you can come up with one answer which is going to work in every case. I also don't think strategically it makes much sense to put all your eggs in one basket.

Unidentified questioner: You spoke of conservation of capital being very important which is certainly true. When are the Congress and you bureaucrats in Washington going to realize that a budget deficit of $50 billion to $100 billion every year is not the way to finance. You're sucking capital out unless you use a printing press, and then in either respect inflation is taking a terrific toll. Why not get back to balance the budget—not tomorrow, not ten years from now, but the day before yesterday? Can you help us on that?

Bardin: Only tomorrow. I can't help you on the day before yesterday. But I do share your concern.

Don Frisbee

Robert D. Thorne is serving as Acting Assistant Secretary for Energy Technology for the Department of Energy in Washington, having previously served as Manager of the DOE San Francisco Office. Bob is a native of Laramie, Wyoming. He attended the University of Wyoming and later the University of Colorado, and holds a Bachelor of Arts degree in Chemistry which he secured in 1951. He began his career with the Atomic Energy Commission at the Savannah River Operations, rising to the position of Assistant Director for the Technical and Production Division. He continued

his rise with the Atomic Energy Commission, occupying the position of Acting General Manager up to the time of the establishment of the Energy Research and Development Administration in 1975. Mr. Thorne is also a graduate of the Federal Executive Institute, the U.S. Government School of Management, and in 1974 he received the highest recognition of federal service, The Distinguished Service Award. He and Mrs. Thorne have four daughters and a son and his subject today is "Technology for Energy: Short and Long-Term Alternatives."

TECHNOLOGY FOR ENERGY: SHORT AND LONG-TERM ALTERNATIVES

Robert Thorne

Thank you, Don. I feel compelled to correct my biographical sketch after waiting seven months to get confirmed and finally getting confirmed, I feel I must say that I *am* confirmed and I am now the Assistant Secretary for Energy Technology.

It is a pleasure to be here. I see many old friends and acquaintances in the audience, and I've been associated with some of the energy activities in the Pacific Northwest off and on for a good many years.

I won't go into the basketball bit; I happen to be a Bullets fan and I need not remind you of what happened last night. But I think it is appropriate to be here because the Pacific Northwest has been the center of hydroelectric and atomic energies for a good many years and represents the technologies of the here and now and, to a certain extent, those that are likely to occur in the future.

The region holds the promise of exploiting other technologies in the not too distant future, and so I'd like to weave my thoughts on the Northwest's role in the national energy planning process and impact of technology on your destiny.

Certainly bringing new technologies into being should not be uncomfortable to most of you. You've been down this road before with the Boeings, the Hanfords, the Idaho Energy Center, and such. Now let me pose the question: How is the Department of Energy going to exploit available technologies, bring new technologies into the market place, and research and develop the long-range creations, and how is this different from the way the other agencies and other administrations have approached the problem and have tried to bring success?

First, the Department of Energy is like no other agency I've ever been associated with in my twenty-plus years in government. It has the regulatory and the compliance responsibility over a very broad range of energy production and resource problems. My compatriot, Dave Bardin, has been very eloquent on that kind of responsibility. But most importantly from my standpoint it has separated organizationally basic research from energy technology and from commercialization. And what that does is bring all the tools to the table so that the Department can make things happen. Things

don't bog down organizationally in one part of the organization instead of another.

Now where does energy technology development, in the near and in the long of it, fit into the scheme of things? And what are the realities of technology? And who is going to do what, when, how much, and where? I think the "where" of that question is quite important because I firmly believe that there is no single or two big technological fixes to the energy problem, that regional deployment of technologies is in the cards, and that the mixtures of energy technologies will be quite different between the various regions of the United States.

Now let me mention the near and the long-term options and the priorities that we've established, but first I'd like to address the realities of technical deployment:

First, none are cheap. Just the commercial scale demonstration plant costs in the neighborhood of a billion dollars.

Secondly, they can't be done overnight. It takes just six or seven years just to build one of those commercial demonstration plants.

Thirdly, there needs to be a balance. You can't have all your eggs in one or two baskets.

Fourth, there is a public dialogue necessary. There has to be acceptability or nothing will happen.

Fifth, social, environmental, and institutional issues have to be surfaced very early in the developmental process.

And lastly, there is no free lunch no matter how much we'd like it to be so.

So what are the technical targets of opportunity and what are the objectives of exploiting these targets? Foremost in my mind is the near term and by that I mean by the mid 1980's when the contributions can begin to be realized—contributions both in the hard and the soft technologies. And I think the President's initiatives that were recently announced set the stage for that. Our highest priorities are in the synthetic fuels from coal and from oil shale, making solid fuels from coal, liquid fuels from coal, and beginning to exploit the oil shale potential. Of equal priority are the small and dispersed solar applications, the use of photovoltaics, lowhead hydro (which in this particular region of the country there are over a thousand sites available), wind machines, biomass residues for direct combustion to produce methane, and geothermal for electricity or process applications. Of equally high priority, the same priority, are ways to increase gas and petroleum production, the use of western coals to produce high BTU gases, enhanced oil recovery, and low and medium BTU gas facilities for industrial use all of which gets us off of the oil kick to a certain extent. And also at the same priority, we want to deal with the waste management question because that's the cornerstone of our water reactors, and to improve the combustion of coal from an environmental standpoint.

So with all these priorities, which as you can see are focused on the near to mid-term, we must recognize that bringing in any new technology or really, *any* technology, into being has its own consequences. It has the problem of economics. Right now none of these technologies can compete

in the market place at current prices. And so there is a high financial risk. And it means, in essence, that you have to bet on the come.

There are the social consequences—the boom town situations that many of you are familiar with in the west. And there's the environmental problem which has varying degrees of disruption to the environment. And certainly there are the political processes at the national, state, and local levels.

It is my view we probably haven't done enough in these areas early enough in the game. Perhaps we become mesmerized by the science of a new technology, but I've found that the non-technical issues are equally important and have to be addressed equally early.

But looking further down the road, our priorities tend to shift toward the bigger and so-called inexhaustible fuel systems. By that I mean the breeder, fusion, solar central power. And each of these has its own advantages and disadvantages in a technical sense and each raises unique social and environmental questions and each has a very large budget appetite.

But each can make a large energy contribution for a long period of time.

Our problem now is how to sort this out. Right now we're involved in the sorting process to look for the right kind of balance between the near and the long term in terms of energy development as well as getting a better grasp on the role and the contribution of solar technology. This is being done through the Domestic Policy Review.

In any case, the outcome will undoubtedly be very controversial. People's expectations are very polarized in this area. But in my view, at the current stage of technological maturity of these three inexhaustible fuel systems, I can't honestly say that any one represents the panacea that many would like to believe is *the* reliable and economic energy system.

In a way that's the bottom line of my message: that there are many risks ahead of us—not only technical, but financial, institutional, and environmental. Consequently, the business-as-usual approach just won't work, and I really wish more of the public believed that.

Thank you.

QUESTIONS

Russ Clark, Tacoma Community College: You mentioned a thousand sites for hydro. Is that lowhead or highhead? [Thorne: "That's low."] Are those conceivably possible?

Thorne: Many of them are or have been in use. The Department has asked the Corps of Engineers to identfy the two most promising sites in this region, and that study is being done by the University of Idaho. It should be finished by the end of this calendar year.

Arun Jhaveri, Science and Technology Advisor for the City of Seattle: Does the Department of Energy have any comprehensive energy technology transfer program particularly suited for cities solving energy conservation and retrofitting problems?

Thorne: There are probably others in the Department, Don Beattie for instance in the solar field, who could answer that question better than I can

since he's responsible for technology transfer, but that was the intent of the way the Department was set up so that a part of the organization was clearly identified who would be graded, so to speak, upon their ability to move technology out of the federal government and into the private sector, whether it goes to communities or it goes to business.

Dave Taylor, Energy Programs Coordinator, Pacific Science Center Foundation: How do you see the R&D budgeting for these near and long-term alternatives shifting as a part of the total DOE budget in the next few years?

Thorne: That's the sorting-out process that I mentioned. Obviously it is a tough problem because in the established technologies—those that have been under way for several years—there are quite substantial mortgages in facilities and operations that are already tied into the budget. So to make dramatic shifts is extremely difficult unless you perturb the whole budget. However, we are prepared to make dramatic shifts in the budget depending upon how we come out in sorting these technologies out, what the real contribution will be and the time frame in which that contribution will be made available to the public.

George Stricker, University of Puget Sound: Hydro is limited to certain areas where you have mountains and rivers, but wind is more pervasive around the world. We seem to have the technology answered for wind—it's a matter of manufacturing the machines. How soon do you suppose we can actually get into production and produce electricity on a large scale with wind?

Thorne: One of the initiatives in the President's recent announcement involved a large number of smaller wind machines to be located in clusters in various parts of the country. The locations haven't been selected, but obviously you can't put a windmill just any place; you have to have a fairly steady wind in order to realize most of its potential. Since those initiatives are associated with the 1979 budget, you'll probably see it next year.

Dennis Bader, Environmental Management Consultants: Many government officials have been talking about solar power as a thing of the future which won't come into line until the 1980's. That simply isn't true. The potentials for solar water heating and solar space heating are available right now, and that has the potential to cut our energy consumption so much that we don't need huge central generating plants like nuclear power. So my question is: Why is it that the government with its huge resources isn't able to come up with the same soft technologies that backyard tinkerers on shoestring budgets all over the country are developing?

Thorne: Exclusive of the use of solar energy to heat water, which is an established technology fairly well into the market place and somewhat hindered by lack of passage of the Energy Plan because of the tax benefit provisions, there still is in the neighborhood of a half billion dollars in the solar program, and I don't think that that's small.

Bader: How much ERDA money is in nuclear power and breeder reactors?

Thorne: The breeder program is about $400 million, and when you talk about nuclear programs you have to talk about waste management, production of nuclear materials—it's a large bag and that bag is over a billion dollars.

Bader: It just seems to me that after thirty years it's about time that the country realized that nuclear power is environmentally, economically, and socially bankrupt; and we should begin to use that money for something more useful.

Thorne: I would say that the experience that the country had last winter and this winter when it depended upon light water reactors, doesn't bear out your view.

Unidentified questioner: What are the usual approaches that business takes to solve energy technology problems?

Thorne: Business basically depends upon moving into a new technology field when they feel they can make a reasonable profit in a reasonable period of time. And since the bringing on of new technologies is so highly capital intensive, the industry heretofore has really not been terribly aggressive. Now one way in which the government works with the private sector in this regard is cost sharing, in which the government picks up a portion of the high capital front-end risk and moves the technology along jointly with industry such that as industry puts in money, they also learn, and it is their job to go ahead and exploit the technology. Another way is for the government to take over essentially all of the front-end capital risk and to move the technology along quite fast with the expectation that the federal government would not participate beyond the demonstration phase. And that's the approach that's being used in developing synthetic fuels from coal. So there are many different ways; most of them involve cost-sharing on very risky ventures.

Pete Rose, President, Mathematical Sciences-Northwest: Early in your talk you pointed to the organization of DOE and the fact that you have research, technology, and commercialization under seperate Secretaries as an advantage in the process. As a participant in DOE technology and research, that's been a somewhat frustrating advantage. I wonder whether you could comment more on why you see that as an advantage, because I'm sure that you and I can point to very long range research activities in commercialization areas and technology areas, and the opposite on the other side.

Thorne: I'll give you my personal view and some experience that I've discussed with friends in industry. One of the problems in commercialization, quite frankly, is the people who are bringing the technology along. The reason that a company sets up separate parts of the organization—a marketing part, a production part, engineering, and a research group—is so that people are motivated different ways; and that's to keep the technology moving. In the government there tends to be—and there's been a history of this in the fossil area—the practice of holding the technology within the government, diddling around with it forever and forever; and it never moves

anyplace because people are not motivated to move it along. By setting up a commercialization organization within the Department, those people are motivated to getting it out on the street—that's the basis upon which they're judged. In the private sector that's done by profits; in the government it's done by other types of motivations. Clearly, turning a technology managed by researchers into a commercial venture has not proven very successful in the government; our track record is pretty poor.

Gordon Gray, University of Washington: With respect to solar energy research, I've run into some confusion as to where the responsibility for administration of certain aspects of solar energy research lies, in DOE headquarters or in the Solar Energy Research Institute, and I wonder if you could clarify where the research community should direct its interests in those respects?

Thorne: I think it varies, whether it's basic research in the solar field or whether it has the glimmerings of an application. If it's generic basic research, it ought to be directed towards John Deutch and his Office of Research in the Department. If it's beginning to have a glimmer of application, it ought to be directed towards the SERI people in Golden, Colorado. The SERI people, as an organization, are really the research and development arm, emphasis on development (with a little bit of demonstration), of the whole Department of Energy. That's what it was created for, that's what it'll be used for. It supports mostly my programs. To a certain extent, it will support a portion of John Deutch's organization, likewise a portion of Don Beatties's organization; but it's essentially oriented towards the solar part of energy technology. So there is a moderately clear demarcation in their responsibilities.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

Concurrent Interest Group Sessions

Wednesday, May 31, 1978, 3:15 p.m.—5:00 p.m.

STATE AND LOCAL ROLES IN ENERGY PLANNING AND DECISION MAKING

Presiding: President Ed Lindaman, *Whitworth College*
Barbara Dingfield, *Office of Policy Planning, City of Seattle*
Ed Hudson, *Puget Sound Council of Governments, Tacoma City Council*
Fred Miller, *Director, Department of Energy, Oregon*
William Peacock, *Director, Intergovernmental Relations, DOE*
Kirk Hall, *Director, Idaho State Energy Office*

Ed Lindaman

Each of the panelists has agreed that he or she would like to make a presentation of five or six minutes, a fairly short presentation, with respect to their judgment on the local role of energy planning. Then this would allow us to spend a major porton of our time in discussing the subject with them and letting them then respond to your questions and/or comments; and I have also encouraged them to comment and question each other during the question and answer period. So, we'll try to take that format for this afternoon's session.

I've asked Barbara to comment first. I'll take a moment to introduce Barbara Dingfield to you. She is the Director of the Office of Policy Planning for the City of Seattle. Her undergraduate degree is from Swarthmore College in Pennslyvania and she also has a Master of Arts degree in Economics from Columbia University. She basically is a community planner and an urban economist. I noticed too that she had the privilege of working with Wassily Leontief, which must have been a great experience. Her job with the City of Seattle really is to work with the planning process for Seattle's overall physical and social development.

Barbara Dingfield

Provision of energy is a business, similar in many respects to other businesses. One significant difference between energy and most other commodities lies in the extent of government involvement in supplying it. Governments intervene in the energy market at the local, state, and federal levels, while retaining a significant role for private industry. I will concentrate my remarks on electrical energy, since it is a topic of immediate concern to

the Pacific Northwest these days, and because it illustrates the roles of different levels of government fairly well.

Electric utilities are businesses that economists refer to as "natural monopolies". They operate most cheaply and efficiently when only one utility serves a given area. Unfortunately, natural monopolies tend to produce too little at too high a price, once they become established. The response to this problem has been some form of government intervention—either "government as business" in the case of public utilities, or "government as regulator" in the case of public utility commissions which control private utilities.

These roles for government are relatively old and established, and have operated at the local or state level for both historical and economic reasons. Historically, utilities were initially quite localized businesses; economically, the cheapest and most efficient scale for administering, as well as producing energy, hasn't until very recently justified consideration of a broader scale. A newer reason for government involvement is concern over the environmental consequences of resource extraction, such as coal strip mining and possible oil spills, and of power production, such as creation of radioactive waste, coal stack emissions, or flooded river valleys. Economists have a name for these consequences too: "externalities". The solution typically tried is to "internalize" them by establishing binding regulations on the entire area potentially affected. This has led to more state and federal involvement and thus a patchwork of local, state, and federal activities in the electrical energy industry. To make some order of these levels and types of government intervention, I will relate them to the three broad functions of assuring a *cheap, reliable,* and *environmentally acceptable* supply of electricity.

Cost: Retail rate design has generally been a local prerogative, and rightly so. Its effects don't spill over to other areas, and rates can be used to promote social goals such as conservation and income redistribution according to local preferences. For local governments with municipal utilities, such as Seattle, this alone can mean a significant involvement in energy planning. Rate increase proposals in Seattle involve policy planners and elected officials almost as much as utility budgeters and technicians. As a result, we have developed rates with provisions which encourage and reward conservation, most notably our inverted residential rates, and others which protect elderly customers on low fixed incomes from the rapid inflation of energy costs, and finance a conservation program for this group of customers.

While non-municipal utilities also design their own rates, there are circumstances which justify a broader state or even regional role in reviewing or regulating rates. Setting rates for a regionally supplied block of power, such as that distributed by the Bonneville Power Administration, clearly transcends local authority. Our recent examination of regional power planning convinced us that in the case of regional supplies, this regional control is necessary to assure that one local area's retail rates don't affect costs in another. Under some proposed allocation plans, a local government using rates to promote conservation could thereby lose a share of its BPA cost advantage. Prevention of this undesirable impediment to conservation requires

either careful design of regional wholesale rates or greater regional uniformity in retail rates.

A second case for broader—usually state—government authority over rates is the regulation of private utilities' rates. Such control is necessary to protect customers from the monopoly power of their suppliers. It is also desirable to have a centralized regulatory commission strong enough to control the utilities and assure uniform treatment of them. The state commissions are a compromise between the efficiency of greater centralization and the responsiveness of greater familiarity on the part of individual utilities.

Reliability: Good forecasting is the key to a reliable power supply. Historically, there has been a mix of local and regional electrical energy supplies in the Pacific Northwest, and a mix of local and regional forecasts to time the additions to supply. Government interest and involvement in forecasting has came to the fore only recently, and then primarily due to concerns about cost and environmental hazards of new supplies. Now, as before, resources which can be developed best locally will be; the difference is that the local forecast which calls forth these resources should, and probably will come under the scrutiny of elected officials and their staffs outside the utility industry.

This is certainly the case in Seattle. Two years ago, the City voted not to participate in the development of two large nuclear plants. The basic reason was that the forecast which the utility had been using was rejected by elected officials in favor of an independently derived and much lower demand projection. Since then there has been a strong, continuing interest in City government in improving the forecasts and in maintaining a reliable supply through the cheaper option of conservation.

There remain many resources and technical options for providing energy which are costly and large and must therefore be provided regionally. The large Columbia dams and mammoth nuclear plants are past and present examples of facilities requiring joint or regional development. The power they supply will be shared by utilities too small to develop any conventional supply sources *and* by large utilities with either residual demand or a need for partners when embarking on a large new project. To illustrate, roughly one hundred utilities proposed to share in the output of WPPSS 4 and 5, the two nuclear plants I referred to earlier. Some large utilities would take as much as 10% of the output, while other small PUDs wanted 1% or less.

However much they take, if the supply is regional it requires a uniform forecast of regional demand to justify and time its construction. At the regional level, as to the local level, costs and environmental hazards call for a public voice in forecasting. A section of Seattle's regional power planning study concluded that a regional commission of non-utility officials should have the final say in sanctioning regional forecasts which dictate regional supply planning. Here again, the peculiarities of the power industry call for a sharing of this function by different levels of government.

Environmental Concern: Conservation is one way to maintain an adequate power supply which is environmentally acceptable. It is also indispensible in preserving low electric rates and planning for a reliable supply. Con-

servation is also the most discussed aspect of government's role in energy planning, so I will deal with it briefly.

The distinction I would like to draw is between the role of local government and that of the state or regional governments in this area. Once again, Seattle's experience is illustrative. We designed a local conservation program as part of our Energy 1990 decision, and are implementing and administering it now. We also designed a regional conservation program during our regional power planning study. The regional program is tougher, since it wouldn't be undermined by the threat of economic dislocations. Assurance of one's neighbors' cooperation allows local governments to enact and enforce building codes, appliance and industrial process efficiency standards, and building retrofit standards which save money on balance without the fear of jeopardizing the local economy. In addition, as I mentioned earlier, rates affect conservation. Local governments, PUDs, and state regulatory commissions can achieve significant and worthwhile conservation by thoughtful design of their own rates. But to assure that they do so, they need to reap the benefits of their conservation. That requires a regional pact designing wholesale rates and constraining retail rate designs to guarantee equitable treatment of all utilities.

In each of these areas—rates, forecasting and conservation—we find the same message: there is a strong and legitimate role for local government in electrical energy planning; and an opportunity to strengthen this role through cooperation with states and regional, publicly representative energy planning bodies.

Ed Lindaman

The second panelist will also speak to the local role in the area of planning. He is Ed Hudson, an attorney from Tacoma. He graduated from the University of Wisconsin in law in 1967. He is on the Tacoma City Council, is Chairman of the Puget Sound Council of Governments, and is Vice President of the Washington State Arts Commission. He is also Co-Chairperson of the Local Government Northwest Energy Electrical Task Force (Washington, Oregon, Idaho, Montana).

Ed Hudson

Thank you Ed. This has got to be one of the more difficult groups to address. There are scatterings of people here who some of us local elected officials have been working with throughout the last year. I asked Ron Quist, staff member in Olympia, "Who is here?" and he says, "You won't believe who is here—there are people here from private power and public power; and there are people here from industry and there are citizens and there are governmental officials." So the question is, how do you address this large group?

In trying to answer that question, I begin to wonder what all of you are looking for—most of you people are familiar with the energy issue. It raises the rhetorical question of whether this is in fact a new issue? I think the answer to that is honestly "no." We certainly have been using energy

for a great many years and we have figured out over the past few years how to develop energy. The reason that we find ourselves treating it as a new issue may be largely because of the oil situation we had in 1973, the drought problem in the Pacific Northwest last year, our deficiencies in generating power, and of course the notices of insufficiency the BPA has put out. Now we all of a sudden have a new issue.

But still people come to such meetings in large numbers—and by the end of the meetings they leave—still looking for some missing or moving target with which to identify themselves. That reminds me of watching a show that has now replaced Howard Cossell on Monday nights. Space 1999. They are continually running into crises—these earthlings who were hurled nto space on top of the moon in an uncontrollable course. Reality hits home when they are about to collide with another planet and they must figure out how to avoid the collision course.

The energy issue in the Northwest doesn't offer that simplicity. It is often hidden—we get into the question of talking about electrical energy and then we soon get into implementation of life-line rates; and then we begin to wonder whether or not we also ought to deal with gas; and whether there are switchovers from gas to electricity if we have life-line rates; and then we begin to talk about whether we should go into some sort of coupon system covering all energy sources; and then we begin to ask who should administer this program if we are going to do that; and pretty soon we are in a swim trying to find up from down in this entire issue.

It is even hard to describe what definition you are using when you are talking about "energy." Are you talking about power or are you talking about electrical power or gas power? Are you talking about the generation of heat? Are you talking about waste? In the City of Tacoma where I am from, we are attempting to recycle our garbage, sell the garbage to our pulp mill, have the pulp mill make steam and then supply the steam back in heat for our downtown city. That's energy.

Transportation—we run into transportation as an energy problem. The air pollution control problems that we have indicate that we should maybe disperse our transportation networks or our factories so that we get better air quality, but that means people may have to drive further to work. We have conflicts in that sense.

Land use policies: current policy in the City of Tacoma for utilities is to extend utilities to those people who have been given permission to construct buildings of any sort—residential or commercial—to make sure that they have utilities so that they can operate. Should that policy in fact be changed to one which designates areas where we do not want new construction to grow, and does not allow utilities into those areas? Some of these items are being addressed at the national level, but land use, at least, was not addressed in the President's original statement. I understand in talking with representatives of the Department of Energy that that may be corrected.

Where, then, is the role of local government? I would like to consider local government as that forgotten body which is left with taking responsibility for annual implementation of the dog leash laws. I want to point out that, forgotten as it may be in the city of Tacoma, we operate approxi-

mately a budget of $123,000 to $130,000 in our own utility system. We are putting a sewer system that's slowly but surely providing all of the sewer wholesale facilities for our country and we have a water system which exceeds the capacity levels of the City of Seattle.

Still, local government must play an increasingly-larger role in energy conservation and decision-making in the future.

There is an important role for local government in the implementation of mandated building codes, zoning laws and curtailment conditions. There is an equally important role as a coordinator of all conservation efforts within its area of jurisdiction, and as a leader of voluntary efforts to cut out waste.

At the Puget Sound Council of Governments, which includes forty-four governmental units within the four Puget Sound counties—Snohomish, King Pierce and Kitsap—we are seeing more and more energy considerations as we make planning decisions.

Individual governments have a wide variety of involvement in energy issues. The cities of Seattle and Tacoma, and King County, have designated full-time energy coordinators. They are in the midst of existing conservation programs and plans for more programs. However, there are some smaller cities and many unincorporated areas with no formal governmental conservation programs.

Puget Sound governments are, fortunately, about to lean upon the action and expertise of utilities which are among the most advanced in the nation in conservation of home heat.

Washington Natural Gas was the first utility to offer a company home insulation program with the costs to be added to the customer's monthly bill, so savings from the weatherization paid for the heat-saving installation. This program has been copied across the nation. Oil heat dealers offer similar programs. For homes heated electrically, programs to audit and weatherize are offered all customers in the area by Puget Sound Power and Lights, Snohomish P.U.D., Seattle City Light and Tacoma City Light.

Recent surveys show that more than 90% of all new housing is being built with electric heat. We are concerned at local government about the increasing costs of electricity and other energy forms, both for the citizens and for our own facilities. We are even more concerned about shortages in supply.

It is difficult to be properly concerned, however, about the importance of energy conservation issues when we are faced with our many other pressing responsibilities. Our region is experiencing growth of almost explosive proportions. Our problems in planning include urban sprawl, congested streets and highways, water pollution, air pollution, increasing crime rates, unemployment, solid waste disposal, housing, retirement financing and dwindling funds available for an increase in demand for services.

It is important that energy use and energy conservation be considered each time a decision is made, whether it be at the smallest city council meeting, or at our four-county Executive Board.

As time moves on, it appears that local government may in fact be in a place to exert more responsibility. Certainly with regard to annual rates setting in electricity, local government is in the postion of taking the heat.

Two years ago when Seattle made a rate increase, they made the news. Interestingly enough I watched the news broadcast with the people chanting, "stop the rate increase," and the next week or so we had a similar rate hearing, and by golly, if about ten of those same individuals whom I saw on the screen at the Seattle City Council didn't show up in the City of Tacoma.

I want to offer a suggestion that local governments can play a major role in energy—we do already. I want to offer the suggestion that you are giving us responsibility whether you talk about it or not. I can't see how standards of any sort, whether they be local, state or federal, with regard to codes and housing, are going to be implemented by anybody other than the city government or county government, at least on the front line. There needs to be a recognition of this fact and there needs to be a recognition that local government people have to become more intimately involved in the policy making processes.

During the past year the Puget Sound Council of Governments has actively supported a task force made up of elected officials from local governments of Washington, Oregon, Idaho and Montana. The task force has been looking at the northwest electrical energy issues, mainly, but has also discussed local government's energy role in general. We have found it difficult to obtain funds to assist us in this effort. It has sometimes been very frustrating because to find elected officials willing to do more than give a speech—to actually put their mental efforts into it—is unique. When that effort has trouble getting money to support it I find myself extremely frustrated. We have come a long way in that process and local elected officials are now prepared to sit down and discuss, with private utilities and technical experts in the public sector, possible amendments to the proposed regional power plan back in Congress. You are going to be hearing a lot more on that tomorrow.

There appears to be a pressing need to enroll all resources of local government in the effort to conserve. There are thousands of technically-trained engineers, chemists, electricians, planners, architects, transportation experts and others who can became a part of the energy conservation effort in a more formal manner.

Some of our cities are setting up energy conservation committees or task forces to include people with technical expertise from local government and from the private sector. We need to do more of this. There is a need to take the best comprehensive energy plans from one community and make those available to others.

The economic and political impact of energy conservation measures, whether they come as directives from state or federal levels, or are determined locally, must be dealt with by local governmental leaders. There is a need for the greatest possible input from local government into the decision-making process at all levels. There is a need for a close working relationship between those regulatory agencies and local government as programs are put to work.

It would seem that the mayor of each city, and the commissioners in the counties, are the ideal persons to take leadership. They are nearest to the

citizens who will be impacted. I believe locally-elected officials are becoming more and more aware of the role they must play, and they are ready to accept the responsibility.

There is so much to talk about here that even two days on the agenda barely scrapes the surface. We are in the middle of a subject; we are not necessarily at the beginning, but we are certainly not at the end. There are so many players involved—so many different functions involved—that we have got to start settling down and finding the forums that we can work in to make sense out of this. Local governments have been around for a long time and I think they are going to continue to be. That's one of the forums that we can begin to work with. Thank you.

Ed Lindaman

We will move on now to the two persons who are involved in state energy planning. Fred Miller will come at that subject from the perspective of an economist. Fred is the Director of the Oregon Department of Energy. His Ph.D. is from Michigan State University; following his degree he spent five years in South America in Peru, Argentina, and Colombia, but he has basically been operating from the role of Professor of Economics, so, Fred, give us that perspective on the State of Oregon.

Fred Miller

Thank you Ed. I think those professional days are now behind me. I've been in state government now for a few years. Like the other panel members faced with a five or six minute constraint, I am trying to tell you all that I know and still include something interesting within that five minutes. I think the former will be easy; the difficult part is the latter.

What I'd like to do fairly crisply is to lay out essentially four areas of state responsibility and indicate that these are influenced by some of the events on-going in Oregon; and hopefully you can learn something from either my perspective or the Oregon perspective.

The areas that I want to address in this brief fashion are siting, need for power or demand forecasting, the alternate energy resource area, and then very briefly, rate setting. And as I indicated, I am influenced by several things that are current major issues within Oregon. In particular, I'm speaking about regional power planning which, of course impacts just about everyone here. The Pebble Springs case involves two nuclear plants for which a site certificate application is before Oregon's Energy Facility Siting Council, at a cost of about $3 billion, or roughly 8% of the state's assessed value. In my terms, that's a major decision. And also I want to say something about what we're aiming for in the 1979 legislative session.

The first observation I want to make is on siting. I think it's pretty widely recognized that states have a very legitimate role, in fact a major role, in siting major thermal facilities. The interesting thing to me is that the issues have changed. I haven't been in energy all that long directly, but in viewing the issues and our past siting legislation within Oregon, it's my impression that changes have occurred. I can think back to when the Trojan Nuclear Plant was sited within Oregon—there was a one-page letter from then-

Governor McCall to the President of Portland General Electric, basically saying, "Go ahead and build your plant." There weren't site certificate conditions; a plant was something that utilities would operate, and essentially this was permission from the state to go ahead and operate it. It was pretty clear utility responsibility. After that, came some legislation that I think planted responsibility more with local governments. It was more of an environmental question: "Is this site suitable? Should we construct a plant here?" Well, I find now that this has changed once again, and if you look at the Oregon siting process, and right now at the Pebble Springs Plant, we don't really have a major question of environmental suitability. There are questions raised about waste, and what will ultimately be done with waste, but in terms of air quality, water quality, socio-economic effects, there aren't really major issues. The major issues in that case tend to be those related to need: are the facilities needed, and are there reasonable alternatives for the construction of those facilities? This, is my view, takes it out of strictly utility operation responsibility or local land use responsibility, and places a lot of responsibility in the hands of the state, since I think most of us will recognize the state does have a role in demand forecasting.

I think that also places a responsibility on the state in the sense of streamlining the process, and that is something that we've worked at in Oregon. We do have some legislative that indicates that any site certificate application before a siting council must be ruled upon within a time period—depending upon the facility—of six months to two years. If there are any kinds of judicial reviews, they must go straight to the Supreme Court, and that review must take place within sixty days of the time of the decision. And also, once the site certificate is signed by the siting council, all other state and local agencies must issue the relevant permits.

I think that does something for streamlining, and I think it is a legitimate state response to the question of expediting site reviews. I don't know that it guarantees any yes or no decisions, but I think it is expeditious. And in fact, in the Pebble Springs case, maybe it's been unduly so, because we have had three or four delays since we got the case back from the Supreme Court. Each of those delays was at the request of the applicants or the utilities. So I think maybe the state has been moving a little bit too fast in that respect, although I'd rather be in that posture than a delaying posture.

Second point: I want to say a little bit about need for power, which I've indicated is a very legitimate state role. The Oregon statute gives the Department of Energy some very strong authority in this area, not only to provide a twenty-year forecast each year, but also to provide a critique of energy suppliers' forecasts. That has raised the consciousness of the forecasting question to the extent that one reporter indicated to me that she thought the major energy story in Oregon in 1976, was energy demand forecasting. That does make it a major item.

As I'm indicating I think the state has a particular interest here, related to a time-honored concept of utility responsibility. Frequently both in regional power planning and also in terms of demand forecasting, we've heard the argument that perhaps the government shouldn't be involved;

that perhaps this should be something that either private or public utilities or BPA is going to be carrying out. I have problems with that concept, certainly when I view the Oregon statute. I think this concept of utility responsibility needs some reeaxamination, because, if once again you look at our Energy Facility Siting Council Statute, and look at a Supreme Court case that remanded Pebble Springs to the Siting Council, you'll find that the judge drew a distinction between *need* for power and *demand* for power, and interprets the statute to indicate that the Siting Council can in fact determine the need for power for future plants. Even if the Department of Energy and the utilities indicate there's a five percent increase in electricity demand per year, the Siting Council could still say we aren't going to site that plan because we don't think it's needed, and presumably there are lots of sub values involved in need. It's awfully difficult in that context for me to see that utilities are liable for not serving customers in the future if a state body can in fact turn down the plant after a showing of need or of demand has been made. I sometimes think that utility responsibility is a misused concept, given the remarks I've just made.

Let me comment about one other item generally in this need-for-power area. One of the areas that really needs airing in the Northwest, that is not being done effectively right now and therefore involves a possible state role, is the cost of insurance; and once again I'm referring to electricity. We pay a lot for a critical water assumption in this area. Citizens may choose to pay that, but I'm not sure they would; and if we took a critical water period or an equivalent assumption of two years, rather than 42½ months or even three years, I think we may in fact find that we need a different number of plants in the future. We are developing some capabilities to translate this into rate structures, and spell out some meaningful trade-offs. But I think when people talk about public involvement—which is an awfully difficult issue—that if we can focus it on rates and tie in our movement from hydrobased power to thermal power, we're going to get some awfully interesting reactions on the part of the public. I think these will be placed in a cost-of-insurance sense: how much do we want to pay to insure against shortages that will lead to buying higher cost power out-of-state, or in fact even to brown-outs or black-outs. I think we may come up with different answers. Once the need-forecasting question is sorted out, and I think it will be to a large extent in these Pebble Springs hearings, I would hope that the state would get in an affirmative posture, and try to get the appropriate number and type of facilities sited.

Conservation is one of those motherhood areas where there isn't much controversy. I saw someone I hadn't seen for a year here who said he was involved in energy conservation; and I asked if he was for or against it, because I was hoping to get an antimovement so we could generate a little more controversy, and maybe get some successes out of that. Well, alternate resource development in some sense is the same way. But I think there are some real gaps that the state can fill in a constructive way. I think we've got to assess the resources that are there much better than we have to date; I think we have to see how those resources, when they're developed, will fit into our more conventional sources. And then I think there are all kinds

of things a state can do in term of promoting the utilization of those resources, that hopefully will take place on a local level. There's lots we can do in terms of providing a framework and providing resources.

Oregon tried this last year through what is now referred to as Ballot Measure Two, to establish a loan fund of about $440 million to go for this kind of purpose. It also would have gone into electricity generation. It would have given the Governor and the Director of the Department of Energy a great deal of power in this area and I think this bothered some people. It didn't bother me because I have confidence in both of these people, but nevertheless it was voted down. We will have something else coming up in this area and I think that's a place that the state really can play a meaningful role in pushing some of these investments beyond the threshold and changing the inertia, because there are some very cost-effective investments out there.

One last comment and I'm not going to belabor this one. Practically everyone agrees that rate setting is a legitimate state function. I'm pleased to say I don't have that jurisdiction; of course in Oregon the Public Utility Commissioner does. But when we admit that rate setting is a legitimate function of states, we don't always think about *level* of rates. You will find that Oregon considers this also a legitimate function for state government, especially in March 1979 when we implement Governor Straub's Domestic and Rural Power Authority. So I think that should be an indication of our interest.

Ed Lindaman

We'll cover another state now. We just finished with Oregon, let's take on Idaho. Kirk Hall is the Director of the Idaho Office of Energy. He graduated from the United States Air Force Academy, went on to the University of California where he received his master's degree. Then for five years he was Deputy Technical Director in the Department of Defense tests on the effects of nuclear weapons on military equipment. Following that he joined the staff of Mike McCormack in Washington, D.C., moved to the Committee on Science and Technology, and while there worked on congressional legislation dealing with solar and geothermal energy and non-nuclear research policy. Then he went down to the great State of California for two years and became part of the California Energy Commission that was established there in 1975. And as Deputy Administrator he was involved in the state program on alternative energy sources such as solar, geothermal and agricultural wastes. That, as you know, is a pretty big program down there right now. So, Kirk, will you come and talk to us.

Kirk Hall

Unlike the previous speakers, I was quite exicited in only having five to eight minutes to speak, because when I received the letter I misread it as fifty-eight minutes. Also unlike Fred, my immediate predecessor, I come from a state that in some respects is a have-not. We have not adopted a specific intent in energy and energy planning at a state level. We are at

the stage of asking: does the state have a role in energy? My answer is yes, and I will outline briefly what I see that it should be. These remarks may be somewhat repetitive of things that have been said before.

The first role is in the area of facility siting, not only in terms of the generation of electricity, but other facilties that are energy-related. In the area of need projections, I think the value and purpose of a state is to provide some determination and differing perspectives on what its needs are, and in particular, to reflect many of the social decisions and social policies that the state wants to implement, and their impact upon its needs for energy.

Third, the state role includes regulatory action, which in our state as i others is currently being undertaken in the area of rates, in electricity transportation and natural gas. But in addition we're finding that there will be new areas coming up where monopolies may be in the public interest and as such would need to be regulated. In the State of Idaho, there is a phenomenal potential for geothermal energy. We are fortunate in that energy which primarily is heat too low to be utilized for electricity, occurs along the Snake River Plain in an arc that coincides with a good portion of our population. That means the possibility of district heating, or heating systems that would probably become essentially utilities and as such should be regulated.

In particular I think the state can be a focal point for technical assistance: assistance to political subdivisions and individuals or associations beneath the state that see a need, an area of concern they would like to resolve, and who need some help in getting started. Again, I'll return to the subject of geothermal. We have a number of cities throughout the state which are beginning to realize that the hot springs down the street are something that they can use to provide energy for their citizens. They have an interest, a great interest, but in getting started they need some help—in essence, some technical assistance. They themselves are capable of undergoing the political processes in making the difficult decisions to prove or to utilize the resource, they are just not quite certain how to get started.

In addition, at a state level, the state government is in a good position to be the focal point for federal and regional interactions and activities. Certainly we need to realize that states' boundaries are somewhat arbitrary and don't necessarily coincide with service areas of utilities, federal regional districts or even regions that are somewhat defined by resources, as most of us are finding out in the discussion of the Bonneville Power Administration and the distribution system that's built up between it, the federal government, and our public and private utilities. This is indeed an area where we have to have regional activity.

A final role that's quite obvious is the general area of education. We're in the field, we can do the work well.

The question then is, if those are the roles, why those roles? From my perspective, states must have a set of priorities. Certainly we have to be realistic in that we cannot directly control every element of energy decisions, but without a set of priorities we are in the position of reacting to every decision rather than being able to act. It is preferable to be able to give

our opinions early on, base them in fact, and possibly influence decisions made at another level.

In addition, states vary. I found that out last week when I was accused of being an outsider because I wasn't born in the State of Idaho. That's something that has to be taken into consideration when dealing with states, or with any group. The familiarity that's implied by background or otherwise has to be there, or the good information you bring will really be wasted.

Often the national statistics do not reflect state's realities. I'll return again to geothermal. On a national level, it may not—justifiably—receive the priority that it should have for the State of Idaho. In addition, if I can use two more Idaho examples, agriculture is of extreme importance to our state. It certainly does not have the same sort of statistical importance on the national level. In addition, we have low density inter-city travel and a large BART mass transit system is useless to us. I've been unable to find any particular federal efforts aimed at solving the sorts of problems that *we* have. We're probably in a better position to try to solve those.

One of the major factors, I think, is that the states must live with the decision they make. While working in California, I was interested to note that the legislature is required, before they pass a piece of legislation that has an impact upon political subdivisions, cities or counties, to estimate the financial requirements that would be placed upon those cities or counties, and support them. In many cases, that happens to cities and counties and states throughout the country, as a result of actions taken by any bigger group. I think since we have to live with those decisions, we often have to be listened to, whether we have the right to an equal voice or not. Thank you.

Ed Lindaman

Our last panelist will speak of state and local planning efforts from the perspective of the national effort, because Bill Peacock is the Director in DOE of Intergovernmental Affairs. Bill is a graduate of Princeton University and Harvard Law School. Immediately prior to his taking the assignment as Director of Intergovernmental Affairs, he was Vice-President and Corporate Counsel for Crocker National Bank in San Francisco. Don't get rough with him because between 1967 and 1970 he was a Marine captain in Camp Pendleton and in Vietnam.

Bill Peacock

Thank you Ed. Most of today we've been talking about energy, so I'd like to deviate from that for just a moment and talk a little bit of medicine to you. Look forward to the year 2078, exactly 100 years from now, at which time after a person reaches a certain point and gets a little tired, you can program a change in career. You can go in to have a brain transplant and continue on a new career. So, picture this gentlemen who decides he's tired of being a gardener and he decides he wants to be an energy planner. He goes to see his local brain surgeon, and says, "Well now, what I want to do is become an energy planner. What do I do?" So the brain surgeon takes him into a refrigerated room; and along the walls of this refrigerated room

are cases that look not unlike the meat counters in your local supermarket. The first sub-compartment that he comes to has a little sterling silver platter with a pile of brains on it, and there's a price tag which says "Local Energy Planner's Brains—$100/Pounds." So he says, "Well, I don't know—I don't really want to work on the local level, let's move down the way a little." So he comes to the next one. This is another silver platter, and there's a pile of brains on it with a price tag in it not unlike those you see in the supermarket "State Energy Planner, $200/pound." "Well, you know, that is getting a little more like it. Let's see what you have down the line." So they walk down a little further, and there in a separate case all by itself is a gold platter with a pound of brains on it with a price tag saying, "$1,000 pound, Federal Energy Planner." The patient turns to his doctor and he says, "My gosh, what in the world makes federal energy planner brains worth $1,000 a pound?" The Doctor said, "Did you ever have to figure out how many federal bureaucrats it takes to make a pound of brains?"

I think today's topic of discussion—state and local roles in energy planning and decision making—is particularly appropriate to this conference. The states and local governments in the Northwest have played a particularly prominent role in addressing some of the more difficult energy issues this country is facing. One issue that has worked out very well in the Northwest is the harmony with which public power and private utilities work together. [laughter] Now that that one went over so beautifully, we will talk about some *real* examples, such as the issues involved in the future of hydroelectric power and regional power planning, the transportation of Alaskan crude oil to the Northern Tier states, the Alaska gas pipeline, and some of the unique programs local governments in the Northwest have put together in the form of energy conservation and planning. And finally, the pioneer efforts in Washington and Oregon in state energy facility siting, of which we heard a little bit before.

Now I am certain that the experience that the states and communities have had in the area of energy planning has given them a strong taste of the frustrations and difficulties that are a part of dealing with these very complex energy issues. My colleagues on the panel from state and local government have firsthand experience and are in a better position than I, to advise us how we can increase the opportunity for state and local participation in energy planning at the national level as well as to strengthen energy planning processes at the state and local level.

Nevertheless, this is a matter on which the Department of Energy places a great importance and my Office of Intergovernmental Affairs has assigned top priority. I therefore would like to spend a couple of minutes with you describing exactly what we are doing.

We have two primary objectives: the first is to support and encourage energy planning at the state and local levels; the second to is *increase* the involvement of state and local governments in energy planning and policy development at the national level.

Let's talk about the first of those two objectives, energy planning at the state and local level. Last July President Carter met with the Governors at the White House to discuss the role of the states in addressing our national

energy crisis, and the steps that could be taken in building a federal-state partnership in this effort. A number of key issues emerge from this discussion. One of those key issues related to the state's growing need for energy planning and management capabilities, to aid governors and other state officials in planning for future energy needs and in coordinating the increasing number of energy projects, facilities, and activities within the state.

The National Governors' Association convened a task force of state officials to address this issue, and to work with the Department of Energy. This group concluded that new legislation was needed to support the states in building this kind of broad base planning and management capability. Since he existing federal assistance programs to the states were primarily limited o energy conservation matters, the task force recognized there were other energy-related matters beyond conservation that should be addressed in energy planning, such as resource development; facility siting, energy transportation, impact mitigation, and the like. Also, states would need to analyze supply and demand information to be able to look ahead and project future energy supply and demand scenarios.

The Department has since been working with this group of state officials as well as a number of local government representatives to draft a proposed piece of legislation entitled "The State Energy Management and Planning Act." The drafting of this bill has been a precedent-setting intergovernmental effort. Traditionally federal agencies develop policy internally and do not share such proposals with outside interests until the Administration has completed its review. In the case of the State Energy Management Planning Bill, that was not the case. We feel strongly that the open process that we have followed has been extremely beneficial, and although it is always difficult to totally satisfy all interests, we are confident that this proposal will be better received when it reaches Congress because of it. We had expected to be able to announce that it had been introduced into Congress by the time I gave this talk. Unfortunately it looks like it's another week's delay before the final clearance procedure goes through and we look forward to that bill being introduced into the Congress next Monday or Tuesday.

I would like to highlight some of the major features of this bill. The bill would provide resources to promote and support the development and enhancement of energy planning and management at the state level and would strongly encourage the participation of local governments in this process. The bill will consolidate the three existing Department of Energy federal assistance programs for conservation and related efforts: the EPCA, ECPA, and Energy Extension Services. It will require the Department of Energy to review and simplify its complex regulations and administrative requirements related to its state energy grant programs in order to eliminate unnecessary red tape in administrative burdens; and finally it would provide some funds to support innovative energy projects of local or state governments which might not be appropriate for financing through other sources.

While the work of this task force in the sent bill has received most of our attention in this past year we are now preparing also to address more closely the role of *local* governments in energy planning. The department has taken note of the growing interests of local governments in energy management

planning and recognizes the significant contributions that local government can make to energy conservation in development of goals through the authorities local government exercises such as building codes, transportation, land use planning, consumer services, licensing, local public utilities, and so forth.

Again it is particularly appropriate for this talk to be given at this conference because the City of Seattle and other local governments in the Puget Sound region have been a major force in bringing this issue to the attention of the Department. Mayor Royer, former Mayor Ullman, Councilman Randy Revelle, who I believe is in the audience, and the Mayor's top sergeant Bil[l] Sound region have been a major force in bringing this issue to the attentio[n] of the Department, and as a result the Department is initiating this summe[r] a major review of the role of local governments in energy, and will be working closely with local governments on this effort.

Let's turn to the second half of the objectives of this office—involving state and local governments in energy planning and decision making. Obviously the success of our efforts in responding to the nation's energy situation depends on the collective efforts of all of our citizens—the private sector and government at all levels. It would be naive, especially in view of the joke I told at the beginning, to assume that federal policy makers in Washington, D.C., have all the best answers. We are looking for new ways to involve the public in state and local governments in early deliberations on major national issues as well as in the formation of specific policy in program proposals.

Just one example: the President recently announced that he had ordered a major review of solar energy for the purpose of developing a national strategy to promote and accelerate the use of solar energy. The results of this review will be specific budget and legislative recommendations to be presented to the President this fall. Now rather than to conduct this analysis internally, the Carter Administration is seeking early input from state and local governments, labor, industry, consumers, Indian tribes, and the public at large through a series of public meetings throughout the country in the month of June. Maybe as a tribute to Mayor Royer and Senator Magnuson and Jackson, the first of these national meetings will be held in the Northwest in Seattle on June 12 and 13th and I encourage those of you who are able to do so to come and present your views at that time. The findings of these sessions will be conveyed to the President and will form the basis for the recommendations which he will forward to the Congress for initiatives in solar energy.

Just another brief example of the input of state and local government in the policy-making process is the recent development of a national policy on mitigating the adverse social and economic impacts of energy development. The President, in announcing his National Energy Plan, noted the absence of a clear national policy and directed that a review be conducted. That review is now complete. The product is not the product of a group of federal bureaucrats, but the work of a task force consisting of governors, Indian tribal representatives, local elected officials, and cabinet members who put their staffs together to reexamine the issue. The instrumental individual from the Department of Energy in putting this review together is Robin

Pasquerella, who is also in this audience and is now part of the Department of Energy Region X Office. Last month the President in Colorado announced a new federal policy to aid energy-impacted areas through financial assistance to states and communities. The President's proposal is a direct result of this inter-governmental effort, which has played a central role in shaping the policy. This legislation is now winding its way through the Public Works Committee under the title of the "Hart-Randolf Impact Assistance Bill" and if any of you want a copy of that my office would be more than happy to supply it.

In addition to the development of major energy policies, we are also concerned about the numerous decisions made through the federal regulatory process, and earlier this month the Department published for comment in the "Federal Register" its plan for re-forming the regulatory processes of DOE. Among the changes proposed is one which would increase the opportunity for public review of proposed regulations and provide for early notification of future regulatory action.

One of the primary missions of the Department Office of Intergovernmental Affairs is to ensure that the views of state and local governments are considered in the development of national energy policy and the impacts of federal energy actions on states and localities are fully weighed before they are taken. We are continuously searching for new ways and new opportunities to involve state and local officials in the energy planning process at the national level and to help state localities build their own energy planning and policy development processes. I am looking forward to this afternoon's discussion and to learning from my fellow panelists and those of you in the audience how we can do a better job of involving you in planning for our energy future. We are here not because we have the answers; we are here because we would like to have you help us find those elusive answers. Thank you for your time.

QUESTIONS

Tom Martin, Chairman of the Energy Committee of the Washington Society of Professional Engineers: I will direct my question to Barbara Dingfield. I agree completely with two of her three points—conservation and rate-making very definitely will affect demand, and are ways of reducing the rate at which our demand will grow. Forecasting, and manipulating the way in which we make forecasts, is simply treating the symptoms rather than the disease. The utilities are experts at making these forecasts—they are revised every year so that if we succeed in reducing the demand by our rate-making, by our conservation, that will show up very quickly and the utilities will then revise their forecasts. As the situation stands right now we are behind; our reserve for outages, for maintenance and all that sort of thing is much tighter than it should be, so if we come out being a little bit ahead because of the time lag in revising these estimates, that actually will be all to the good.

Barbara Dingfield: I certainly agree that the people in the utility industry—in our case it is the government which is the utility industry—are certainly

the experts at forecasting. But I think we all recognize that the state of the art has changed a lot in the last few years. We now use fairly sophisticated econometric models for forecasting. We are right now moving to an end-use model with City Light, which means that we are going to try to look at what kinds of appliances and uses residents in the City of Seattle have, in order to gage what energy demands will be. Being an economist I also know that a lot of assumptions are built into making every econometric forecast and I think the role of an office of elected officials such as ours is to understand those assumptions. Then if they feel that those assumptions are not reflective of local policy, that can be stated and the utilities can take those policies into consideration as they proceed with their forecasting. That's no taking the role of forecasting away from the utility, but an understanding of the part of government of the assumptions that are the basis for forecast, is very important.

Dick Nelson, member of the Washington State Legislature: I would like to direct this question to anyone who has an answer to it. It is clear that part of our energy problem is the living patterns that we have all come to enjoy—the freedom of transportation and the urban sprawl that allows us to extend our living abodes out miles from where we work and from centers of cities. Since it was mentioned this morning that changing that is difficult—it is going to take a lot of time, and in effect you have to wait maybe until you renew those houses, those industries to be able to make a big dent—maybe we should look elsewhere. Predictions are that the Northwest is going to grow substantially—in particular the State of Washington may grow by 50% to five million residents in the next thirty years. Perhaps that gives us an opportunity to do some re-direction of living patterns, and I intend that to mean industrial patterns, job patterns, as well as residential patterns with those new residents of this state. So I am wondering how you would respond to what you alluded to—the role of land-use planning and growth management in getting a handle on at least part of our energy problem?

Ed Hudson: "Partnership" is a well-worn word, but it has to begin to occur between the state legislature and local officials who are now in the process of implementing or at least finalizing some regional development plans and, within those regional development plans, some local growth plans. The Puget Sound Council of Governments in this area, which represents approximately 57% of the population in the state, is forming an umbrella plan over that. We have a Legislative Task Force Committee which would like to meet with some legislators prior to the January session. In the particular area of energy we have formed some good relationships with Mr. Lysen and Mr. Bottiger, and we are now working with Mr. Bagnariol. We are also working directly with the Governor's office. We have a long way to go in this area.

It is clear that there is much that can be done; while as everyone says, it's difficult, there are a lot of easy things that can be done if we would sit down and chart out a course for ourselves—that hasn't been done in years. Each body has been allowed to go its own way so we are looking forward to strengthening some of these ties that have been already brought together to some degree in this last year.

Rob Walton, State Senate Energy Committee: My question is directed at Fred Miller or any of the others who wish to respond. Would you comment on the role of the states and local government with respect to the choice of the type and size of future power plants in the generation mix for the region? Specifically (in reference to some recent work I believe the Oregon Department of Energy has done regarding cost production modeling and future thermal power plant capacity factors), do you think that the states should be in a position to tell the utilities what type of plants to build?

Fred Miller: It's tough to give a consolidated response to that. My earlier comments were that I do think that the state has a role; as our siting process is set up we don't tell an applicant, "We're going to turn down your coal plant but come back with a nuclear plant and we'll site it." We really are in a position of responding and saying if it won't work. I think that may be unfortunate if in fact the state is going to assert itself in terms of type and size of plants. That's one thing that we are talking about changing as the new legislation comes up. But I have some problems with the state getting into the role of unilaterally laying out specific types and sizes of facilities—that is bothersome to me. That is not a satisfactory response to your question, but the other part—in terms of how do local governments get involved—that's where I see the alternate resource comments that I was making as fitting in. I think what the state can really do is to lay out a framework and some kind of incentives for a lot of localities to take advantage of those indigenous resources so they don't really have to get bogged down in some very esoteric debates. We have areas in Oregon where about half of their energy comes from wood. We have areas where we have geothermal potential along with solar and wind potential in Northeastern Oregon, that probably could become close to self-sufficient and I think local governments can really participate most effectively by taking advantage of these resources. Our production cost modeling would enable us to see how this kind of effort fits into the system, but I really can't do a good job on your question because I have to think a lot more before I can wrestle with it.

Curt Eschels, Staff of the Washington State Senate Energy & Utilities Committee: The State of Washington has deliberately kept the need-for-power question out of its Siting Council, and to lend some perspective to the discussion today, I would like to tell you some of the reasons why. The first, to tag along under the previous question, has to do with how you use that need-for-power determination. If a utility is directed to build a particular kind of plant, perhaps one group would say, "Well you could use it to balance the degree of protection for the environment against our need for energy," while the other group says, "No, you're reducing health and safety standards to build this plant." Those are hard policy kinds of issues. Also, who is to decide those policy issues? Setting aside for a moment all the models that are available, let's look at how it can be done. You may have "a coolly objective professional group of experts," one side says. The other side says, "no, they're the arrogant academicians." You could turn it over to the "foundations of our republican form of government," says one side. The other side says, "no, it's the sleazy politicians."

Another question that has not been resolved in the State of Washington: who is responsible if there's an error—what about the question of liability? If there is an error, the public usually wants someone to blame. Secondly, if the lawyers that I've witnessed practicing before our own Site Evaluation Council are any indication, they would find a lot of things to argue about.

There is also the question of how durable a forecast should be. To be useful as a planning tool, it should be fairly durable. At the same time, you want to make it responsive to the will of the public, the people, the folks. What do you do when there's a change in administration. In the State of Washington, we've just had one. I would suggest that the present administration wouldn't have the same philosophy about energy as the previous one and the next administration won't have the same ideas as the present one. These are questions which we have examined; and the legislature has deliberately kept that need-for-power question out of the issue of evaluating the site. Well, that's just a statement to lend some perspective to the discussion today.

Pat Dugan, Grays Harbor Regional Planning Commission: I noticed that the local representatives didn't accent a role for local government in siting, and perhaps that's because they are from the consuming regions. Being from a producing area, and probably representing the feelings of local governments in potentially producing areas, I feel that there's a very strong potential role for local government in siting. I'd like to address a question to the representatives from the state agencies, as to whether their states directly involve local governments in siting considerations, particularly before a particular site is proposed. And also—probably the most difficult part—do you see a need for the state to preempt local planning and zoning?

Fred Miller: That sounds like mine. As I indicated earlier, we have a statute that provides for a one-stop process, so that once the Siting Council signs off, all state and local governments must also issue their permits. This isn't done without consultation with local governments prior to that time, and they are by statute incorporated in the process. It's just that we have to have that one-stop approach to get things done by the allotted time. So I think there is a very strong role there.

My other comment though, is that local governments, in my view, at least in the Oregon siting situation, have not been all that interested except to want the facilities as soon as they can get them. One doesn't have to be awfully bright to spot that in Gilliam County, Oregon, with $110 million assessed valuation, that $3 billion would do something to their property taxes, and do something to the services they could offer—and that's a pretty big item. I think generally we find that local governments are not very concerned about the socio-economic impacts—I'm thinking now of the major thermal facilities. We've had a lot of support from local governments, so I think they do get their oars in, and it hasn't been very controversial. If we get into transmission lines and some other things that cross a number of jurisdictions, there will probably be more opposition, and it's all the more important that we incorporate those local views. But to date, I really haven't seen much controversy.

Kirk Hall: I might note that in the State of Idaho we do not have facility siting legislation; the activity is carried out by the Public Utilities Commission. The legislation proposed in the previous legislature, which did not pass, would still have had the Utilities Commission in the position of responding to a request by a utility. It would then be the responsibility of the utility to involve those communities in the preproposal stage. I would note that you need some specific place to give response to in a formal sense, and that probably rests upon the state. The Facility Siting Act did call for hearings in locality prior to any decision.

Ray Hausler, Audit Manager for the General Accounting Office: My question is for Mr. Peacock. We've heard today about a lot of pretty sophisticated things: analyses of demand forecasts, perhaps testing and validation of demand forecast, alternative energy sources, siting decisions. It sounds like we're expecting a great number of state bodies and perhaps local municipal people to develop a lot of expertise in some very sophisticated areas.. We can also probably expect an uneven development of that expertise with some states and municipalities and local bodies leading the way, some moving at a slower pace. What does DOE expect in terms of an oversight of that development, especially when we're talking about major capital commitments? What kind of an over-lay does DOE have when it watches this developing across the nation; what fall-back positions, if decisions are going contrary, for example, to directions that might be considered the National Energy Plan?

Peacock: There are a couple of ways that your question can be answered with regard to the legislation that I referred to, the State Energy Management Planning Act. The bill specifically requires that the state energy plans be submitted to the DOE for review. Now, we've tried to build into this legislation sufficient flexibility so that the differences between the State of Washington, the State of Arizona and the State of Massachusetts can be taken into account; and you don't just impose a cookie cutter program on each of these states, notwithstanding the differences that they have. However, there are some fairly strong provisions in the Act itself, if it passes in its present form, and which certainly will be written into regulations, providing that state energy plans will be at least in a major degree consistent with national energy plans and national energy goals. If a state comes up and says, "Well, we're going to embark on a new program of oil-fired boilers," that's certainly not going to be an energy plan that's conducive to acceptance and thereby funding under this act. I'm not trying to ridicule the question by taking that absurd example. Things have got to be consistent with the differences between what goes on in Massachusetts and what goes on in Arizona, or it's like night and day as far as promoting the goals of the National Energy Plan. There are a number of activities that are involved also in the basic educational process. The Energy Extension Service, built on the Agricultural Extension Service model, provides a tremendous vehicle to small users, small businesses, individuals, users of energy, through a methodology to decrease the use of energy and to cultivate and promote alternate resources. So that is another way that consistency is found in

what we're trying to achieve. We have to live with you as well as the OMB and we're not there just to give away money willy-nilly. We want to see as much result—return on investment—as we can, and we think these are programs that will provide probably the greatest return on investment. That's why they've achieved the highest priority and they're being introduced into the Congress at this early date—because we feel that they will have that benefit.

Hausler: Let me get a rejoinder. I wasn't suggesting that there wouldn't be differences. I was just suggesting that the state of the art would be far different, and that, for example, some utilities serve multiple states.

Peacock: Your point is extremely well taken; one of the primary reasons underlying the proposed Act is that there is such a wide variation in expertise and capability for planning and management of energy issues in the states. You can look at the difference between the State of California and the State of Idaho; and you have a representative of Idaho who just made the comparison, so I'm not talking particularly out of school on that. This is an effort which will undoubtedly provide greater benefit—dollar for dollar—to states like Idaho, who are starting from a lower base, than it will to California. It will make California marginally more sophisticated in its efforts. It may bring Idaho, if I may use the phrase "out of the Dark Ages," if that's what I heard before.

Jim Young, Manager of Energy Planning, Weyerhaeuser Company: I'd like to address this to Mr. Peacock. I attend energy conferences and the Environmental Protection Agency is missing, and I attend environmental meetings and energy people are missing. I don't know whether *inter*-governmental also means *intra*-governmental. One of the disappointments in the Clean Air Act amendments of last August, was the fact that a lot of energy considerations were not made—in other words, the trade-offs were not evaluated. Secondly, we're beginning to see some beginning analysis of what the Clean Air Act really means to things like coal development. And then we see in the National Energy Act very little language focussing on those kind of trade-offs in dealing with EPA. So my question really is, sir to what extent are you responsible, or are others trying to deal with this question of intra-governmental relations on the federal level?

Bill Peacock: That's an excellent question and I'm glad you raised it. Senator Jackson alluded to the fact that there are five federal agencies that have primary jurisdiction in developing a coal fired facility—if that doesn't make for an inconsistent statement on that type of a project. By the time you do a complete analysis there are something like twenty-two stops within the federal government for one coal fired plant. In the major area of concern that you talked about—the differential between EPA requirements or objectives and the objectives of the Department of Energy—EPA, the Congress and DOE are well aware of apparent inconsistencies there, and we're working hard to address those issues. My office is responsible for intra-agency activities also. I must say that when it comes to knocking heads with Doug Costle, I call on Secretary Schlesinger to do that. I think we're making some

progress in ironing out where the priorities are. As Senator Jackson mentioned this morning, our objectives and those of the management level at the Environmental Protection Agency are not to create an either/or, the disjunctive. They are to create the conjunctive, so that we can have energy production and a clean atmosphere at the same time. We're working very closely with EPA on developing memoranda of understanding in order to accomplish those objectives. So that effort is on-going and it's a daily effort.

Hudson: I'd like to add on that, not necessarily on energy specifically, but Northwest governments have been working extremely hard to wrestle with that same problem. As you know, Seattle has been a sponsor of the Intergovernmental Coordination Act. Currently—and this is why I'm responding to the question—I think it's no secret that there's the possibility of working out an arrangement with the Under Secretaries of various departments on a special relationship with this Puget Sound area. The possibility may exist of getting one regional plan in this area that theoretically would encompass the Clean Air Act and allow some of these trade-offs to exist at the local level; and then have the "feds" buy into that local plan. We're in the initial stages of that. We are trying very hard to encourage private business to get involved with us, either through the EDC or the EDD or through us directly. Weyerhaeuser would certainly be a company we'd like to see participate in this effort, which is just under way, I can advise you of that.

Walt Gordon, Gordon and Cross Engineers, Tacoma: I'm not affiliated with any power company. Having the politicians determine the load growth scares the hell out of me, because no matter how hard they try, how are they going to be effective on it? I'd like to present some facts. During this year-ago power shortages, due to the lack of rainfall in the Northwest, the best that the region came up with was less than 7% curtailment. And as soon as their rain began to fall, that disappeared. Now, traditionally the electrical load in the Northwest has grown at the rate of 10% a year, or 7% a year—it doubled in ten years. I can give you some facts on it, because the past is prologue to the future. I have the specific figures for Tacoma: in 1930 the kilowatt/hours per home (never mind how many homes, of course it increased each year), was 1800 kilowatt/hours; in 1940, 2100; in 1950, 6600; in 1960, 9900; in 1970, 14,000. In 1975, the last I have, the figure is 16,000 per home; and my partner who has an electrically heated home in that same year used 57,00 kilowatt/hours of electrical energy.

Now of course electrical energy has been growing faster than the other things, although gas came into the Northwest only about twenty-five years ago. And now there's gas, there's oil, and there's electricity. If you curtail this, if you can assume that there is going to be 2% load growth, that's still going to require more generation. If Seattle, in their 1990 study, says there's going to be no load growth, who's going to pick it up? It's only the other utilities—like Puget Power, Pacific Power and Light, City of Tacoma—that have invested in nuclear plants that perhaps can share it with Seattle. I don't think that we're going to cut Seattle off and have power in Tacoma, because we have a tie line between the two places and we buy power jointly.

Twenty-five years ago I was chairman of the Washington State Power Com-

mission, and on the governor's Power Policy Committee. And Governor Jordan of Idaho, a very astute politician said, "Walter, what in the world is going to make our load double in the next ten years?" And I said "Governor, I don't know, but it's doubled every ten years for the last seventy years and I'm not about to say that it won't do it in the next ten years." Stop and think a moment. Just back in 1950–55, did we have television sets like we do now, did we have the profusion of household appliances? That's the reason that the load per family in Tacoma increased so astoundingly. Are you going to stop buying appliances at the store down on the corner? I don't think so. Where are you going to get that energy? These people that have six kids—are they going to stay at home, ten, fifteen years from now, or are they going to want to have their own homes and their own appliances? So, it's going to be dangerous to underestimate the load growth.

It's far better to have the power and have the jobs than to be without power and without lights perhaps. Remember this: in some cases with the state-owned telephone systems in foreign countries, you have to wait five to fifteen years to get a telephone. Do you want to tell people they can't build a house, or are you going to have a house that's lighted with candles or wood? And Mr. Miller, I think you said that Oregon is lucky to have 50% of their energy from wood waste? I suggest you look into that because I doubt that it is 5% when you take into account oil, gas, and electric power from hydro.

Miller: I think you misunderstood: I said that in a *particular* county, 50% of the energy, counting all sources, comes from wood. I don't want to argue with the various statements you made about load growth, but I want to get to the process and I think that you may not have understood at least what Oregon's process is. When you say politicians determine load growth —we have a Siting Council of seven citizens that listens to evidence presented in a quasi-judicial format, and they cannot make a decision that is not based on the evidence. So if in fact you are right about the future, that evidence is in the records that determines the process. It is not politicians sitting around in a room who determine what load growth is. To argue against that kind of process, you either have to think that citizens should not be involved in it or that the quasi-judicial system won't work. I tend to opt *for* both of those.

John Rasmussen, Manager of Kootenai Electric, Coeur d'Alene, Idaho: I think this is probably for Mr. Peacock, but it is more of a statement than a question. We've heard an awful lot today about the Department of Energy, state and local government, setting policy on pricing, peak-load pricing, time-of-day, life-line rates, load forecasting. We've heard about state and local government being called upon, Indian Tribes, and so on, and yet today I don't think I have heard any mention of the electric utility people. I am wondering if we are being stripped of something here as electric utility people, and if all we are going to be left with is trying to come up with the money for capital investment and electric utility responsibility, but no voice in it.

Peacock: Your statement reminds me of discussions—and I say this with great respect—that I have had with my father in the past, when I have said one thing and he comes in from left field on another. The issues that we are talking about today concerned the participation of state and local governments in the energy policy-making process. We were not talking about the issue of the involvement of electrical utilities in the energy policy-making process; that is a subject for another talk. I would be delighted to meet with you afterwards and talk about some of the major efforts that the Department has, involving the utilities. For example, the Nuclear Siting and Licensing Act of 1978 which was introduced into the Congress about a month ago provides an enormous incentive for utilities to move forward with the planning process to be involved in the standardized design that you heard Senator Jackson talk about this morning with regard to nuclear plants. The number of activities that we have with regard to the electrical utility industry is so diverse that I hate to get into it and carry us overtime. I appreciate your comment. I can understand your frustration if you thought we were going to talk about the role of utilities or utility executives in the planning process. That wasn't what we were here to talk about. It doesn't mean that there isn't a role; and we are most happy to hear from you all, because after all that is where the expertise in this whole industry resides. I hope you understand that as a citizen and as an employee of a utility, your views are more than welcome in the public participation process that we are designing here and that this Administration stands for.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

INDUSTRY AND UNIVERSITY ROLES IN DOE RESEARCH AND PROGRAMS

Presiding: Dale Comstock, *Dean of the Graduate School & Research, Central Washington University*
John Deutch, *Director, Office of Energy Research, DOE*
Ronald Geballe, *Dean of the Graduate School, University of Washington*
Ken Smith, *Director, Ecotope*
Peter Rose, *President, Mathematical Sciences-Northwest*

Dale Comstock

Welcome to the panel on Industry and University Roles in DOE Research and Programs. We have a distinguished group of people up here today, and are going to try to have an informal free-wheeling session.

John Deutch, our first panelist, has an interesting academic background. He first took a B.A. in History and Economics, then, later switched and took a B.S. in Chemical Engineering, and eventually a ph.D. in Chemistry from MIT in 1966. He subsequently was a post-doctoral fellow at the National Bureau of Standards. In 1966 he joined the Faculty at Princeton University as an Assistant Professor of Chemistry and then switched to MIT in 1969. He moved up through the ranks to Full Professor of Chemistry and eventually to Department Chairman in 1976. He has also had work experience in the Defense Department as a systems analyst and at the Bureau of Budget, which you know better these days as OMB. He serves on the Defense Science Board and the Army Science Advisory Panel. He has published a number of papers in his field and has served on editorial boards of the Annals of Physical Chemistry and Chemical Physics. We are looking forward very much to hearing about the new Office of Energy Research, the basic research programs being developed in the Department of Energy. Dr. Deutch is also going to try to fill us in a little bit on Assistant Secretary Sam Hughes' area—Intergovernmental and Institutional Relations.

John Deutch

Thank you very much. The energy business sometimes really amazes me. I sat at lunch and heard about deposits of crude oil on the West Coast. There are many people here today involved in the problems of the coast and the nation. I met with the Washington Public Interest Group to talk about nuclear waste management problems in the West early this morning; there are a whole series of problems that face us both regionally and in Washington about energy. All too frequently I think the tendency is to worry about the problems that are here today which will be with us for the

next three or four years, and not make an investment in the underlying knowledge and capacity to deal with energy problems as they develop in the next half century.

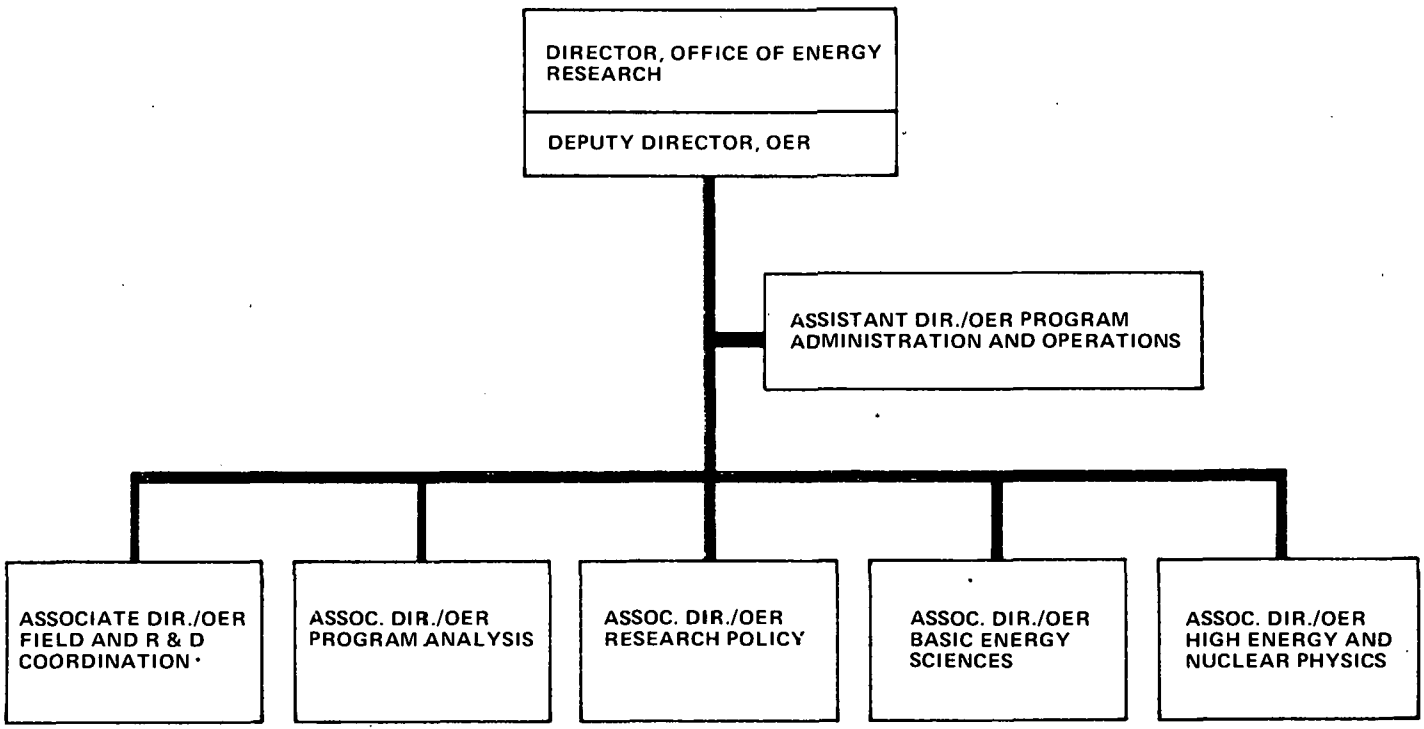
As the DOE Director of Energy Research, I worry about the health of the system—not today, not tomorrow, not what the natural gas price is, nor what the price was in the last few days—but about the future, and how to develop basic research programs that will keep the country in a position to do well in energy supply and environmental controls for a long time. Today what I shall be speaking about in part, are the basic research programs of the Department. Because I thought it would be of interest to the sponsors of the conference and to you, I will be emphasizing our activities at universities. In the past, both the Atomic Energy Commission and the Energy Research and Development Administration were heavily focused on the use of the national laboratory system. While the national laboratory system was well represented here in the State of Washington, there has been a great deal more attention placed in the Department on aiding the basic research area at universities and, through our efforts in commercialization, working with industry.

As a preface to my speech, I would start off by discussing the organization of the Office of Energy Research. This office was not originally in the Administration proposal for the Department of Energy, but was placed in the bill by Congress. Both Houses of Congress have a great interest in the Office as a result of the fact that it was created by them and reflects a certain concern they had for proper attention to basic research during the energy crises. I would like to point out the five positions in the Office because they tell you a little bit about what kind of job I have and the place of basic research in the Department.

Currently I have three functions. First, I am responsible for ensuring health and well-being of the Department of Energy Laboratory System. I am personally responsible for several of the laboratories and, in addition, the Secretary, and Deputy Secretary, and other Secretaries look to me for guidance on general policy and assessment of the health of all the laboratory systems with the exception of the two weapons labs, which I'll get to in a moment. Two other responsibilities are for program analysis and research policy. The Act makes it clear that the Secretary is supposed to look to the Director of this office as the principal corporate person who is going to provide technical advice on research. So while I don't run enormous plants and don't have responsibility for most of the large technology programs, I try to provide objective technical advice to the Secretary.

[Question: "Can you tell us where all those laboratories are?"]

The Department has 144 lab and field installations. Some of the major laboratories are Hanford, Los Alamos, Livermore, Argonne, Brookhaven, Oak Ridge. In addition, there are dozens of smaller ones throughout the country. We have also just established the National Solar Energy Research Institute, SERI, in Golden, Colorado, and we have established four regional solar centers including one western regional solar center which I believe will be located in Portland, Oregon.


DIRECTOR, OFFICE OF ENERGY RESEARCH
DEPUTY DIRECTOR, OER
ASSISTANT DIR./OER PROGRAM ADMINISTRATION AND OPERATIONS
ASSOCIATE DIR./OER FIELD AND R & D COORDINATION
ASSOC. DIR./OER PROGRAM ANALYSIS
ASSOC. DIR./OER RESEARCH POLICY
ASSOC. DIR./OER BASIC ENERGY SCIENCES
ASSOC. DIR./OER HIGH ENERGY AND NUCLEAR PHYSICS

Second, I provide program analysis and guidance to the DOE management. I will just mention the three programs which occupy most of my time presently: radioactive waste management, fusion, and solar energy research and development. Finally, I am charged with two outlay programs, basic energy sciences and high energy and nuclear physics. High energy and nuclear physics are clearly not energy-related research, but I do think it is entirely appropriate to think of basic energy sciences as being energy-related research. This is just a heritage of the fact that our Department grew up out of the atomic energy system.

The summary chart describes how our budget has changed with respect to support for basic research in colleges and universities, and I show you this just to give you the impression of a trend which is under way. The chart details programs by Assistant Secretaries—Bob Thorne is Assistant Secretary for Technology and Don Beattie is Acting Assistant Secretary for Conservation and Solar Applications.

Next I would like to turn to the actual programs of the Office of Energy Research. As you can see, the high energy physics program is roughly a $300 million program, and we are committed to maintaining that as a very strong program. Nuclear Physics includes our major nuclear physics accelerators around the country, many of which are located at Department of Energy laboratories, and some of which are located at universities, such as the facility that exists at the University of Washington here in Seattle. I draw your attention to Basic Energy Science in particular, because here you find the basic research program which underlies the efforts of the Department. You can see the sort of change in budget that has taken place: roughly a 20% budget increase in basic research. There is extraordinary support, both in the Department and in the Administration, to continue that kind of increase in our basic research programs in the energy field because of the recognition that the work that is being done today is going to set the basis for advances tomorrow.

The final program, which I won't spend much time on, is close and dear to my heart—the Advanced Technology Assessment Projects, (ATAP) Program, which is intended to provide, not ordinary basic research grants and contracts, but rather opportunities for very high risk technology projects to be undertaken in competition with existing programs. We expect that these programs will be undertaken either by industry or universities, or possibly by the Department of Energy laboratories themselves. The ATAP budget for FY78 is $1.8 million, the fiscal '79 budget request is for $21 million.

Now in addition to these basic research programs, there is life science activity in the Department which is supported not out of the Office of Energy Research, but by the Assistant Secretary for the Environment. Here you see some of the programs which have been under way in the life sciences basic research area. We have a long history of involvement in nuclear medicine, and many of our laboratories and our programs have unique capabilities in using nuclear physics or nuclear science to support all kinds of health-related programs. You will see that this program, unlike the ones I have discussed before, has had some budgetary illness: it has indeed dropped in fiscal '79 relative to fiscal '78. That is a matter of some concern to me

FY 1979 SUMMARY—OFFICE OF ENERGY RESEARCH OUTLAY PROGRAMS

(DOLLARS IN MILLIONS)

	BUDGET AUTHORITY		
	FY 1978	FY 1979	CHANGE
HIGH ENERGY PHYSICS (HEP)	$274.1	$294.7	$20.6
NUCLEAR PHYSICS (NP)	80.5	90.8	10.3
BASIC ENERGY SCIENCES (BES)	177.4	211.5	34.1
ADVANCED TECHNOLOGY AND ASSESSMENT PROJECTS (ATAP)	7.5	21.0	13.5
TOTAL OER OUTLAY PROGRAMS	$539.5	$618.0	$78.5

personally, because I believe that we ought to be doing a great deal with basic research and generalized science, partly to support our environmental programs. Every new applied technology that we put out has an environmental assessment side, so you have to look at environmental control and environmental litigation, and you need to have a basic research program to underlie those environmental considerations.

In addition, the last program, which is called the Biological Energy Conversion and Conservation Program, is intended to develop basic research programs to explore ways of using biological systems to do some of our processes more efficiently, more cheaply, and using less energy, in more environmentally-benign ways. It would be absolutely terrific if we found a way to economically and rapidly break down cellulose into other kinds of organic molecules suitable for fuels. This program should be going on at much higher level than is presently under way.

I don't know how much interest there is in the high energy physics program here; I would be happy to answer questions on that at the end. What we try to do with high energy physics is illustrated on this chart in which we speak about a long-term program of roughly $300 million a year in constant '79 dollars. We do not anticipate that the high energy physics program will be growing at the same rapid rate as some of the other basic energy research areas. However, this is a little bit misleading, because included under that $300 million line is the commitment to a three-centered high energy physics system: SLAC at Stanford, Fermi Lab at Illinois, and a commitment this year to build a new accelerator at Brookhaven called Isabel—an enormous machine, 400 by 400 GED proton storage. That last construction item which you see on the chart is for $250 million for that single accelerator, so it was also the single largest construction program in the Department of Energy budget. Indeed, that construction program was the largest construction item for one single facility included in the federal budget this year with the exception of some items for the Department of Defense. So the high energy program is in good health, and we are committed to keeping it strong, in a caretaker capacity, although it isn't really related to our energy supply concerns. We have a major commitment to build the new accelerator to try to maintain world leadership in this area.

With respect to basic energy sciences one of the first items that I noticed when I started in October was that the Department of Energy had no engineering research programs. Engineering is supported in a variety of ways in connection with specific projects and programs, but the idea of having an area where engineers can come to the Department for research supports, as they could if they were materials scientists, or chemists or physicists, is simply absent; and yet engineering is central to our ability to develop all kinds of energy supply technologies or environmental control technologies. I was stunned by this and felt very strongly that the absence of a strong engineering program, primarily at universities, was one of the major deficiencies of the Department's basic research program. In contrast, let me point out that our materials science program is larger than the National Science Foundation's, our chemistry program is larger than the National Science Foundation's, in fact the whole DOE research program is larger

HEP – HIGHLIGHTS

ACCOMPLISHMENTS–REFLECTING CONTINUED WORLD LEADERSHIP

• UPSILON PARTICLE	FERMILAB
• POLARIZED PROTONS	ANL
• ESTABLISHMENT OF CHARM	SLAC, FERMILAB

FACILITY PRIORITIES

• COMPLETE PEP	SLAC, LBL
• COMMENCE ISABELLE	BNL
• CONTINUE ENERGY SAVER DOUBLER	FERMILAB
• SHUTDOWN ZGS	ANL

than that of the National Science Foundation and larger than the sum of all the basic research programs of the Armed Services. However, in engineering we've had nothing, and we are, of course, attempting to start a program which I hope will grow quite startlingly in the years to come.

These are areas with projected increases of greater than 15%.

The next area which I think is very important is geo-sciences. We are taking more and more of our resources, not only more natural gas and oil, from the earth, but we are also trying to do more geo-pressurized work using hot-dry rocks in selected parts of the country to produce energy. The Department, accordingly, has a real responsibility to perform basic research to support the geo-sciences program.

Perhaps the single program which personally concerns me the most is the waste management program. Some of the issues which are facing us in waste management deserve great attention.

The third area that we have picked out for specific emphasis is computational sciences. The Department of Energy is perhaps the third largest owner of computational power in the world. We use an enormous number of computers to support our weapons' program and for other activities of the Department. But the question is, are we using that kind of technology as intelligently and efficiently as possible both in terms of doing calculations and in terms of information processing and transfer between all parts of the agency? I feel that we aren't in a position to know. We don't know whether we are making the most efficient use of our automatic data processing equipment. So we are trying to develop a program that will not only extend the state of the art in computer science, but also will give us a means of making the most efficient use of the computational assets that we have.

The final area that I have selected as being of particular interest is solar energy and related research. We are very conscious of the fact that the Department has a tradition of nuclear involvement—a tradition with fission, a tradition with all aspects of nuclear technology. We also have had experience with knowing how to do other high technology activities like fusion, for example, which is certainly a far-out prospect. We are relatively comfortable in doing high technology development. Recently, we have been given responsibilities in the solar area; much of the solar technology is state of the art, but we must now deal with the economics of the technology and societal aspects such as additional employment opportunities. We must attempt to formulate our research and development programs in the solar area to be most advantageous, to provide the greatest strength, to accumulate knowledge to bring it to us as a realistic and economic source of energy as soon as possible. Unlike the other patterns that I have mentioned to you which are discipline areas—chemistry, physics, geo-sciences, and applied math—here we reach something a little bit different. Here we try to work back from the technology in order to select the appropriate areas of basic research. We make no promise that it will be here tomorrow, no promises that it will fit on your window sill or on your roof tomorrow. But we try to look for the most far-out ideas and accumulate the knowledge as we have for other technologies over a period of years, to be in the best possible position to take advantage of solar energy.

BASIC ENERGY SCIENCES

OPERATING EXPENSES

($ in Millions)

	FY 1978		FY 1979		% CHANGE FY 1978 TO FY 1979	
	BA	BO	BA	BO	BA	BO
NUCLEAR SCIENCE	$ 26.1	$ 25.0	$ 28.4	$ 27.5	+ 9%	+ 10%
MATERIALS SCIENCE	65.7	61.4	72.0	68.9	+10%	+ 12%
CHEMICAL SCIENCE	43.3	40.3	48.2	46.7	+11%	+ 16%
ENGINEERING SCIENCE	0	0	3.7	3.6	∞	∞
APPLIED MATHEMATICAL SCIENCES	7.4	6.9	11.8	11.6	+59%	+ 68%
GEOSCIENCES	4.1	3.8	7.7	7.6	+88%	+100%
ADVANCED ENERGY PROJECTS	3.2	3.0	3.8	3.6	+19%	+ 20%
TOTALS	$149.7	$140.4	$175.6	$169.5	+17%	+ 21%

This is a rather interesting example also from the point of view of relationships between the Office of Energy Research and programs sponsored by the Assistant Secretary for Energy Technology, Bob Thorne. Both Bob Thorne and I are very interested in making sure that there is a proper transition between basic research and what we might loosely call applied research efforts or technology development. By organizing a basic research program out of technology, solar energy makes a good initial case to see whether we can do our basic research properly and have it meld nicely into advanced technology development efforts. We intend to use the National Solar Energy Research Institute partially as a decentralized location for technical monitoring and management of solar energy-related research.

I would like now to conclude with the ATAP program, or Advanced Tech nology and Assessment Projects program. I will spend a moment to indicate what the program is trying to do and how it differs from the more conventional basic research programs I've been discussing up to now. We would like to have a program that allows people to come in with new ideas that have high risk and have high potential pay-off—a program which would permit us to explore whether those ideas have merit and whether they should displace some of the activities in the on-going programs. All too frequently, but nevertheless understandably, when a program like the bio-mass program or the fusion program gets going, it has commitments which extend over several years. Major technology programs may get locked into pursuing two or three top objectives. If somebody walks off the street and says, "I have an idea that will create natural gas; you can forget your existing programs," it is very hard for an ongoing program office to find funding for that activity. So the idea here is to add a series of technology projects which would be in competition with existing programs and would be looking for higher risk things.

I'll give you some examples of ATAP activities. The first one is in the area of tribology or lubrication. Small advances in lubrication technology would allow more efficient use of motors which would permit advances in a whole series of different programs. If we could make a small advance in lubrication anywhere there is a moving part we could have an enormous impact on energy states. But there is no single program which can naturally and uniquely push towards a lubrication effort because their programmatic missions often preclude non-directed work. There is no place that the cross-cutting problems of lubrication can be looked at. The ATAP concept is not something that has emerged full grown from our heads—it turns out that the American Society of Mechanical Engineers have been pushing this for a very long time. But it does give an example of the type of technology project we might go into for limited periods because they cut across many of the main-line program efforts.

Laser photo-chemistry is another one which I am particularly interested in because of my own technical background. We had been working for years on radio isotope separation very successfully at Livermore and Los Alamos and in universities. The notion here is to try and examine the use of laser photo-chemistry and the use of lasers to actually produce chemicals more

ADVANCED TECHNOLOGY PROJECTS

PROJECT CHARACTERISTICS

- HIGH-RISK, HIGH-PAYOFF POTENTIAL
- ALLOW NEAR-TERM DECISIONS ON CONCEPT VIABILITY
- BRIDGE GAPS BETWEEN BASIC RESEARCH AND PROGRAM TECHNOLOGY
- PROVIDE DATA FOR OER ASSESSMENTS
- NOT FUNDED SIGNIFICANTLY BY INDUSTRY

efficiently, in terms of both costs and energy utilization by the use of selected frequencies and selected photons.

These are the kinds of programs that we believe are logical candidates for an advanced technology program. We are very anxious to get this started. These would not be small scale projects. Each one of these areas might be a couple of million dollars, and we would expect that these programs would be undertaken primarily in industry or in universities and also potentially at the Department of Energy laboratories.

That concludes my remarks on basic research. The main feature that I would like to leave with you is the following: the Department of Energy does not do basic research today primarily to invest intellectual capital in knowledge to set the ground work for bigger advances in the future, whether tha be ten or twenty or thirty years from now. But the Department recognizes the need for doing that and for having universities fully involved in the process. We have had some luck getting budgetary support for that, and we anticipate that it will continue in the future.

Now I will try to spend two minutes telling you about what Sam Hughes and his delegates do. He manages a series of programs that are of importance to our co-departmental effort in R & D. I will mention two of them in some detail. Sam Hughes is worried about education. Presumably I'm responsible for research education and higher education but Sam Hughes has got most of the organization for that, and in fact he and I work closely together.

The first issue which comes up is student support. Does the Department of Energy have programs or would it like to have programs to train undergraduate or graduate students in certain areas which are important to energy technology? We have a very small fellowships program which consists of about 167 fellowships a year. We choose these Fellows from something like 4,500 applicants which Sam Hughes and I regard as being an absolute atrocity because probably more money is spent xeroxing applications at universities and more time is spent by the students in filling them out than it is worth to the 167 applicants who are awarded fellowships. So this year we plan to propose a program of 1,000 fellowships. So we're trying to develop a major traineeship program for graduate education at a level of 1,000 fellowships which really allows the Administration and the Office of Management and Budget to put thumbs up or thumbs down. After all, it's not a significant program in the context of all federal traineeship efforts. I'm sorry to say that I think it's unlikely that such a program will be accepted, since historically the Administration has not been supportive.

The second program which Sam Hughes runs, the Laboratory Cooperative Program, is of interest, I know, to you. Here in the state the group is NORCUS. We try to provide modest funds (although not very significant funds) for the region where a laboratory is located—in this case, Hanford—so that there can be an exchange of faculty and students between the laboratory and the regional universities and technical areas. We believe that that is a very important program, and one which will have our support for it seems absolutely critical to provide some means of exchange between the surrounding technical community and the laboratories. A laboratory or a regional organization can expect to have available several hundred thousand dollars to

pay students or faculty to spend the summer there to promote an interchange with the universities and to do all the things that are necessary to have healthy technical interchange within communities. It is a very modest program—the costs are four or five hundred thousand dollars across the whole nation.

The fellowship program and the laboratory-coop programs are programs which Sam Hughes is running and running well. There is another series of programs that I'm less familiar with and less able to speak on, which concern his efforts to provide support to regional educational efforts such as regional conferences, training and teacher support, support for high schools and junior colleges, and primary grade education programs. If he were here I'm sure he would speak eloquently about the need for the Department to do more in terms of providing general education and outreach to a community.

Let me stop there. I hope I have given you some impressions of the efforts which we are making on the basic research side of the Department.

Dale Comstock

Without further ado, let me introduce the next panelist to you, Dean Ronald Geballe. He is probably known to most of you, but let me repeat for those of you who are new to him. He is Professor of Physics at the University of Washington, Dean of the Graduate School, and Vice-Provost for Research.

Ronald Geballe

I don't have any prepared remarks, and it is a little difficult for me to think of something to say, because as you can imagine, almost everything John Deutch has said sounds like sweet music to the ears of someone at a university. After all the years with AEC, with which organization universities had a working relationship, although not always the easiest kind, and after a few years with ERDA during which relations between universities and that agency seemed to be deteriorating at a rapid rate, it has been very refreshing to us to see a complete reorganization arising like a phoenix from the ashes.

It might interest the audience to know that the Office of Energy Research which Dr. Deutch heads came into being, of course directly through the actions of Congress, but also because of the urging of many universities. I am sure Dr. Deutch is very aware that many were dismayed, as quite possibly I was, to see that the initial plans for the new Department of Energy nowhere mentioned explicitly a locus of responsibility for basic research, particularly in energy sciences. The universities were part of the campaign to see that what looked like a glaring omission was rectified. At any rate, what happened has turned out to be all right because we do have an Office of Energy Research, for which we are thankful, and we also are very thankful to have someone of Dr. Deutch's background and caliber as Director of that office.

Now as I said, it is hard for me to think of matters to argue with him about except possibly for a few details.

Half of the basic research in the United States—half of the federally-funded basic research in the United States—is carried out in universities, so universities are an important part of the nation's basic research establishment. It is not surprising that when a problem arises, such as the energy problem, which clearly requires the attention of people at all levels of technical and economic and social proficiency, universities feel they ought to be deeply involved. We are glad that Dr. Deutch's plans for the Office of Energy Research are so broadly conceived and so clearly oriented towards the kinds of activities that universities are equipped to carry out. They offer promise that we will have a very fruitful relationship in the future.

There are a few problem areas, however. Some are highly detailed an probably not worth much time in a meeting such as this. Certain problem stem from the joint interest of the universities and the "feds" in research. Some are problems that those of you not directly associated with universities may have read about only occasionally. They have to do with the process by which the government sets out to "procure"—if you like that word—certain kinds of commodities which it feels are needed for the nation. These include battleships and airplanes and shoes and buttons and so on, but also research. If the government wants to procure research and wants to negotiate with the universities in doing so, it is dealing then with an organization of a different kind than is typical in industry. Universities are chartered by government because they, too, are basically instruments of social policy. They have special problems, responsibilities, and needs. These need to be recognized more clearly in the future because there are some very worrisome trends in the relationship between the federal government and the universities that do not bode well for the nation or for the health of higher education.

I will just mention one of these, and that is the role of the universities in producing not just research, but also educated people. I have picked up another term from the little bit of economics a dean is forced to encounter, the concept of a "joint product". The activity of the faculty at universities generates two results: information and educated young people. The process by which these are produced can sometimes be resolved into two, teaching and research, but more often the two are so thoroughly intermixed that it is hopeless to try to distinguish them and perhaps even wrong in principle. Yet if an agency of the federal government wants to procure research, it declares itself interested in research, and the other product, namely the educate people, may not enter into consideration at all. This makes it very difficu for a professor to decide, when he is engaged on a research project, how much of his effort should be classified as "research" and how much as "instruction". It wouldn't matter very much except that the federal audit procedure requires that an accounting be made. Well, this is a perplexing problem, but resolving it is not necessarily Dr. Deutch's problem. However, he understands it because of his academic background, and I hope that he will be in a position and of a disposition to try to help government and the universities reach an understanding that will allow them to work more comfortably together.

Speaking of working comfortably, I am going to mention another one or two quibbles, to try to provoke some discussion. Dr. Deutch stated that his research budget is larger than the National Science Foundation's total budget, which causes his office to loom large in university eyes. He has made it clear that he welcomes this interest of the universities. It turns out, however, that universities are more comfortable with the National Science Foundation at the present time than with the new Department of Energy. One reason is that the universities have many inputs into policy formulation and even the procedures of the National Science Foundation. They find there greater willingness to accommodate the problems of the universities within the constraints imposed on the Foundation. I wonder, Dr. Deutch, whether you envisage in the future, any way in which universities can make input to the decision-making and policy-making process in the Department of Energy? Is consideration being given to establishing an advisory board, which would have university, industry, and other kinds of representation and would recommend policy for the Department? DOE and NSF are two quite different kinds of organizations, with quite different types of responsibilities, but nevertheless, some kind of council in which those directly affected by the research and development policies of the Department could have some influence within it, would also go a long way toward strengthening the relationship.

Another problem that universities see in dealing with the Department of Energy has to do with the responsibility the latter has for the national laboratories under its jurisdiction. Dr. Deutch is well aware of the possible conflict of interest that confronts him and I suspect he anticipated that I was going to mention it. When a faculty member applies to DOE for support for a particular project he might find he is in competition with somebody at a national laboratory who might be engaged in similar work. The person at the national laboratory is already employed by the Department of Energy and has a budget which comes to him by a simple internal process through the machinery at the Department of Energy; whereas the person at the university has to apply as an outsider and his proposal has to be judged by insiders. He is not a civil servant, he is not a permanent employee of the Department of Energy. I cast this in rather sharp terms in order to try to make it clear; it means that universities sometimes find themselves in a worrisome competition with in-house groups. Dr. Deutch, having been initially an "outsider" and now a chief "insider", must have thought hard about this problem. His views on the way in which the Department and particularly the Office of Energy Research proposes to handle it would be of interest to many in the audience.

I will just mention one other matter that comes to mind, and that is the question of student support. Dr. Deutch has said that he and Dr. Sam Hughes will be asking for some additional traineeship support fellowships for graduate students interested in energy-related disciplines. I can't help but welcome that, although I take quite seriously what he says about the poor chances for success. But we are somewhat concerned now over trends in the production of scientists for the future. We have been through a period of time, as everybody knows, when universities were geared up with government support and

encouragement to produce large numbers of highly trained people, and we did produce them. There now seems to be an over-supply, at least in the physical sciences, to which enrollments have responded. One is entitled to worry whether they will go too far in the other direction. Nobody knows whether 1,000 traineeships is the right number. Universities, again, *have* to work with the federal government to invent means for damping fluctuations in the numbers who enter into these fields. Dr. Deutch might be able to tell us about the considerations behind the request for traineeship funds.

Dale Comstock

Our next panelist is Ken Smith, who many of you in the Seattle area knov as the co-founder of Ecotope Group, Inc. Currently he is working out of the Governor's Office in California on a design team for appropriate technology and solar energy applications for community improvements. Ken, maybe you want to tell us a little bit about that, and respond and raise questions here to our other panelists.

Ken Smith

I guess the first thing that I should say to clarify where I am coming from, is that this panel is billed as "industry and university." The work that I have done with the Department of Energy has been in a kind of gap between university and industry. Ecotope Group is a small, non-profit organization which does solar energy research and development, and when we say "development," we really mean "application." At Ecotope Group over the past four years, we have really emphasized small-scale appropriate technologies that are solar-related and energy conservation-related.

Currently at Ecotope Group we have one direct contract with the Department of Energy and another indirect contract with them. We developed a a 100,000 gallon methane digestive system at the Monroe State Dairy Farm four years ago, with State of Washington Department of Ecology money. Currently that project is being operated and evaluated under a contract with the Department of Energy. This application of solar energy at a dairy farm scale is supported by the Solar Energy Division, Fuels and Bio-mass. A lot of people have a hard time connecting cow manure with solar energy, but it comes down through the corn. In other words, the sun grows the corn, the cows eat the corn, and it is reconverted into a gaseous fuel—methane gas—which is very similar to natural gas. So we have been operating this small scale project under Department of Energy funding along with other projects that are looking into bio-mass utilization from agricultural residue.

Our other project which is DOE-related comes indirectly through the Department of Agriculture, the Agriculture Research Center at Clemson, South Carolina. We are operating a solar heated greenhouse which employs an aqua-culture system to look at small scale applications of solar greenhouses on small farm applications. So, our look at technologies or at solar technology, is one that is small-scale. We have often criticized Department of Energy for looking at the giga-watt or mega-watt or the quad, and all of our technological applications are at small scale. But when you add those small

scales up, they become megawatts and giga-watts and quads. So we think that we have constantly approached it from that angle.

I would like to talk from the perspective of a small business, small research development company's interaction with a large agency like Department of Energy, and discuss the sorts of things that we have experienced. Before I bite the hand that feeds me, since we depend for the most part on R & D funds from government agencies, and especially from Department of Energy, I would like to say a few things that are evolving and that are really good about the Department of Energy program.

First, we have seen the Appropriate Energy Technology Grants program which Don Beattie talked about this morning, which is a use of DOE funds to seek out small scale applications—put out high risk money and see what you come up with from small companies and individuals who are looking at these technologies. The evolution of that into the Office of Small Scale Technology is also a very inviting thing. We are seeing more small businesses which are able to get to agency money to develop small technologies. In addition to that, I think the regional solar energy organizations such as Western Sun are going to emphasize the grass roots approach and look into application at a smaller scale, and these are all very encouraging.

On the other side of that, we look at some of the difficulties that small companies such as Ecotope have in dealing with federal agencies. We get our money through one of the labs at Hanford, our little $100,000 contracts have to compete with a very large contract for nuclear waste disposal. It is often difficult in a bureaucratic sense to get things done when there are much larger amounts of money being funneled into the laboratories, so a small company ends up with a very high overhead trying to deal with the agency. We would really like to see a softening of that type of thing and encouragement for small companies to be able to get this money.

I think another problem that a lot of the small solar technology companies are seeing is more of an institutional barrier than a technological barrier. That is the barrier of high risk capital—that is, the little bit of capital that it takes to get from being there with the product, to actually having an inventory which can produce the product and put it on the market. I think those institutional barriers are clearly a part of the Technology Transfer Program from DOE. We like to see more emphasis on the Technology Transfer Program with professionals like architects and with the banking institutions, all the way down to the county tax assessor type of activity. We have been a little bit involved in that and we can see those activities being very important in breaking down the institutional barrier and putting out high risk capital; not from DOE, but from local banks, such as the example we have here in Seattle in which the Seattle Trust actually gives preferential loans to solar energy applications.

In another way of looking at this sort of high risk capital application, we see the small Energy Grants Program which was originally funded at about $5 million; I think $3 million of that actually went out and $2 million was turned back. I had a chance to participate in the Appropriate Energy Grants Technology Program which was tried out in Region IX, including California

and Nevada. Announcement for those dollars was put out, and the response was tremendous. I participated in the California project in reviewing proposals; there were approximately 850 proposals put in. Now a lot of those were reinventing the wheel; you can't say that the inventors are out there with all the answers, but there are some good ideas. Now out of the 850 who applied, only around sixty or seventy actually got funded. There must have been twice that many which were really good sound proposals, and yet we see that Small Energy Grants money being turned back and not being released. There is some really good talent out there. When we say high risk capital, sometimes that is not exactly what it is, because the review process was stringent enough to keep people from reinventing the wheel, and the should have been more money put into that. But I think that is just a frustr tion of small versus big; there is some real effort at the Department of Energy to try and reduce that sort of thing.

Another area which directly affects us, which we looked at in a small-scale versus large-scale application, is related to our contract working on dairy farm agricultural residues and converting them into a useful fuel at the farm. We have seen that be applied to rather large scale things, like first looking at large feedlots. You can look at feedlots, and you can get a lot of concentrated energy from a feedlot, but when you look at the overall perspective of agricultural residues in the country, you find that a lot of it is at a really small scale—the dairy farms. In an overall sense there is actually a greater potential from those small-scale dairy farms than there is for the large feedlot.

Another thing that we have experienced in dealing with Department of Energy, is that the Department of Energy looks at energy production; and quite often we are not allowed to look at side benefits of the various resources. For example, in looking at agricultural residues from a dairy, we have to look at only the energy aspects; we are not allowed to look at the fertilizer aspects or the leftover residue after the energy is used. In industry you find a chemical company, for example, and they look at every aspect —all these activities that can be associated with that energy—because they're looking at some way to justify the investment. I think that's the type of thing we would like to see more of in the technologies that are being looked at by the Department of Energy.

In closing I can say that as a small company we feel somewhat in a anomalous position to be able to participate in Department of Energy pr grams and we think that we have filled a gap that is not often filled by these programs. I could extend that to say that Ecotope Group is not necessarily the high-priced, professional engineering firm; it's a firm that has relied mostly on application—getting out and doing it—a little backyard tinkering plus a lot of looking at the real aspects, the real engineering aspects, of building these systems and operating them and seeing what happens when you get in the field. You do a lot of things on paper, but you never know what's going to happen until you get out with a four-inch piece of pipe clogged with cow manure. Thank you.

Dale Comstock

I've asked Pete Rose on very short notice to fill in on the panel. Pete is the President of the Math-Sciences Northwest, Inc., a research, development and consulting firm. He has extensive background in aerophysics, gas dynamics, optics, gas lasers, and fusion technology.

Pete Rose

I suppose I'm left here really taking the part of industry, and yet I'm not really typical—of big industry anyway. We're a small company and we're somewhat unique in that we are a company, which quite largely depends on the existence of the Department of Energy. A large fraction of our contractual support for energy research and development and technology comes from the Department of Energy, and we work in many of the areas that Dr. Deutch mentioned. We're a major participant in the fusion program, both magnetic and laser fusion. We do work on uranium isotope separation. We have projects in solar energy, both advanced concepts of high temperature, solar heating and cooling, conservation technology, fossil fuel research, hydrogen production, heat engine efficiency, and we've been trying very hard to get some really good ideas in the area of laser-induced chemistry.

I think we're still on the same boat that most people are; it's a great temptation but there are really no tremendous ideas yet. We're basically a company of about sixty or seventy technologists, and we try to apply our wits to creating new ideas and then finding contract support. In the end I suppose we hope that some of these things will come to practical applications, but many of them right now are really research. They're not quite the basic research that Dr. Deutch emphasized, and therein lies the problem. We call it "applied research," and I think it's more typical of the kind of research that is done in industry as a whole. I think that large corporations do very little really basic research in terms of the way a university does, but maybe Bell Labs is an exception. They've certainly done their share of basic research and turned out their share of Nobel Prize winners, but there aren't very many Bell Labs in the world. Most of industry—for example, the aerospace industry—works in applied research. Some work on more product-oriented, commercially-oriented research; the pharamaceutical industry has a lot of basic research as well, but they are very secretive. In recent experience of ERDA (now DOE) some companies that have historically not been in government-sponsored research, like major oil companies, are beginning to participate; and that has created a new relationship and a new set of problems.

Many of the things that Dr. Deutch has pointed out that he is trying to do are "right on". I think he shares the concerns of many of us who are working in this area, and I think it is very fortunate for us that he is in the position he holds and will have some long-range influence. Exactly how research is supported in the Department of Energy has been a rather slippery business, first with the AEC, then in ERDA, and now in the Department of Energy, and many of us who have tried to ride with the waves have also gotten caught, sometimes spilled pretty badly.

I think the one thing that isn't really happening yet, although Dr. Deutch is going in the right direction, is an emulation of the Department of Defense methodology of supporting research. Whatever feelings one might have about expenditures in the military area, the research support by the Department of Defense has been what has *made* American research since the Second World War to a large extent. It has been a steady source, and people knew what their philosophy was. It's had its ups and downs with the Mansfield Amendment and its implications, but still the Department of Defense has had a very powerful research program. A very important part of the DOD program has been something that is called IR & D, Independent Research and Development, which has been the way in which corporations that do government contracting are allowed to charge part of the cost of research into the overhead. IR & D has been under fire on various occasions, but so far has always carried through. I think it's a very essential function. The AEC at first was very negative on IR & D; ERDA was an improvement; and I hope that DOE will adopt the IR & D concept wholeheartedly. Procurement regulations are going in the general direction of the Department of Defense practices. Certainly the work of the Office of Naval Research and organizations like that, whether it concerns academic or industrial research, has set a very good example.

I also know that Dr. Deutch likes the model of the Advanced Research Project Agency in the Department of Defense very much, and is planning to act similarly in his Advanced Technology Assessments Project. Having worked for the ARPA Advanced Research Project for many years in the early part of my career, I look forward to that kind of support for new technical ideas. ARPA supported exactly what Dr. Deutch is trying to support, a high-risk, high-payoff program. If you had an idea that was well founded, but way out, you could get your case heard and if it was right, there would be a way to fund it.

That sort of support has been missing in the energy picture, unfortunately for us since that is a large part of our background and our bag of tricks—ideas that you try to sell. Although there are various isolated pockets in parts of the energy establishment which support that kind of activity, it's very badly spread. It's very easy to get the run-around, where everybody's pointing over their shoulders, and after having made two or three visits to Washington you know more about who is doing what than the people working there themselves. Very frequently people in DOE really don't know what the groups next door are doing. That's typical of a growing agency, particularly one that has been put together out of all kinds of splinter groups, like the Department of Energy certainly was over the last five years. Surely that's going to be improved and Dr. Deutch and his group are going to have to cope with it for the first few years.

I think the important point I would like to make is that research, whether it is applied or basic, needs steady support over the long run. That is something that has been missing in the energy business, and I hope that the organization of the new energy office will supply that sort of support. I am still worried because I know there are groups trying to do research with the other groups of the Department of Energy. What I would like to emphasize is that

there needs to be good coordination, and that has been missing for a long time. As I said before, that's largely a function of new personnel.

The last thing that I'd like to mention, similar to Ron Geballe's comments, is that the National Laboratories continue to be a source of frustration to people who are trying to be active in DOE research. They have their special role, but very frequently if you're trying to do research—particularly in large programmatic areas—you are in competition with them whether you like it or not. Unfortunately, I can talk about that subject for a long time. I just want to bring it up, because it's one that is very close to my heart.

And finally, there are areas that are sort of trivial and in which a lot of mprovement has been made over the last couple of years. I'm just throwing hem out in the hope that they will continue to improve: these are some of the contractual questions. Buying research, whether it's from industry or from universities, is not like buying a bucket of bolts, and you can't specify it the same way. Yet procurement regulations are frequently being applied to it. We recently went through that on a contract from Dr. Deutch's very division.

The patent policy is another source of constant frustration. The AEC took everything and left you with nothing; that has been improving with ERDA and DOE, but it has a long way to go. Again, the Department of Defense, at least to those of us who are in the business of developing technology, has a good policy. They take a royalty free license, but indeed they leave you with the right to exploit the work for your benefit if you can as long as they get the rights for what they want to use your idea for.

And, finally the pressures on things like cost sharing are a burden from a purely small business point of view. We're a small business that always competes with large corporations by the nature of the work that we do. We're not in small technology, but what people like to call large science. Large corporations are generally asked to cost share this type of activity and a small business has a hard time competing in this respect, i.e., financially. Thank you.

QUESTIONS

Fred Schmidt, University of Washington: I find myself trying to say things which agree with Ken Smith and with Pete Rose, but on a rather different scale and from this side of the fence. So let me explain the problem. I have been studying energy now for five years; I have spent most of my research time at the University studying energy, as an energy generalist. I know a whole lot about energy, but nothing about anything specific. I am a total misfit, as it were. I am a misfit because I have looked at the entire problem; and now I look at a table of organization of DOE and find that I can't open it. There is nothing in the present DOE structure which allows me the freedom to study any damn thing I please in the field of energy. The University is the only place where I have that freedom, and indeed I recently began to find myself a misfit among my own colleagues because I am no longer interested in specifics, but rather in broad issues which are the only possible way we are going to solve the problem. I don't believe in a solution to the energy crisis, but we need people who will look at the whole picture. I don't really find that possibility in DOE. I don't find people who are trying to see

the whole picture as I am and as my colleague, Professor Bodansky, is. I think Ron Geballe will back us up on this.

John Deutch: I sympathize with that problem. I think I know exactly what you are saying: you don't fit into a technology niche or disciplinary niche. It is hard to find a massive program directed at one's interest. I *will* point out that there are several nooks and crannies, not major boulders, which do provide room for support in both lines of thought. We do have a program that can provide core institutional support for universities to develop small and modest programs for central cross-study views, for energy laboratories and energy research centers, although I don't believe University of Washington profits from this at the moment.

Schmidt: No, not energy laboratories and energy research centers—I'm saying for study of the entire problem to try to understand it.

Deutch: Such centers can pass funds through to faculty members who want to do that. Secondly, we are giving some thought as the result of an appraisal of the basic research program of the Department to establishing—here again don't go violent on me—a social science type of research program which could allow a disciplinary social science project to have some opportunity for support under that rubric. Thus, a broad view could be taken to study the economics of some technologies within the larger social issues. I think that is a very real problem. I don't know how to solve it easily, but I think there are locations where one can find support for the kind of work you are speaking about. I might add that the Department has a $17 million research budget which is not assigned to my office, but to the Office for Policy Analysis in general. A great deal of that money does flow to independent scholars in universities to take a cross-cutting look. So some opportunities do exist.

Unidentified questioner: Do you formally issue Request for Proposals daily, or is there a standard way that a person can find out what ongoing programs exist; or does one have to write each individual sub-area and say, "please put us on your mailing list?" It is a difficult thing to understand. I have heard of at least three or four programs here that I had never heard of before, but that I found very interesting and maybe good possibilities. Is that Sam Hughes' domain of intergovernmental and institutional relations? There is an energy network of information in this building, but it appears to be contained inside the network. I don't know where to go for information What is the normal procedure?

Deutch: Let me say first of all that in the basic research area we work primarily on the basis of unsolicited proposals, so we don't go out with Requests for Proposals nor do I hope we ever do that. We try to sit back and sponsor the best ideas we can. I think this is a legitimate problem for an individual who is looking for research support to connect up to the system. I am afraid that all the written words put out on the subject don't really tell you how to plug in. We do try to send our people around to all kinds of different special energy conferences such as this one, to give some flavor of what the Department has to offer. We don't do advertising; we don't usually do RFP's.

Unidentified questioner: I would like to pick up on a question that Pete Rose raised at the very end that has to do with cost-sharing. He was trying to deal with both universities and industry effectively, and stated that industry is profit-motivated. I am curious if there are policies or guidelines for profit-making industry on cost-sharing. The fact that you can't maintain a profit in your dealings with industry, and therefore, motivate basic R & D programs in industry.

Deutch: I am not sure I'm going to give you the Department's answer. I'm all for profits. It doesn't bother me at all to know that private companies make a profit. Obviously, there is a balance to that, about the equity of having a corporation make a great deal of money off government-sponsored R & D. There are certainly wide differences of view on how you balance the equity, that is, a company making profits off a taxpayer's paid-for contract. My own view is that the business of the Department of Energy is to commercialize technology. In dealing with private industry, the way to do that is by using the profit motivation. So, in that spectrum of opinion which goes all the way from the view that a private company should only make its cost, period, or some minimal fee—i.e., the view that the government should own all the patents and should not allow any substantial return on their investment—to the other view which says that businesses have to have a real profit incentive to do commercialization, I come down all the way over on the profit-making incentive side. That is by no means a unanimous view, or even a dominant view in our Department.

Questioner: You have contracts with industry whereby they realize some profit?

Deutch: Yes.

Questioner: I think that's good, by the way.

Barry McClain: In the Office of Energy Research, are there people who help get general energy research information to other energy researchers and vendors? Also, do you give monetary awards for inventions?

Deutch: There is an inventor's program in the Department which I believe is run by Don Beattie. We do try and recognize inventions by supporting them, and I believe we are just in the process of considering a significant award system for them.

Unidentified questioner: I heard a comment which apparently dealt with spending time on research proposals without knowing the fundamental problems you are interested in. Is there any system so that professors or people in the private sector or laboratory operations do not spend time developing proposals that are already being done elsewhere? This could reduce undue conflict and duplication.

Deutch: I think the answer is that we like to encourage proposal discussion with us before the assembly of an enormous paper proposal, done without knowledge from the program support side relative to duplication or whether the proposal would be welcomed. Although these gentlemen may be talking

about the national laboratory system, this goes beyond work done inside the laboratories. It's an issue that goes to the heart of the competition of an inhouse laboratory person with an outside researcher. That's problem and a difficult one to overcome in one day.

John Shrader, Central Washington University: You talked of Sam Hughes' responsibilities for education. I'm wondering if some of this problem might be alleviated with an effective education program for students, professors, and researchers?

Deutch: These programs are not directed to universities, but to high schools and junior colleges. There is a broad spectrum of efforts to bring students information about energy.

Banquet

Wednesday, May 31, 1978, 7:00 p.m. — 9:30 p.m.

Presiding: President James Brooks, *Central Washington University*
Energy Conservation Award, *Washington Natural Gas*
Introduction: Charles Royer, *Mayor of Seattle*
Speaker: James Schlesinger, *Secretary of Energy*

James Brooks

I am Jim Brooks, President of Central Washington University, again having the privilege of welcoming you—this time to the banquet.

In 1975, the Washington Natural Gas Company introduced an industrial energy user conservation award program called CONCERN which is an acronym for "Conserve Our Nation's Crucial Energy Resources Now." The award, in the form of a plaque, is presented to industrial customers within the Washington Natural Gas Service area who have successfully implemented measures and programs to improve efficient energy utilization. The objectives of the program are to increase the general public's awareness of the conservation accomplishments in the industrial sector of our community and to recognize and reinforce the efforts undertaken by the management and employees within the firm. It is appropriate to this conference that Mr. James A. Thorpe, President and Chief Executive Officer of the Washington Natural Gas Company, is here to present the award tonight. Mr. Thorpe, who has been with the Washington Natural Gas Company since 1967, is well known to many of you, as he has been active in the Seattle area, engaged in a variety of community and industrial interests.

James Thorpe

It is a great, great privilege to have this forum tonight to present to Boeing an award for its concern. The fact that a big corporation—and it is huge—endeavored to save energy, is a fact that should be recognized by all, and I have the pleasure tonight of making that recognition. Boeing saved 34% of its energy requirements in 1977 compared to its use in 1972. It saved 13 million therms—now those numbers may be foreign, but 13 million therms, ladies and gentlemen, will serve 13,000 homes in the Puget Sound region for a year—a valid contribution. Boeing did this while its employment went up 17,000 people or 41% and thus, its energy requirements were also increasing, so you can compound its efforts. It did it through a very simple process. It developed in its employees the motivation to conserve. It

upgraded some of its control equipment so that it could do a better job with the equipment it has. It insulated buildings. It modified its production processes.

Boeing joins a long list of past recipients of CONCERN awards familiar to Seattle, and Northwest people: the Port of Seattle, Scott Paper Company, the University of Washington, the Intalco Aluminum Company, Pacific Car and Foundry, Pacific Lutheran University, The Langendorf Bakery, McChord Air Force Base—adding their gas savings to what Boeing has accomplished. Today we can serve 33,000 additional Northwest homes due to this conservation. Conservation is not the total answer, but conservation is a piece of the President's package and we believe in it.

I would like to introduce now Mr. Henry K. "Bud" Hebeler, President of the Boeing Engineering and Construction Company. Bud was born and raised in St. Louis, went back to Boston to MIT to get his aeronautical degree, won all sorts of awards at that University, gravitated to Seattle in 1956, has been instrumental in the progress of Boeing and most instrumental in the conservation efforts of this fine company. So, Bud, if you would come forward, I would like to present you with this plaque. If I may read it to you, it says, "Energy Conservation Award presented to the Boeing Company in recognition of exceptional achievement in helping to Conserve Our Nation's Crucial Energy Resources Now. Presented by Washington Natural Gas Company."

Henry K. Hebeler

I would like to say a few words about the employees who made this possible. The first the employees knew about this was when we turned off 100,000 light bulbs in the plant. The next they heard about it was in the winter, when we lowered the temperature from our norm of 72° down to 68°. In some plants, such as at Vertol on the East Coast, it was substantially lower than that. Then in the summer, instead of keeping the temperature at 74°, we let it go up to 78°. Those were important reasons why we were able to save as much energy as we did. But the people have been highly motivated and without the union's help and without the help of people like Howard Donaldson, that couldn't have come to pass.

In addition to working the problem at the plant, we have also had a program to get people to save some energy in their homes. We had an energy fair the other week where some 65,000 people turned out—employees—to learn something about saving energy in their homes. We think that is another kind of contribution.

But we don't think that you can stop with conservation. We think that companies like our own have to take a very active role in doing things about getting additional energy sources, and so our company is investing in that area. It is a little known fact that today the Boeing Company has some $250 million worth of contracts related to energy production. I would like to mention to the Secretary that the Department of Energy is our second best customer, but like Avis we hope that you will try harder. I would like to thank you very much for this award.

James Brooks

It is now my pleasure to introduce the Mayor of Seattle, Mr. Charles Royer. Prior to becoming Mayor on January 9th of this year, Mr. Royer was the news analyst for KING Television. He was with KING for seven years prior to December, 1976, when he began his campaign for Mayor. He attended public schools in Oregon and was graduated from the University of Oregon with a degree in journalism. Mr. Royer studied government and public policy at the Washington Journalism Center in Washington, D.C., and was awarded an American Political Science Association Fellowship for reporting of public affairs. During 1969–70, he was a Visiting Associate at the Joint Center for Urban Studies, Harvard—MIT, after which he joined KING Broadcasting. Besides his daily commentaries, Mr. Royer produced a number of documentaries which won a number of very important state and national awards.

Charles Royer

Thank you. As Mayor I should officially welcome you to the City of Seattle, those of you who have come from the less desirable parts of the Pacific Northwest. I should tell you that this break in the weather we have had is unique. We have suffered under rain and hail and inclement weather for most of the year, and it is not often like this in Seattle. One of the ways we hope to conserve energy in Seattle is to conserve our present population at about the present level.

It's an honor for me to be able to introduce Secretary Schlesinger to you tonight, I will try to do it rather quickly, but I am also going to get in a plug for the City when I do it. Most of us have seen the thoughtful expression and the bonfire of Secretary Schlesinger's pipe on national television as he was announced, first, Assistant Director of the Budget in 1969, Chairman of the Atomic Energy Commission in 1971, Director of the Central Intelligence Agency in 1973, Secretary of Defense in 1974. He is, in the colorful terminology of baseball, "one of the great utility infielders of our time," ranking right up there on the list with Clete Boyer and the Richardson Boys—Bobby and Elliot.

The Secretary is, as they say, a man of many hats. Because of his experience he was chosen by the new Administration to not only serve in another cabinet position, but to construct the Department he would head. This required, of course, the hat which Secretary Schlesinger most often has been seen wearing in public service, and that is the hard hat; because construction of the kind that he does requires special protective gear for good reason. The breaking of new political ground in an entrenched bureaucracy, the changing of cultural and economic patterns, requires more than a few saw horses and blinking lights—it requires courage and it requires purpose.

The country awaits, I am certain, with mixed emotions and mixed concerns, the completion of Mr. Schlesinger's most recent project; and I believe it is perhaps the most important thing going on in America today. This part of the country—the Northwest—is a proper place, I believe, to hear the Secretary talk about a new American resolve on the question of energy.

Power here historically has been close to the people. Local governments in the Northwest have not been afraid to take the hard political course they knew to be right and we now benefit tremendously from the political courage of those local decisionmakers who brought us public power. We have an energy tradition here in the Northwest which requires public involvement, thrives on it; and we enjoy a constituency of sophisticated consumers. Together—and we have seen it recently—those circumstances create a fertile growth medium for new energy ideas and innovation. The Columbia River system, the great dams at Bonneville and Grand Coulee, immersed this part of the country very early in important energy and natural resource questions. A social movement based on the fair allocation of power resulted in Public Utility Districts and rural electric co-ops spread throughout the Northwest.

We now have another social movement spreading among our local communities, and that is the demand for efficient and sane management of our natural resources. When we delay the use of a penny's worth of power today, we save the spending of six cents for the same unit of power tomorrow. That's efficient management, and our citizens know it. They support local government's initiatives in designing programs which conserve electric energy. Today the Secretary and I were in a house on Queen Anne Hill where the subject was weather stripping; and in the Secretary's broad view of the problem of energy, he quickly extrapolated from weather stripping to about a million barrels of oil a year. That's called seeing the big picture.

Mr. Secretary, I heartily support yours and Senator Jackson's efforts to set up an advisory group of local elected officials to the Department of Energy. Here is my local government plug, and it will be brief. With your support, Mr. Secretary, I am confident that local governments like ours can be of major assistance in developing practical solutions to the whole range of energy problems we face. We see and work with citizens everyday and we local officials can best communicate to state and federal government both the concerns and ideas our citizens bring to us. Successful solution of the energy crisis means not only the assurance of adequate, affordable energy supplies, but also the people of this country changing the way in which they use energy, and changing in a way that preserves our basic freedoms and the health of our economy and environment. Local government is closest to the people and is in the best position to give direction and purpose to the new national energy program, but there are several examples of federal legislation now pending that simply do not provide an adequate role or funding for local governments in energy planning. The McCloskey Amendment to the National Energy bill would provide funds for sophisticated technical energy audits of public buildings, schools, and health facilities. However, the program would be run by state governments. The draft version of the State Energy Planning and Management Act excludes local governments from any significant role in, or funds for, energy planning. Now this city has an outstanding record in taking responsible action in managing our own energy affairs and we are urging the national energy program to recognize and reward cities and towns that are doing an outstanding job on their own hook. Such a national policy would encourage responsible action at the local

level, and I believe would make the most efficient use of scarce taxpayer dollars.

We are making a good beginning in improving the efficiency of energy use here in Seattle, in part because of the grants the new Department of Energy has made to the city to augment our existing conservation program. I believe these programs are providing an example of how local government can, in effect and in fact, become an efficient, sophisticated and meaningful partner of the federal government as we try to decentralize not only planning, but responsibility, to deal with our energy problem.

So, it is a good place and a good time for us to hear Secretary Schlesinger, because of Senator Jackson's long efforts, because of Dr. Schlesinger's excellent and unique preparation for the job, because of our own local resolve, we are approaching an energy policy in America that will work and that will be fair.

THE U.S. ENERGY FUTURE

James Schlesinger

Thank you, Mr. Mayor, for your kind words, for your sales pitch. We heartily agree with that sales pitch.

It is plain, I think—and it has been a guiding principle for us—that the nation's energy problem cannot be solved from Washington. There can be framework planning in Washington, but the difficult task that must be undertaken must be taken by states, by municipal governments, and must have the full support of the business community, as the award that we witnessed earlier testifies to. These efforts must have the support of the unions and of voluntary organizations. America is going to go through a very difficult transition in the course of the next twenty years and if we are to successfully go through that transition and preserve the economic and political framework under which this country has thrived, it will require the efforts of all of our people as a united nation.

The local governments, indeed, are closest to the people. It is there that response—effective response—can best be stirred. It cannot be stirred primarily by homilies from Washington, D.C.

So I welcome this opportunity, Mr. Mayor, to visit with you in Seattle, in particular, but in the Northwest in general—all of the states of the Northwest, all of them blessed each in its own way. The State of Washington, of course, has its own unique role in Washington. Its junior senator is chairman of the Energy and Natural Resources Committee. I have never seen so many members of the Department of Energy gathered together in one place. I think that it does underscore the fact that when "Scoop" Jackson issues an invitation, it is very hard to turn down. It is also something of a surprise that Senator Jackson, who has now been in the Senate for twenty-six years and is I believe today the sixth or seventh ranking member of the United States Senate, still remains Washington's *junior* senator. The senior senator, "Maggie", heads the Appropriations Committee; and while we are attentive to "Scoop" we are also attentive to "Maggie".

But each region of the country has its own special problems, special history, and special opportunities. We are most keenly aware of this when we review, for example, our biomass program, because that varies by region. And for that reason, we are preparing to regionalize, as it were, our biomass efforts so that we take advantage of the unique opportunities offered in each part of the country.

The Northwest is unique, including Washington, in the availability of natural resources, in a long history, different from that of many other parts of the country, of close cooperation between government and business, which have played a special role in the development of the energy resources of the Northwest. Those natural resources have been developed through government initiative working with the private enterprise system.

Your position is unique also in that the resources of hydro-power all of you recognize are finite. Much of this country has not recognized the finiteness of our energy resources and it is only in recent years that we have come to recognize that fossil fuels, notably oil and gas, will begin to play out and that we Americans who have always been used to expansionism must become aware of finite limits. It is that amongst other things that underscores the stress on conservation which Seattle is doing so remarkable a job in encouraging locally.

The Northwest, Washington State, I think has also had a unique concern with the national defense, and there is an interplay between energy matters and the national security which I should like to touch on in a few minutes. National defense has been a special concern in the Northwest. It is reflected in the major role that Boeing has played in the creation and maintenance of the United States Air Force. It is reflected today in the development of an improved deterrent posture for the United States that will maintain the peace and will maintain a world-wide balance of power so that the free societies can continue to flourish. That is reflected in the construction of the new Trident Base at Bangor; and I am sure that there is well nigh universal support amongst Washingtonians for the continued defense of the country.

Energy has become a special problem for the United States because it has been tied into our strength so closely in the past. We have never had to worry about energy matters here in the United States. There has always been an abundance. And our policies will gradually have to be adapted to a future that will be characterized by constraint. I underscore that close relationship between America's strength and our energy supplies. If one goes back just twenty-two years, at the time of the Suez Crisis and the first of several interruptions in the flow of petroleum worldwide: in 1956 the United States had sufficient shut-in capacity so that despite the interruption of the flow of oil internationally, we were in a position not only to take care of our own needs but also to tide our European allies over during a difficult period. In the following twenty-two years we have not only lost that margin, that margin of shut-in capacity, we have become heavily dependent ourselves on foreign sources of supplies so that today almost 50% of our oil is imported. And that has raised questions about the security of our position because not only is the United States 50% dependent upon oil but our principal allies in Western Europe and Japan are even more dependent—75–80% dependent—

upon the flow of oil from the Persian Gulf, a volatile region of the world close to the Soviet Union. This raises fundamental questions about the long-term security of supply not only for the United States but for the entire free world.

This is a changing problem and I think that we need to keep in mind how much things have changed in these last twenty years as a result not only of the growth of our appetite for petroleum but the growth of our economy. If we look back to 1945 I think that we will recognize the enormous expansion that has occurred in international trade, associated with a growth of the American economy and the economies of Western Europe and Japan, economies of nations with which we were allied in World War II and those to which we were opposed. And this enormous expansion of the world's economy took place under the protective cover of American power, power that, relatively at least, has declined in recent years as a result of the expansion of the military position of the Soviet Union. That reinforces the concern that we have about the growth of our dependency on what has been a volatile region of the world. But we are also concerned about what will fuel our economy.

One notes that in each decade the consumption of oil more than doubled. The rate of growth of petroleum consumption was in excess of seven or eight percent, so that in each decade we consumed more oil than had been consumed in all of prior human history. That occurred in the 50's and in the 60's, but nature, despite its abundance, does not give us a wholly free ride. And as we look out now, we know that with world oil production running something in excess of 60 million barrels a day, that we cannot look to an increase of production much in excess of say 15 or 20% more. By the 1990's we will have topped out worldwide in terms of our production capacity, and the underlying question is, how do we keep the economy continuing to flourish, and our society—our social order—stable when that which has fueled this expansion is no longer there to such an extent that we can continue to expand our use? World production of oil will probably not much exceed 75 millions barrels a day at its peak and, therefore, we must begin to adjust now.

That is what lies behind President Carter's energy plan, a recognition that a change has come and that we must go through a transition. That plan is designed to help ease our way through that transition by preserving decision making in the hands of individuals, corporations and local government units. Unless we take advantage of the time that is available and begin to adjust the capitol stock of the United States to become more fuel efficient, to move towards other more abundant sources of energy, we will be in difficulty in the 1980's.

That is why we are concerned fundamentally about the prospects of an oil crunch in which demand overtakes supply. Markets of course will clear under those circumstances, but the consequence will be a driving-up of oil prices and a shrinkage of income, output and employment not only here in the United States but elsewhere in the world. That would be tragic. It would imply, I believe, a loss of confidence on the part of the general public in the social and political framework of the United States. So we cannot afford

to permit that to take place and we must avoid that by bending our efforts while time is available to prepare for that transition.

We have other, more immediate problems than that oil crunch of a future date. Right now the dollar is under severe pressure. We are importing in excess of $45 billion worth of oil each year and our balance of trade at this juncture has a deficit in excess of $30 billion a year. The dollar is weakening, the decline in the dollar raises the cost of imported goods and therefore tends to fuel inflation. The position of the United States' balance of payments is of course also a concern in terms of security. And as I indicated earlier, our foreign policy is under some degree of restraint in circumstances in which we have acquired as great a degree of dependency as we have in recent years.

The problems that I have outlined for the United States are severe, potentially. They are even more severe potentially for other nations, the other industrial nations and the LDC's because the United States continues to have ample resources. The United States today continues to be the world's second largest producer of oil. It has abundant resources of coal. It has abundant resources of natural gas. Our European allies, the Japanese, by and large are very limited in terms of their energy resources. So the crisis that we potentially face could be far more severe for those allies of ours and therefore, it is a concern to us in particular because we remain the leader of the free nations of the world.

We must begin to make that adjustment now; the Mayor has referred to the need for a new American resolve. That is what underlies the President's call of a year ago in terms of "the moral equivalent of war." That phrase has been much misunderstood, indeed on occasion it has been derided. But the derision is inappropriate and the misunderstanding should be clarified. The President was not saying that we had to go on a war footing or adopt wartime measures. Indeed the plans that we forged were designed to avoid the necessity of such extreme actions. Those plans were designed to take advantage of the years of grace before that oil crunch comes upon us.

What the President was calling for when he referred to the moral equivalent of war was a degree of national consensus that we have obtained in the past only in times of war, a recognition of a common problem to which we all had to respond. A necessity for us to avoid regional strife, a tendency that sometimes crops up with regard to energy matters. A tendency towards balkanization, pitting the consuming areas of the Northeast against the producing areas of the Southwest, and the like. We, if we are to solve this problem, must do so in terms of a united nation. That was the purpose of the President's message and the National Energy Plan.

We are now somewhat down the road. As you will recall, that Plan was delivered to Capitol Hill thirteen months ago and a survey of the press will suggest that legislative progress has not been unduly rapid. We did not send up a "fly-by-night" National Energy Plan—here today, gone tomorrow. We wanted an opportunity to reflect and savor the components of that Plan, and we have now had ample opportunity. But I suggest that as is sometimes our way, that we are exaggerating our difficulties.

Indeed, as Senator Jackson indicated this morning, we now have four bills of the five bills agreed on in conference, three of them for some time; the fourth being the Natural Gas Bill which has been part of one of the most bitter debates in American domestic political history, a debate that traces back at least to Truman's veto in 1949 and President Eisenhower's subsequent veto of a Natural Gas Bill in 1956. Since 1956 we have never been able to get the two Houses of Congress to agree on natural gas.

And finally, despite the fact that our ambitious plans were delayed somewhat—by six months approximately—we do have agreement. An agreement that reflects, I believe, the best spirit of American compromise and the ability of a democratic system to forge a consensus *even* in an area which has been highly polarized, in which positions are entrenched, and in which there have been many personal scars. I believe that the last element of the plan, the tax credits and taxes, will also be enacted, and enacted shortly.

The energy plan has taken us perhaps six months more than we anticipated, but that is no reason for despair. And we must look at something larger than the legislative vehicle, important as that is. We must, I think, look at national attention, what we have done about energy in these last eighteen months. There is reason there to have misgivings, as Senator Jackson indicated today. Some 50% of the American people, according to the polls, still do not recognize that we import any oil at all and, therefore, that is reflected in some degree of imperviousness to understanding our energy problems.

Nonetheless, if we look back at our response to the President's challenge of a year ago, aside from the legislative vehicle we are doing quite well. In terms of our prior performance, in terms of Washington performance on a prior basis, we are doing quite well. We may be deficient in relation to the magnitude of the problem as it develops for the 1980's, but we are making remarkable progress by past historical standards.

The Mayor has indicated what is being done, not only here in Seattle, but elsewhere in the country, very much so on the West Coast, the State of California, with regard to conservation. We do not have any tax credits yet, but a very substantial proportion of America's homeowners have in recent years insulated their homes. It happens to be cost effective for them to do so, but they are also doing it because they have been alerted to a national problem. They have been called on and they have responded to that challenge.

We have a love affair with the automobile here in the United States, but one notes that in this last year the American public has increasingly bought fuel-efficient cars for which there was only a limited market previously. That America's automobile manufacturers increasingly emphasize the fuel efficiency criteria in promoting sales—that is a remarkable development given our long love affair with the automobile. There is no longer that presupposition in American life that one must be able to accelerate to 60 miles per hour in a 4000 pound vehicle in less than 10 seconds. That reflects, I think, a response beyond legislation.

So I submit that we cannot *only* look at the legislative vehicle, we must look at the overall response by the American people at large. The President described conservation as the cornerstone of the National Energy Plan.

Initially, that too was treated with some skepticism. Industry had acquired the view that there was some lock-step relationship between the growth of the economy and the growth of our energy demand, that for each one percent growth of the economy there had to be a one percent growth in energy consumption.

A year later, that attitude is completely changed, indeed, there is a growing view, publicly expressed, that the Administration has not fully appreciated the opportunities that lie in conservation. That is the kind of criticism, by the way, that we welcome. I think that it reflects a major change in the attitude of American industry and of American commentary. In the last year the relationship between energy and the growth of the national income has been .6 of one percent: a very remarkable achievement in terms of overall conservation. The award that we were privileged to participate in earlier underscored that American industry fully recognizes the opportunity for conservation, and through the actions of local governments, reinforced our trust by appropriate tax credits and assistance from the Department of Energy; that the American householder who is less sensitive perhaps to questions of cost effectiveness and price calculations than industry, will also have an opportunity to improve his budget position at the same time that he serves the national interest and in the process makes his home more comfortable.

Our fundamental problem is oil, for the near term. We have diminished in the Department our relative expenditures on the long-term electric power-producing technologies. We have diminished the relative stress on fusion power; we have substantially reduced our expenditures on the breeder reactor. For the foreseeable future we have technologies in hand that can provide us with electric power. [Audience question: "You mean nuclear?"] I mean coal and nuclear, those technologies are here. We have diminished our emphasis on new R & D for those kinds of longer term technologies, particularly in the nuclear area. And we have increased our emphasis upon our nearer-term problems, substitutes for oil, natural gas, synthetics. We are now spending about a billion dollars a year on conservation, broadly defined, including conservation R & D which has perhaps the highest payoff of all. Oil will continue to be a troublesome problem. We must prepare for a world in the later 80's—or if we act sensibly—in the 90's, in which we will find substitutes for oil. Recently we have begun to emphasize some new supply initiatives that will result in the gasification of coal and the liquefaction of coal so that we have the technologies in place when we need them, the production of synthetics.

We will have the opportunity to reduce our dependency upon oil through conservation and through shifting to more abundant resources. In our transportation sector, we will remain for a long time dependent upon liquid fuels. Our friends from Boeing will tell you that there is no easy substitute empowering jet aircraft or for that matter in driving automobiles, for liquid fuels. So we must arrange to diminish the use of what will be limited amounts of oil for boiler fuel. The Coal Conversion Bill is designed gradually to increase the amount of coal that is used under boilers so that a larger share of our available oil supply will continue to contribute to the amenities of American life which include easy transportation, by motor car, by aircraft.

But in order to have the liquid fuels available for transportation, in which the penalty for the absence of liquid fuels is great, we must begin to move towards coal under boilers, under industrial boilers, because in that area the penalty for using coal is relatively trivial. It will be a far better allocation of our energy supplies.

In the area of electric power, the Coal Conversion Bill mandates that the utilities of the United States will not build additional base load, oil-fired capacity. Here the substitutes for oil come at no penalty in a financial sense. Indeed, a coal-fired plant or a nuclear plant today are cheaper than the very cost of oil that goes into an oil-fired plant that already exists. And with the prospective future rise in the price of oil, that penalty associated with electric power production from oil will be intensified. So the Coal Conversion Bill mandates that electric power producers will not use oil-fired capacity for base-loaded plants. For the foreseeable future, that implies that they will have a choice between coal-fired plants and nuclear plants. That choice, of course, will be up to the utilities. We want that to be a relatively unfettered choice, not constrained by harassment, guerrilla attacks or the like; but the utility will have to make that choice. It will reflect, of course, local attitudes. But we cannot afford, given the stringency of oil supply in the future, to continue to use oil improvidently in the boilers that fire our electric power production capacity.

We have other opportunities in the longer run. We may develop the capacity to produce electric power from the sun's rays. In the shorter run, we can substitute in many parts of the country where energy costs are high, present technologies using solar energy for space heating, for solar hot water heating and the like; and that will conserve by and large on the expansion of our generating capacity. We would like to restrain as much as possible that expansion, the need for the expansion of generating capacity; but to the extent that we need new generating capacity, it should be something other than oil or natural gas fired.

This will be a difficult transition for the United States. If we are to succeed, we must succeed as a united people. We must hold the country together, recognizing the unique aspects of different parts of the country, but not allowing those unique aspects and the unique opportunities to divide us. The President, in calling for the moral equivalent of war, was, I think, quite right. We need to restore in this country a sense of common purpose, a sense of responding in a unified way to a national challenge. That is the challenge that the President has laid before us. I think that we are doing not spectacularly well, but we are doing reasonably well. Thank you very much.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

Regional Perspectives on Energy Issues

Thursday, June 1, 1978, 9:00 a.m. — 12:30 p.m.

Presiding: Jack Robertson, *Regional Representative, DOE–X*
Randall W. Hardy, *Assistant to the Regional Representative, DOE–X*
Sterling Munro, *Administrator, Bonneville Power Administration*
Alex Fremling, *Manager, Richland Operations, DOE*
Richard Wood, *Director, Energy and Technology Division, Idaho Operations, DOE*

Jack Robertson

Good morning, and welcome to the second day of the Northwest Regional Energy Conference. Today we're going to focus on the specific Department of Energy activities in the Pacific Northwest and explain the role of these various activities.

I am the Regional Representative of the Secretary of Energy in the States of Alaska, Idaho, Oregon, and Washington. However, I am only one of five persons who represents the Department of Energy in the Northwest, three of whom will follow me on the speaker's platform this morning: Sterling Munro, Alex Fremling, and Richard Wood. You heard from Robert Cross yesterday at lunch in the discussion of Alaskan energy issues.

As Jim Brooks said yesterday, echoed by the Senator, the reason for holding this conference is to explain the Department of Energy programs to the citizens of the Northwest and to get feedback from you on your programs: tell us what we're doing right and what you think we ought to do differently. Yesterday you heard a lot about the Department's priorities and goals on the national level, and we hope to be able to relate some of these to the region.

As I'm sure most of you know, the regional energy situation in the Northwest is quite unique in terms of end use; for example, natural gas accounts for roughly 18% of all the energy consumed in the Northwest as opposed to some 29% nationally. Seventy percent of our natural gas comes from Canada, and this means at least for that 70% we're essentially paying the world price. So the Northwest has been insulated both from the gas shortages experienced in other parts of the United States and from later sharp price rises that may occur. We are pleased to observe that the natural gas supply outlook for the next decade is good. The outlook for petroleum is also favorable, but in a rather peculiar way. As you know, the States of Washington, Oregon, and Idaho produce no petroleum; it's all imported. But the advent of Alaska oil assures us that the region will not face an oil shortage in the foreseeable future. Petroleum provides about 55% of the region's end-use energy while

the national average is about 46%. This higher figure regionally is accounted for in part by the greater distances generally traveled in the West. In terms of end-use electricity, it meets about 23% of our regional demand versus some 10% nationally. Of this use, in the Northwest a very large proportion —something like 90%—comes from hydroelectric sources, as opposed to a much lower figure nationally, as you know.

The current debate, of course, is over regional electric power planning. Our abundant hydroelectric resources are now essentially being fully utilized and the region is therefore wrestling with the economic, social, and technological feasibilities of meeting additional demands in the future through some combination of coal, nuclear, or renewable generation sources. In conjunction with these efforts, the appropriate role of conservation in reducing the need for future supply sources is also receiving increased attention, perhaps more so in the Northwest than in any other region of the United States. This is certainly so for electricity.

The Office of the Regional Representative has responsibilities which span all of these forms of energy. Quite simply, the Office serves as the eyes and ears of the Department: we alert our national leaders to emerging energy problems in the Northwest and we provide analyses of their prospective impacts. The Office also administers several energy grant programs to the various sectors of state government. And finally, we look on ourselves as a catalyst for accomplishing the Department's overall energy objectives within the region.

Now I want to lead off our discussion this morning with Randy Hardy, my assistant, who will give you the background on our Regional Department of Energy organization and mechanisms to respond to regional needs.

DOE–X: ORGANIZATION & RESPONSE TO REGIONAL NEEDS

Randall W. Hardy

As Jack Robertson mentioned, the Regional Representative is spokesperson for the Department in Alaska, Idaho, Oregon and Washington. While his main office is located in Seattle, he is also responsible for a small subregional office in Anchorage, Alaska. Although not supervised by the Regional Representative, DOE's offices of Regional Counsel, Enforcement and Fuels Regulation are also co-located with us in the Federal Building in Seattle.

The Regional Representative has five basic functions, all of which are designed to fulfill major Northwest needs in the energy area. First, he is primarily responsible for explaining DOE policies and programs to industry, interest groups and the general public. This role entails not only describing the myriad of Departmental policies and regulations, but also getting feedback from regional people on the impacts of actual or potential DOE actions. I would especially like to stress this latter point, as it is the very essence of why we have a regional office in the first place. We are here to serve *you*—the citizens of the Northwest—as best we can in executing our mandated responsibilities. We, in turn, depend upon you to let us know how different energy actions by the Department or the Administration affect you. It is

only through this active, informed public participation process that we can get an accurate assessment of whether our priorities and activities are proper.

The Regional Representative's second function is to analyze and evaluate regional energy issues, including the impact of significant energy projects and programs in the Northwest. This planning capability complements broader analysis activities in Washington, D.C. by providing the entire Department with what amounts to kind of an institutional "memory" of regionally specific energy issues. It includes the maintenance of energy data and policy information on such key regional issues as supply and demand, consumer energy prices and major energy proposals and projects in the area. In the past, our analytical effort has included joint regional/national studies of Alaskan oil disposition to the Northern Tier States and elsewhere, Alaskan natural gas pipeline alternatives, as well as studies of the regulatory requirements for crude oil interstate pipeline construction, thermal power plant siting and marine oil port location in the Pacific Northwest. Some of our more recent activities include: a major technical report on issues related to the development of solar energy for residential heating here in the Northwest; a background analysis of the issues involved with our current debate over regional electrical power planning; and a soon-to-be completed supply/demand analysis of the disposition of petroleum products to the Northern Tier States. The focus of all these efforts has been to provide both officials in Washington, D.C. and citizens of the Northwest with timely, objective analyses of important regional energy concerns. We believe that such studies and analytical efforts will continue to benefit both groups in the future.

The third major area covered by the Regional Representative is congressional, intergovernmental and public relations. In essence, it consists of working with Federal, State and local officials, members of the media, industry and public interest groups, on existing and potential energy issues. Besides the standard briefing/speechmaking responsibilities, it entails a variety of contacts with all of these people and groups—in person, in correspondence, by phone—in an effort to keep all informed of and appropriately involved in significant regional energy issues; and also to get feedback from them on constituent or consumer energy concerns. A primary aspect of this feedback function is the conduct of public hearings and other forums to gather information on particular energy issues in the region. For example, two weeks ago we sponsored a hearing here in Seattle on alternative distribution systems for the Northern Tier, for Alaskan crude oil. In mid-June, we will conduct another series of hearings and town meetings throughout the region on the Administration's domestic policy review of solar energy.

Our fourth function is that of administering major Department of Energy grant programs in Region X. There are presently two such programs in which all the Region X States are participating. The first is the State Energy Conservation Program, which provides grants or funds to States to develop and implement comprehensive energy conservation strategies and plans designed to achieve at least a 5 percent energy savings by the year 1980.

The second present grant activity is the Weatherization Assistance Program, which provides funds for weatherizing homes of low-income persons,

primarily low-income elderly and handicapped. The program emphasis is on conservation measures which not only save energy, but which also result in reduced energy costs for those most in need.

In addition to these existing grant programs, we currently expect to acquire several new grant activities over the next few months, both from the expansion of programs already in the pilot stage and from passage of already agreed portions of the National Energy Act. These prospective additions include the Energy Extension Service—a program designed to provide information and technical assistance on energy conservation and alternative energy technologies to small energy users; the Appropriate Technologies Program—a grant activity to encourage the development and demonstration of small-scale energy technologies for localized applications; and, the Schools and Health Care Facilities Program, which is designed to help those institutions make energy conserving improvements to their buildings.

Our Office's final function is provision of a Regional Energy Information Center for use by both energy specialists and the general public. This facility either possesses or has direct access to Departmental scientific, technical, and contractor reports. It also provides literature searches, reference, and referral services to DOE's own regional staff, State and local governments, and other regional interests. In addition, it collects State and regional studies relevant to national DOE policies and programs. The major subject areas covered by the Center are energy economics, conservation, fossil fuel and alternative energy source development, and energy-related statistics.

In addition to these generic responsibilities, I would also like to talk briefly about two on-going regional DOE efforts in the solar and wood waste utilization area. These were started and matured under the leadership of DOE's Richland Operations Office, and are in the process of being transferred to the Office of Regional Representative.

The first of these is the second annual Pacific Northwest Solar Conference, Solar '78 Northwest. This year's solar conference, jointly sponsored by DOE and all the Northwest State energy offices, will be held in Portland on July 14–16 at the Sheraton Hotel. The topics covered will include: passive solar applications, including presentations on underground housing and greenhouses; active solar heating systems with examples of the best products in the area; new State and Federal tax credits; solar energy ordinances; consumer protection codes; commercial, industrial, and agricultural solar applications; wind and biomass resources; and photovoltaic cells. If Solar '78 proves to be as much of a success as it was last year, we are tentatively planning to host a Solar '79 Conference, probably in Spokane.

The other major area of independent DOE activity is participation in something called the Wood Energy Coordination Group. It was started as the result of efforts, by DOE's Richland Operations Office and the regional Office of the U.S. Forest Service, to identify possible methods of utilizing some 800 million cubic feet of dead and dying lodgepole pine in the Blue Mountains of Oregon, as an energy source. The Group continues to coordinate activities involving the utilization of wood waste throughout the Northwest. It is comprised of members from State and Federal agencies, two Northwest utilities and a variety of public and private interest groups. We

are also currently working to increase participation from representatives of the forest products industries. In a few short months, the Group has become an important mechanism for exchange of wood energy data, and has proved useful in preventing duplication of efforts in the wood energy field for the three-state area of Idaho, Oregon and Washington.

We believe that both of these areas—solar and wood waste utilization—hold great potential for the Pacific Northwest. Questions of relative economics and technical feasibility will no doubt be the primary factors influencing their future development as energy resources, but we in DOE are working *now* both to improve public understanding of their potential applications and to remove the institutional barriers to their eventual use.

These last two examples also illustrate another facet of the new relationships that are being established among the various components of our new department. Our office is now working with our DOE counterparts at Richland, Idaho Falls, Bonneville and Alaska to establish closer, more effective methods of operation than in the past. Thanks to the cooperation of all these units, we are currently well on our way to maximizing the use of existing federal energy resources in Region X, thus giving the individual taxpayer a more efficient, responsive organization. The potential for achieving economies of scale and better coordination of operations among these various independent actors, was one of the major reasons Congress passed the Department of Energy Organization Act in the first place. We in the Northwest are now actively working to make that Congressional intent a functioning reality.

That, in very brief sketchy fashion, covers the main activities of DOE's Regional Representative in the Northwest. As you can see, they span the entire gamut of energy issues and concerns. Whether it is delivery of oil to the Northern Tier, Regional power planning, Alaskan lands or alternative energy source development, we are there—always involved in trying to explain the Department's policies; but more importantly, to get your ideas on how best to solve our mutual energy problems. As I said before, we depend upon *you,* individual citizens and organized interest groups alike, to let us know whether DOE policies are on track or seriously misdirected. We hope that this conference is another step towards that end and toward achieving a consensus on much-needed solutions to our energy problems.

Jack Robertson

The next speaker will be Sterling Munro, Administrator of the Bonneville Power Administration. He's going to give us "A Peek at the Future."

WHAT COMES AFTER NUMBER 13?

Sterling Munro

Thank you, Jack. Good morning all.

The program for this event says that I am going to talk about the future of BPA in the Northwest. So I will say that in the opinion of the Bonneville Power Administrator, the future of BPA in the Northwest is very

bright, very hopeful, full of promise. There are plenty of problems, but those are just really opportunities for us to serve the people of this great region. That is the way it has been for forty years now, under seven previous administrators; and I am very pleased to spot in the audience today a surviving former Bonneville Power Administrator. Don Hodel, you look good. Stand up so we can see how healthy a former administrator is—terrific! Don, I think it is sickening, you look so good!

You know, I telephoned another surviving former administrator not too long ago—Russ Richmond, whom I am sure many of you know and recall, basking in the sun down in San Diego. After a few pleasantries I said, "Russ, I have now been on the job a few months, and I thought you would want to know that I have got the goods on you." He said, "What?" I said, "I always knew you were a phony and a prevaricator, and now I've got the evidence of it." He said, "What are you talking about? What are you talking about?" I said, "Well, for years you used to come around and whine and moan and groan about what a tough miserable job you had as the Bonneville Power Administrator." I said, "Hell, this is the easiest job I ever had! I have this competent, able, professional staff; they do all the work. All you have to do as administrator is nod your head every now and then, or shake your head every now and then. It doesn't really matter which, and things turn out all right; they see that it functions."

Well, what I am really going to talk about today does of course concern the future of the Bonneville Power Administration in the Northwest, but in a much larger sense it concerns the future of all of us in the Northwest. I have titled these remarks, "What Comes after Number 13?" In a sophisticated audience like this, I am sure most of you think you are familiar enough with higher mathematics to be able to come up with an answer to that, but I am here to tell you—you don't have an answer to that, and I don't have an answer to that—because in the context of our region's future power supply, none of us can really count past thirteen.

Certainly not with any certainty!

On the other hand, I think we are developing new working relationships in this region—and must develop more—that will enable us to count to 14—and beyond—and which also will cause us to pause now and then to reflect together on *how much* higher we need to count, and *when,* and higher *what?*

I'm not really accustomed to speaking in riddles, so let me explain immediately that Numbers 1 through 13 represent the conventional thermal power plants—9 nuclear and 4 coal—now scheduled for completion in our region by 1989. What will Number 14 be? And where and when? Who will build it? What indeed comes after 13?

The new working relationships that I think will help answer these questions are those developing between the Bonneville Power Administration and its traditional customers . . . between BPA and the states . . . between BPA and the universities and research organizations . . . between BPA and the environmentalists and consumer groups . . . between BPA and the public through a new public involvement program to which we are dedicated . . . and between and among all of these shapers of our region's power future.

These new working relationships, I believe, will chart a clearer course for our region. These new working relationships, I believe, will enable us to build on the base we already have. These new working relationships, I believe, will enable us to do things we couldn't do before.

It is also my belief that these new working relationships will be cemented in a new regional power bill acted upon by the Congress of the United States *this year.*

But whether new legislation can be passed this year, or next year or even by the following year, we have some tough power policy and program decisions that must be made soon, very soon—no later than 1980 in many cases.

Most if not all of the issues to be resolved can be encapsulated in the ngle question that serves as my title. What *does* come after Number 13? ıhe answer we in this region jointly arrive at will be a real test of the new working relationships.

Of course, there are those, including the Natural Resources Defense Council, for example, who earnestly take the view that we don't need all 13 by 1989 and maybe not for a long time thereafter. They feel that utility forecasts of future needs are grossly overstated and that only those plants already under construction, together with strong conservation measures, are necessary to offset load growth until well after 1990. If they are right, then I am wrong in feeling the sense of urgency I believe the situation calls for.

There are others, including some responsible state officials here in the region, who hold that Number 13, itself, does *not* need to be completed by 1989, and perhaps not Number 12, *either.* If they are right, then construction schedules *could* be slipped further than they already have slipped without serious consequences to our region.

Still others, mainly the utilities, including BPA, are persuaded by the current utility forecasts which show that even if present construction schedules are met, the region is threatened with power shortages every single year between now and 1990. I say "including BPA" because we at BPA help make the forecasts for the smaller public preference customers who get their wholesale power supply from us. When you add up the total forecasts for all the utilities and industries of the region—which is the way the region's future power demands are now assessed—you will find that BPA directly assists in the preparation of forecasts accounting for 13% of the total load, and reviews and comments on forecasts accounting for another 23%. So we have had a hand in forecasting 36% of the load. That's exclusive of the BPA industrial customer load, which is a constant contract amount and which, by tself, currently accounts for another 22% of the region's loads. So all of that adds up to 58%.

So maybe I just should have said BPA stands halfway behind the regional forecasts? It *is* difficult to resist being a little Puckish about forecasts. But it is *not* difficult, indeed it is tempting, to decline credit for any more than we are actually responsible for—for, indeed, the utility industry's regional forecasts increasingly are coming under attack.

Why *should* anybody believe them? Well, maybe the only basis for confidence is that forecasted loads and actual loads have been in remarkable balance in the past—or, at least, until about five years ago when the historic

7½ percent annual growth rate in our region came to an end. Since then, growth has declined to the present 4 percent. For the past 18 months or so, actual power use has been running about 6 to 8 percent below forecasts. Of course we've had a drought and voluntary curtailment, combined with some business downturn. And no one can argue fairly that the forecasters should have been able to predict the drought.

As a matter of fact, the utilities' own forecasts of future needs have been coming down in each of the past four or five years, but construction schedules have slipped so much that we find ourselves faced with bigger shortages in the 1980's than we foresaw when forecasts were higher. How do you like that?—the less we think we need, the more we fall short!

The forecasts made by the utilities with some help from BPA take int account population growth, past energy use, business trends within each utilitity's service territory, and other socio-economic conditions. They have not—to date—utilized sophisticated sampling techniques to measure appliance saturation and personal use habits. But on the other hand they have utilized a pretty sophisticated econometric model purchased from NERA—the National Economic Research Association—and the NERA output has tended to corroborate the forecasts based on more conventional methods. The trouble with models, of course, is that the results can be no better than the information fed into them.

One reason present forecasts are suspect in the eyes of some people is the lack of a good end-use data base that would tell us more about people's actual use of electricity and, perhaps more important, about their *changing* electric use habits. BPA has recently made some proposals to see that a better data base is developed in our region.

Related to the concern for the adequacy of our data base is an even larger concern, which is that the utility forecasts may not be counting on conservation as much as they should. I've already told you that utility forecasts have been reduced in each of the past several years, and my staff tells me that maybe half of the reduction results from conservation—that is, from anticipated lower consumption combined with more efficient production and transmission technology. Nevertheless, some people doubt the willingness of utility forecasters to rely on conservation as heavily as these people think utilities should. "Your forecasts were accurate," they said, "when you were in a selling mode. But now that everybody is or should be in a conservation mode, we no longer can count on your forecasts."

Well, of course, those with the responsibility for having the power on the line when people flick the switch do take that responsibility seriously, and strongly feel the obligation to plan for enough future power generation. At BPA we feeel that obligation keenly. But I also can assure you that at BPA we are determined to treat conservation as a resource, and to rely on it as heavily as we prudently can in planning for the future—and my experience so far is that most utilities feel the same way. Some of them have outstanding conservation programs, or are proposing them, and others are getting there. But when you're the responsible party—when the buck stops on your desk—isn't it only natural to hesitate about counting on what you can't be reasonably sure of? On the other hand, if you're not going to be held ac-

countable 10 or 15 years from now for whatever decisions are made now with respect to future power supply, isn't it a lot easier to just say "let's crank in more conservation?" That is one reason why BPA is so eager to see the region develop a better data base.

Now, there is one more important reason why many people are dissatisfied with utility forecasts of electric power requirements. It is because they do not feel their views have been adequately considered or reflected in the forecasts, and I think many state officials fall into this category. Why *don't* outside views get more consideration.

Well, I suppose it might be true that the utilities have jealously guarded the forecasting privilege, if that's what it is, that goes along with the responsibility. But another reason, and I think a more important one, is that until recently, nobody was pushing very hard to get into the act. Before we were threatened with shortages, there wasn't a whole lot of interest in forecasts outside the utility industry. But now that we're all facing shortages, and with new concerns for conserving scarce resources, together with the growth of concern for the environment—and we might add to this mix the doubts about anything that "the establishment" tells us—everyone wants to get in on the act. Good. I think that's the way it should be. But there has to be a method, a system, a means for assuring that forecasts properly reflect the concerns of a whole lot of people—and especially the findings and determinations of state governments, local governments, and the federal government.

The preponderance of comments on the environmental impact statement concerning BPA's future role in the region have suggested strongly that BPA itself should take more of a leadership role in regional forecasts. The premise seems to be that BPA, by necessity, must take a regional point of view. I also believe that Bonneville must do more than just add up the total of individual utility forecasts. But I don't believe that Bonneville should supplant utility forecasts or state forecasts. In my view, there is merit in a plural system—even though forecasts may differ.

We can and should be skeptical of utility forecasts, but we should be skeptical of the others, too. They *all* have weaknesses, or are potentially error-prone. Improving the data base will help. But many differences will be matters of judgment or choice. For example, do we want rapid economic growth, or moderate growth, or no growth? If those who make forecasts will just pay attention to what others who also make forecasts think, that in itself could help make *each* forecast more honest and more accurate.

Meanwhile, we cannot, in my opinion, reject the current utilities forecasts out of hand. They are the basis for present power planning. They should not be changed willy nilly. They should not be changed on the basis of just somebody's opinion—or suspicions—and certainly not on mere hope. Of course, we shouldn't reject the non-utility forecasts out of hand, either. But we should recognize that these alternative forecasts differ widely, not only from the utility forecasts, but from one another. So we do need more information on which to base our judgments.

To gather more information than already has gone into the present forecasts will take time. It cannot be done overnight, unfortunately. My staff

tells me that if we started today it would take about two years to build a better data base and develop a new econometric model which might—only might—lead to a different utility industry forecast. While it might or might not lead to a different forecast, it would, of course, give us all a lot more confidence in whatever forecast results. And it would also permit us to better evaluate the potential for conservation alternatives that we can rely on in making the forecasts.

As with any forecast, we will not actually know until after the fact—until each passing year goes by—how accurate the present forecasts are. But if we're going to try to develop a new and better data base against which to confirm or change the present forecasts—and present construction schedules —we had better get started fast, for the decisions have to be made very soon.

For example, it takes 10 years or more to bring on stream a new generating station of the type we presently rely on—hydro, nuclear or coal. If what comes after Number 13 is to be one of those conventional power installations, we've got to make up our minds by 1980 at the latest—the sooner the better. Yes, the first big test of new working relationships in the region is truly close at hand.

There really are two big decisions—or sets of decisions—that must be made fast. There is the one which relates to what comes *after* Number 13. But there also is the one that relates to what happens *on the way* to Number 13. Let me treat the latter question first.

Present forecasts tell us that in any year between now and 1989 in which we have critical or near-critical water conditions, the region may be short of power. Water conditions are considered to be critical when streamflows over an extended period are equal to or less than the minimum flows on record going back 40 years. On the basis of an average 900 megawatts per big nuclear or coal-fired plant, the shortages could be equivalent to the output of one-half of a big new generating plant, or as many as 2½ big new power plants. If the schedule slips by one more year, on average, the potential shortages range from one to 3½ big nuclear or coal-fired plants. And if the schedule slips two years on average—as it already has in the past few years—the potential deficit could be equivalent to four or five big power stations.

But is it *really* likely we will again have critical water conditions so soon as on the heels of the 1973 and 1977 droughts? Aren't historical averages in our favor? Of course they are. But 1973 did happen. And 1977 did happen. And doesn't prudent planning require us to plan not as if it *could* happen again, but as if it *will*?

OK, you say, let's plan as if it *will* happen. But didn't you just say, Mr. BPA Administrator, that present electric consumption in the region is underrunning the utility forecasts by 6 to 8 percent? Yes, I did say that, and it is true. But is it safe—would it be prudent—to expect the public to continue to do or to do again on a constant basis what they did under drought conditions?

We—all the affected parties of the region—must make a decision. One course would be to do nothing to augment the construction schedule between now and 1989. We could assume streamflows will stay sufficiently above the

critical point every year over the next 12 years, or—should deficits occur—count on people to conserve, or voluntarily curtail, or accept mandatory curtailments, to whatever extent necessary. After all, BPA has implored the people of the region to convert the curtailment of 1977 into lasting conservation savings, and we have asked the utilities to keep the pressure on in that regard.

The other course would be to try to speed up or augment the present schedule. As a practical matter, speeding it up is out of the question. The schedule already has slipped badly. Augmenting it with new coal or nuclear or hydro projects is also out of the question. It takes too long to bring them on line—that's why we may be in trouble already. What about solar and the other renewables—wind and tides and geothermal steam and biomass and cogeneration? Can any of those be brought on line in time?

BPA is surveying the region for cogeneration potential, and we have said we would take the power into our system and seek markets for the small blocks that otherwise would not be marketable. But we don't yet know the potential and won't until the survey is completed in December. Then there are the innumerable investment decisions that must be made—not by BPA—and not by Congress and not by the Department of Energy and not by the States, nor by anyone else except the owners of the potential cogeneration. We hope our offer to seek markets for the small incremental blocks of power will encourage favorable decisions by the owners, and that the utilities of the region will cooperate, too, in making cogeneration work.

BPA has begun a survey of wind conditions in the Northwest to see where the wind blows hard enough and long enough to justify harnessing it. Research people tell me some wind potential could be developed in as little as five years. We should try to make it work.

As for tides, the Oregon and Washington coasts add up to one-eighth of the U.S. coastline, exclusive of Alaska. But there is not sufficient difference in height between low tide and high tide to anticipate power development here when it hasn't yet been proven practical in places such as the Bay of Fundy. I'm told the one tidal project in operation in France has turned out to be an economic disaster. What about wave-action generators? If they're the solution to making use of the ocean's energy, I have seen no signs of near-at-hand large-scale availability of the hardware.

And so it goes. The unconventional, renewable and supplemental methods generally are not as economic or commercially available on a large scale. We have yet to make them so. Whether this can be done in time to help our region *on the way to* Number 13 is "iffy" at best. But as I have noted on many occasions, the Columbia River Power System could improve the feasibility of many of the new methods by acting as a giant storage battery to firm up output that otherwise could not be depended upon day-in and day-out. So we *may* find that such systems can be made feasible in our region, if we try.

Short-term purchases may be another option. Should we seek out higher-cost power from outside our region to augment our own supplies between now and 1989? Or should we pour that money into insulation projects or

other conservation programs? Or into seed money to speed development of the alternative resources—the renewable resources—whose date of commercial availability is in doubt?

Aha! Decisions to test the region's new working relationships—even *before* we get to Number 14.

And what decisions will we have to make soon about 1990 and beyond? What will it be *after* Number 13?

Based on work done by the University of Idaho Colleges of Forestry and Engineering, the Northwest Energy Policy Project Study—the NEPP Study for short—sees, in the most optimistic case considered, a potential of two million kilowatts of solar power in our region by the year 2000. That's the equivalent of two large nuclear power plants. Could Number 14, then, be the sun?

Or could what comes after Number 13 be the wind? The NEPP Study suggests wind potential by the year 2000 equal to that of solar—or the equivalent of two large coal or nuclear power plants. Of course, we're not talking about pretty little Dutch countryside windmills. The NEPP Study says that to produce the equivalent of just one large nuclear or coal generating plant would take 700 giant windmills, the base of each standing 16 stories tall and the blades making them 10 stories higher—25 or 26 stories tall altogether. Even though there are sites that could be generally out of view, perhaps not everybody may like the thought of giant windmills on the landscape.

Will what comes after Number 13 be geothermal? The NEPP Study sees a potential of about one-half a big thermal power plant, but not long before the year 2000.

If Number 14 is to be one of the new methods, or a combination, our region must make up its collective mind—*very soon.*

If what comes after Number 13 is to be conservation, we must decide—*very soon*—and our assessment had better be right.

If what comes after Number 13 is to be coal or nuclear or more hydro, we must choose one or another—*very soon.*

The region must decide *very soon* because if it is not to be conservation, it will tax available technology to get new systems on the line in time. And to get *any* new project on line by 1990, using new or old technology, will tax approval procedures and our construction capability.

It also will tax BPA's transmission system. That's a very big problem. Typically power plants in the Northwest require long miles of transmission lines to get the power from where it is produced to where it is consumed. Partly, this is geographical accident and necessity. Partly, it is because of decisions we make—for example, decisions as to where to locate power plants. Did you know that if the region's next ten thermal power plants, or their equivalent, were to be built on the west side of the mountains instead of on the east, savings in transmission losses would let us get by with 9½ instead of ten plants? And even though BPA continues to push the voltages and carrying capacity of our giant power lines ever higher and does research and development work for that purpose, I must warn you that we are running out of transmission corridors in which to build lines to bring power across the mountains.

Sticking with conventional coal and nuclear power plants or hydro, of course, gives us more certainty about what we can count on being delivered than the unproven new systems. For example, we cannot know today that we can count on Number 14 being a photovoltaic cell solar system. Some would argue that either old technology or new technology offers more certainty than just to rely on conservation—that no matter how cost-effective we show it to be, no matter how financially attractive it should be to the end-user, conservation is still subject to changes of habit. Clearly we must work hard to maximize conservation and to develop unconventional renewable resources, but we cannot be complacent and assume that they will do the job if we don't know that.

For all my enthusiasm about conservation—based on the obvious benefits of stretching what we have as far as it will stretch—nothing frightens me more than those who say, in effect: "Folks, you don't have to do anything else because conservation will do it."

To me, that's treating conservation as a panacea. I'm not sure there are any panaceas. In fact, I'm sure there are not. My fear is that down the road aways, some of today's panaceas will turn out to be placebos—pills with nothing in them—and that we'll wind up with a worse headache than we started with.

I can remember 15 or 20 years ago when many persons offered nuclear power as *the* panacea—and now some of the same people have changed their minds dramatically. Just 10 years ago BPA and the utilities of the region were certain there would be enough financial flexibility in BPA's rates for "net-billing" to assure the financing of the region's power supply through the year 2000. Well, conditions change. Who knows how much gasoline energy we may save ten years from now by rapid development of the electric automobile—or what 2 or 3 million electric cars in the region would do to electric demand? Twenty years ago we didn't foresee accurately where we are today—what makes any of us so sure about twenty years from now!

I return to the question with which I started. What comes after Number 13? We don't have to rush pell mell, but we must decide soon, for the lead time and the investments required are large. And we must choose wisely, for the consequences of error—error in any direction—could be enormous. From my own current vantage point, I think there is no single solution. I think we would be foolish to rely on any one resource or method—old or new—but that the prudent approach is one that will use all available tools: conservation, hydro, conventional thermal, and the new and particularly the renewable systems.

The decisions are ours, together—decisions that will test the new working relationships that are taking shape, that we *need* to work out. But as I reflect on the potential in those new working relationships, I am more and more confident that our decisions will be the right ones. Thank you very much for listening.

QUESTIONS

Tom Martin, Chairman of the Energy Committee, Washington Society of Professional Engineers: I agree completely with the fact that there is no

single solution; we must explore all available ones. The place where I disagree is in the area of spending so much effort trying to work out new econometric models for forecasting. I think all of that effort can be spent in developing of various new techniques of conservation, because our forecasting is being done now by experts. It gets revised every year so that within a couple of years you have picked up the change in the trend and, Lord knows, we're far enough behind now that the couple of years we'll pick up will be to our advantage anyway. So let's spend the effort on really trying to do something about our power supply—both new sources and conservation—and not waste so much time on developing a lot of mathematical techniques.

Munro: Tom, very nice to see you and the Society of Professional Engineers. We have a few engineers around Bonneville—about 800 actually. We have far fewer economists than that, but we've got some good ones. I try to listen to both the engineers and the economists, even the lawyers sometimes. I appreciate your advice. When I became Bonneville Power Administrator, one of the first things I had to do was appear on a television call-in program. The moderator of the program really threw me a curve right from the beginning with a real great question. He said, "Munro, what are your qualifications for this job?" Well, I was fumbling around a little bit, doing some fancy dancing, and I said, "Well, I'm not an engineer, and I'm not a lawyer like previous Bonneville Power Administrators." One of the people calling in was kind enough to suggest that that was qualification enough.

Martin: I appreciate the advice.

Gordon Gray, Applied Physics Laboratory, University of Washington: I'd like to direct my question to Mr. Hardy. In your discussion you mentioned Solar '78 coming up, and you indicated that a number of the devices, systems, or sub-systems that would be shown there would be the best elements available for solar collecting. My question relates to definition of the word "best". One of the problems that we face in commercialization right now is in providing the buying public, the community, with exactly what "best" means. To my knowledge, we do not have a good set of standards to measure against or even a mechanism for providing performance verification of equipment that is available on the market. I would like to know what Region X's position is relative to establishing a mechanism, a center, or some system for providing the public with a basis for knowing what is best in solar technology.

Hardy: I think your point is very well taken, Gordon, and perhaps "best" was not the most appropriate word to use in describing those solar systems. In reference to Solar '78 Northwest and for the foreseeable future, what we can do is to provide a sample of those sorts of active systems and let the individual consumer judge for him or herself just what sort of criterion should be applied, depending on their own situation.

More fundamentally than that, I think the Domestic Policy Review of solar energy that the Administration is currently undertaking, for which we're going to hold a whole series of meetings throughout this Region and throughout the United States, will try to get at just that question. One of the aspects

is how do you judge? Is it a cost-effectiveness criterion, is there some other sort of end-use criterion you use? Just like #14, I don't think that's one for which we have a very good answer yet. In the short term about all we can do is say, "Here's what's on the shelf, and to the limit we know it, here's what System X, Y, and Z does," and let the individual consumer make those choices. I would hope that when we get through with the Domestic Policy Review of solar, we'll at least have some sense of where the collective wisdom or ignorance of the government is on some commonly-agreed-upon criteria to make those collective judgments.

Allen Jones, Cosmic Forces: Mr. Munro, I am quite impressed with the proprietary attitude that you take towards the thirteen existing and planned thermal power plants in this region. I want to remind you that the BPA's legislative mandate is to distribute hydro power from the federal dams. Now if BPA is to become the leader in the region's thermal power development, their responsibility must be established by law, and that law has not yet been forged. Would you like to comment on that?

Munro: We're not violating the law currently in purchasing and distributing thermal as well as hydro electricity; that is done under net billing arrangements which are limited. Currently under consideration in the Congress are legislative proposals which would change that. Without change in the law, BPA will do no more or less than we are authorized to do by law in the interests of the region, I assure you.

Barbara Zepeda, Light Brigade, Seattle: I'd like to know if it was a fact that external purchases of excess power by all the industries and utilities in the region, were about $21 million last year outside the region; $16 million was from BPA? And if it was the case, why was Seattle City Light so anxious to raise almost all of this? In fact, the City Light surcharge goal was to raise $22 million. Where are the other utilities? Is City Light actually subsidizing BPA?

Munro: Barbara, I frankly don't know how much electricity was purchased by all of the utilities of the Northwest outside the region. A great number of purchases were made, of course, because of the drought at very, very high cost. For example, utilities in our region were purchasing hydro power from British Columbia, at in effect the highest thermal rates. So the dollar amount under those conditions are quite large even though the kilowatts weren't that great. But I, frankly, don't have an answer to that question—maybe Heck Durocher of our staff, who's in the audience, does? No? I'm awfully glad to know that the world's leading expert on that subject doesn't know the answer, either. Thank you, Heck. We can find out for you, Barbara, but I would obviously suggest getting in touch directly with the Seattle City Light folks. I know some of them are here.

Fred Schmidt, University of Washington: My question is directed to both Mr. Hardy and Mr. Munro. Last night we heard from Secretary Schlesinger that one of the important things to do is take oil out from underneath boilers. Well, one place we put a lot of oil is into home heating. As a substitute for home heating oil, it's perfectly clear there is one good thing

available and that's an electric heater that you can plug into the wall. Although the world situation on oil is very difficult to predict, the best predictions are that the first shortages will occur in 1985 and that we will begin to see serious things by 1995. Now if this is true, then even here in the Northwest we have to plan for that, and that means that our predictions for the future aren't just historical predictions of the past gain in electric power. We have to look at the world oil situation, and that is tied up with how much oil we use as home owners; and that's the part that Mr. Hardy can address himself to. Now the second issue is the time that it takes to make a nuclear power plant, which we all agree at the moment, is ten to twelve years. However, Secretary Schlesinger, has said that the new regulation which are in the legislative pot at the moment will reduce that time to five o six years. That's very realistic because other countries do do it in five to six years, and therefore, there's no reason we can't. Hence, the political element is thrown into the prediction pot and maybe these two are such large elements that they overshadow the more subtle elements that go into predictions for the future. It's a difficult mess, but perhaps the two of you have some comments on it.

Munro: Yes, there is a legislative proposal which has been described as possibly reducing the time it takes for licensing and the commencement of actual construction of nuclear plants. I don't know really whether one could count on it being reduced to five or six years, however. Certainly an even less dramatic reduction in the lead time would be a dramatically useful change from the standpoint of prudent power planning purposes. We are in an intolerable situation in attempting to assess what we have to do today to initiate construction of a very huge investment on the basis of what we think the situation is going to be twelve years from now. It's very difficult to err on that prudently, other in the direction of building them; and so people who criticize construction can be critical. It's not a very good situation. If that can be improved, it would help a lot.

Hardy: We can say a couple of things, first about the Nuclear Licensing Proposal that the Administration has submitted. One of the main elements is generic siting, that is, you preselect sites essentially to build up a bank of potential sites within a particular region, so that you have already gone through some of the preliminary steps in getting the environmental clearances that currently are an ongoing part of the regulatory process. You use standardized plant designs to the maximum extent feasible, so you theoretically achieve some economies by virtue of the similarities involved. You use a hybrid hearing process to try to reduce the multiplicity of hearings that you have under current NRC procedures; and you endeavor to establish funding intervenors and other proposals that will hopefully assure full and complete public discussion of the issues involved. You have a judicial review limitation so that old issues are not re-raised again and again at every single hearing. If an issue is new, or if there is new evidence on an old issue, that's a different question, but you try to keep the *same* questions from coming up again.

The Department is hopeful that these procedures will reduce the time on the order of magnitude that we talked about. In the real world, you're right, we just don't know. If that bill is passed, or some reasonable facsimile thereof, at least I think we will shift portions of the delay to those parts of the process which minimize the cost to the individual utility system constructing the plant. So you consider these issues on the front end of the process before tremendous investments have been made in construction or other areas where you've got so much capital tied up that you're committed to the extent of your net worth in some cases.

On the oil question, I agree with you. Most of the so-called experts in and out of government think, even absent of physical shortage in the 1980's, that oil prices will increase significantly and may even double by 1985. The implications of that, whether you're talking about home heating oil or about oil usage, are significant. That's a perfect example of one of those structural changes in the econometric modelling process that Sterling was talking about which can't really be predicted. That will drive a lot of people off home heating oil and onto electricity very, very fast. That's one of the things that the best econometric model in the world doesn't tell you very well until it actually starts happening—just like it doesn't tell you how fast population growth is going to happen in a region. So it's very tricky to judge how much conservation you're going to have relative to those other factors that would tend to increase electrical demand.

Bill Duffy, Director of Governmental Relations, Gonzaga University: Mr. Hardy, you mentioned in your comments that one of the future responsibilities of your office would be administration of grants related to energy conservation projects for schools and hospitals. Of course President Carter has authorized $200 million in FY '78 funds for such purposes, assuming the Energy Policy Act is eventually passed. I wonder if you could provide us a few additional details regarding that particular program? For example, how long after passage of the Energy Policy Act might we expect to see guidelines; how much money might be available to respective states within your region, most particularly Washington; will any particular type of projects deserve priority; and when do you expect the awards actually to be made for the first round of grants applications?

Hardy: If I were the Department's General Counsel, I could perhaps give you a much better answer to that. My guess—and please understand that it is just that—is that you would probably be talking about the first set of regulations six to eight months after passage, with funding hopefully in the FY '79 budget. The extent of that funding is purely a function right now of the conference committee decision on the overall level of funding and allocation formula. You know the total amount proposed over three years nationwide was $900 million, and I would anticipate that we would get something near that figure. The procedures that would be involved would essentially be to do a series of energy audits on schools, health care facilities, and other non-profit facilities most in need of this type of assistance, to develop building profiles, and then to use a two-step process to help change them. The first step would be to suggest low-cost or no-cost changes in their

operating and maintenance procedures that would have to be completed prior to going on to step two, which would be the major capital investments in retrofit measure for furnace improvements, insulation, or whatever was dictated by the energy audit to achieve energy savings in those facilities. Optimistically, I would guess it would probably be eight months to a year after passage of the Act before you at the receiving end would actually start seeing money and people coming out to say, "We're here to give you technical assistance on the energy audit."

Munro: All I want to know is, what have you got for Gonzaga, and more particularly, for Central Washington University?

Robertson: I see Don Beattie in the back of the room who's in charge of this work at our headquarters. I wonder if you might like to make a statement, Don.

Beattie: I think we'd be a little more optimistic than Randy was on the schedules. If the NEA is passed in June, we would hope to have the preliminary rule-making ready in about thirty days. We've been trying to work on the language based on our understanding of the conferees' report. After that, there's a thirty-day comment period. Then we have to look at the comments, and with a little luck, we could potentially have the final rules ready before the end of the fiscal year. However, as Randy pointed out, the first step is the energy audits. The best we could hope to do this fiscal year is to start spending $25–30 million of the $200 million for the energy audits. I guess the final thing that wasn't mentioned is that these are matching funds. In order to get a dollar from the federal government, there must be a matching dollar from whatever entity is going to do the actual program. The way it looks right now, I don't think we can anticipate the NEA being passed in June. Perhaps July or August, which would then put us into the time frame that Randy was talking about—perhaps six to eight months from now before we'd be ready to entertain proposals on the preliminary energy audits.

Don Wick, Director, Washington Association of Community Action Agencies: Mr. Munro, as you know, I represent an association of some thirty community action agencies in the state. I work with some 200,000 low-income citizens of the state, and naturally, we're greatly concerned as decisions are being made about energy in this region about the impact that's going to have on low-income citizens. I certainly appreciate your remarks today, and through other conversations I've had with you, your willingness to open up the process, but I still haven't heard what that process is going to be. I would like you to comment on the mechanism that you foresee being set up to insure that, say, low-income people are not just participating in that process but are a part of the decisionmaking.

Munro: Yes, Don, and nice to see you, too. We have, of course, established at Bonneville a new public involvement program which we follow on each of the major policy decisions that have to be made. Right now, for example, we have under way public involvement processes on rates, because we do have to establish new rates by December of 1979. We have a process under way on

allocations, because we program that, in the absence of any change in the legislative mandate, we will have to adopt a policy by 1980 on how we allocate or reallocate lesser availability of power than is necessary to serve the load growth of our utility customers. We also have under way a public involvement process on a conservation program.

In each case we provide first an opportunity for comment on the general subject matter and hold sessions for people to participate and provide those comments orally or in writing to us before we float a preliminary proposal. Based upon the information we receive from the first round of comment, we then devise a preliminary proposal and make that available for more detailed public comment and involvement in the decisionmaking on the proposal itself. We provide notice of this by advising everybody on our mailing list and other people we know are interested, and also by running advertising in the newspapers. I think one of the most intriguing pieces of advertising I've ever seen was one of our recent public involvement ads which said, in effect, "Folks, we would like to hear from you as to what you think about an increase in Bonneville power rates that would increase our revenues by about 90%." I wonder what kind of a response we're going to get to a question like that. We ran advertising in eighty-five newspapers in the region for that purpose, as we have done also on the allocations process and will do on the conservation program. I know we're already in the process of scheduling a meeting with you and other folks from power on this subject, so that we have a chance to get your full views on the import of it. We'll do the best we can and accept your advice as to how, hopefully, to do better in that regard.

Nancy Oster, Washington Public Interest Research Group: This is to Mr. Munro. It is my understanding that you are writing another legislative bill to compromise between the PNUCC and the Weaver Bill, and to include testimony from public hearings. Could you tell us how far along you are with that and what areas this bill will emphasize?

Munro: There are legislative proposals already in the process of hearings in the Congress, and, as you know, hearings have been held in the region by the Senate Energy Committee and previously by a subcommittee of the House Interior Committee. I have to anticipate that at some point in that process the Congress, through its committees, may very well ask the Department of Energy for the Department's views on the proposed legislation. The Department might even ask the Bonneville Power Administration for the Administrators' views on the proposed legislation, and we might even be asked to testify on the subject. I think in prudent anticipation of that possibility, I do have to examine what has been proposed or might be proposed and even what's occurred in the process of the hearing, so I would be prepared to testify. I don't expect, however, to initiate a piece of legislation that would be sponsored by the Bonneville Power Administration or the Department of Energy unless the Department of Energy were to take a stance that it wanted to do so at some point. I can't rule that out, but it hasn't happened and I don't necessarily anticipate at all that it will happen. So with the necessary aid of my staff, I am in the process of preparing for

that eventuality; and I will not tell you what I'm going to say until I know myself—if I'm asked.

Barry McClain, Seattle: My question is for Mr. Munro. How much of the available electric power is being used now, and how much power can be conserved by voluntary conservation; and is there a need for mandatory control, and how serious is it?

Munro: As I said in my remarks, I think we are achieving some considerable, favorable results from conservation, largely in the sense of householders responding as a result of their perceptions of the drought. That's not a perception that can be counted upon to last; but I think more lasting perhaps is the industry and enterprise perception that it is in their economic interest to conserve. That started with the 1973 drought when Bonneville had a conservation program. I think that's where the most savings are being achieved and will continue to be achieved; I just hope we can do a lot more in that regard. We have to *invest* in conservation like we invest in other power resources, not just exhort people to conserve. We'll get far more by actual investment in the kind of program that Pacific Power and Light has proposed, currently under consideration by the Oregon Public Utility Commissioner; I was delighted that they stole that program from Bonneville. I only wish we could implement it right away.

Jack Robertson

Our next speaker is Alex Fremling, Manager of the Department of Energy's Richland Operations Office. He has been at the Hanford site since February of 1972, and was formerly Special Assistant to the Atomic Energy Commissioner James Ramey in Washington, D.C.

HANFORD 1978

Alex G. Fremling

In December of 1942, an Army Reserve colonel and two du Pont engineers stood in the broad, desolate valley of the Columbia River in southeastern Washington. They looked around and liked what they saw.

Less than a month later, a historic decision was made. 550,000 acres of desert land would be acquired by the Federal Government for the construction of facilities to produce materials for the world's first nuclear weapons.

During the next two years, 95,000 workers, under the leadership of General Leslie Groves, Enrico Fermi, Arthur Compton and others, built reactors, chemical processing plants and fuel fabrication facilities in an effort which was to become known as "The Miracle in the Desert". The materials produced helped to end the second World War, and Hanford had begun a long and distinguished history as a producer of special nuclear materials for national defense programs.

But in the last fourteen years, a significant change of emphasis has occurred at Hanford. The production mission for nuclear weapons has lessened

and the site has diversified into other programs, many of which are in the forefront of this Nation's efforts to solve the energy problem.

In my remarks this morning, I will be describing for you the role that Hanford is playing in 1978 as a major Department of Energy research, development and demonstration site.

Hanford is located in southeastern Washington just north and west of the big bend of the Columbia River, about 200 miles from Seattle, 200 miles from Portland, and 140 miles southwest of Spokane. On the 570 square mile site, is an investment of about $1.8 billion in Government-owned facilities in which the "hands-on" operations, research, development and maintenance functions are performed by operating contractors such as Battelle Memorial Institute, Rockwell International, United Nuclear Industries and Westinghouse. These contractors, together employ about 11,400 people, with a much smaller number of Federal employees—about 320—providing broad policy and program direction, funding for the work and performing surveillance, audit and overview functions.

About 59% of Hanford's Fiscal Year 1978 budget of $537 million is energy research development and demonstration work, with about 4% devoted to research on the biomedical, environmental and safety effects of the various energy production alternatives, and 37% to the production of nuclear materials and the management of radioactive defense wastes.

In our materials production program, only one of the nine Hanford reactors remains in operation—the N reactor. As a byproduct of its operation to produce special nuclear materials, the reactor generates steam used for the production of electricity for the Pacific Northwest. Together with a Washington Public Power Supply System turbogenerator facility, N generates 860 megawatts, sufficient to meet the electrical needs of a city such as Seattle.

Hanford also continues to be responsible for the management of high-level radioactive wastes generated in the materials production activities of the past 33 years.

During the war, when the first production facilities were built, a decision was made to store the high-level radioactive wastes resultant from fuel reprocessing until a later date, when the wartime urgencies had passed and technology for the ultimate disposal of the waste had been developed. Underground tanks were built during the war to store radioactive liquid wastes and, in the ensuing years, additional tanks were built for this purpose.

In 1965, after problems had been encountered with leaks from the underground tanks, a program was initiated to convert the liquids to a less soluble form. Evaporation equipment was installed and the liquids were reduced to a salt for continued tank storage.

In 1973, a major effort was undertaken to accelerate this solidification process and to improve the total Hanford defense waste program.

As a part of this improvement effort:

New facilities were built and the volume of liquids stored at Hanford reduced from 48 million gallons in 1973 to 12 million gallons at the end of 1977, with a corresponding increase in solids from 22 million gallons to 36 million gallons.

New and improved liquid storage containers have been—and are being—

constructed. They consist of a tank within a tank within a concrete vault, equipped with sensitive monitoring and control devices.

In 1973 we had three such tanks. By the end of 1977 we had seven, and 13 more tanks are in various stages of design and construction. At the same time, the numbers of single-walled tanks in service for storing liquids have been reduced from 133 to 44. And by 1981, single-walled tanks will no longer be used for liquid storage.

In 1975, a comprehensive environmental impact statement was issued on Hanford's defense waste programs.

Monitoring equipment and procedures have been upgraded, including extensive use of computerized readouts.

Additional personnel have been assigned to the work.

A comprehensive long-term defense waste management program is being developed.

In our long-term program, we recently issued for public comment a Defense Waste Document discussing the options available to us for ultimate disposal of the high-level wastes stored at Hanford. These alternatives are now being evaluated and research and development performed on waste forms and equipment. For example, scientists and engineers at Hanford are in the process of demonstrating the technology for converting defense wastes and commercial radioactive wastes into insoluble forms such as glass.

In 1979, an environmental impact statement on our research and development program, will be issued for public comment and input, with an additional environmental impact statement issued in 1982 or 1983 on the proposed methods to be used for ultimate disposal. By 1985 we will be ready to start the construction and operation of the facility that will be needed for the storage and/or ultimate disposal of those wastes. To give you an idea of the magnitude of the undertaking, if, for example, a decision were to be made in 1985 to remove the salt from the tanks, convert it to another form such as glass, and place the glass in a geologic repository, we're talking about a program that would extend out to about the year 2005.

Several other things I would like to note about defense waste management at Hanford:

From the outset, Hanford has had a comprehensive environmental monitoring program. This program shows that the impact of Hanford waste management and other programs on the offsite environment and the public has been inconsequential.

In the summer of 1977, a Panel from the National Academy of Sciences completed a year long, independent review and evaluation of the current Hanford waste management practices and plans. The review had been done at the request of our agency and the Council on Environmental Quality. The Panel consisted of recognized experts in nuclear engineering, waste management, radiobiology, environmental health, hydrology, soil sciences and geology.

The Panel's principal conclusions are that the Hanford waste management problems are solvable; isolation of the wastes can be accomplished in

any of several ways with presently available technology and there has not been in the past, and is not in the present, any significant radiation hazard to public health and safety waste management operations at Hanford.

Hanford is also playing a lead role in the Department's efforts to solve problems involved in the use of the nuclear option as a major energy source.

For example, together with Battelle Memorial Institute, in Columbus, Ohio, the Richland Operations Office was recently assigned responsibility for management of a major portion of the national program for the long-term storage and disposal of commercial nuclear wastes.

In this effort, extensive studies are being performed of geologic formations throughout the United States to assess their suitability for possible disposal of radioactive wastes and/or spent nuclear fuel.

In addition, the unusually thick layers of basalt beneath the Hanford site, which are part of the Columbia River basalts underlying the eastern part of the States of Washington and Oregon, are being examined to determine their suitability for use as a repository.

During 1978–1979, extensive technical evaluations and analyses, including drilling activities, are being conducted at Hanford. This evaluation work and public involvement needed for a decision on the use of basalt will be completed in the early 1980's. Should a repository be located in basalt, it could, of course, be used for permanent storage of nuclear wastes both from commercial power reactors and from defense nuclear material production.

The largest single program at Hanford is the development of advanced reactors. Included in this mission is the construction and operation of the Fast Flux Test Facility which, when it becomes fully operational in 1980, will be the largest fuels, materials and components test reactor of its kind in the world.

Two other major facilities which will play a vital role in the fuels program are the Fuels and Materials Examination Facility and the High Performance Fuels Laboratory. These two facilities are currently in design and will be completed in the mid 1980's.

This program, also includes the devolpment of fuel for breeder reactors, the conduct of sodium research and development work, and reactor safety research and development.

As a part of the implementation of President Carter's nuclear nonproliferation efforts, a program is underway to develop a fuel refabrication technology for proliferation-resistant nuclear fuel cycles.

This program, being managed at Hanford, includes fuel cycles for light water reactors using concepts such as coprocessing, spiking, and thorium-based fuels containing Uranium-233. Refabrication of fuels using these concepts will be heavily dependent on the use of remotely operated equipment.

Another energy program involves the testing and evaluation of materials for use in magnetic fusion reactors. The Fusion Materials Irradiation Test Facility, which is soon to be under construction, will be used to develop materials which can withstand the extremely high temperatures and radiation fields which will be experienced in power-producing fusion devices.

In North Richland, the Department of Energy is funding a solar demonstration project in facilities owned by Olympic Engineering. In this project, Olympic has built two essentially identical buildings, one using electrical energy for heating and cooling, the other deriving a significant portion of this energy from an array of solar collectors on the roof of the building.

Hanford solar energy programs also include measurement of solar intensity at various geographical locations, and serving as the national lead laboratory for wind characterization studies.

A wide spectrum of biomedical research is also performed to determine the potential health hazards which may be associated with present and future energy production systems.

For example, studies are being done to determine the effects of product from shale oil processing; diesel exhaust from engines used in mining; an airborne pollutants. A portable blood irradiator is also under development for possible use in treatment of patients with certain types of leukemia as well as in the prevention of tissue rejection in organ transplant patients.

Environmental research and development is also a major program at Hanford. In addition to extensive studies of the environmental effects of effluents from energy production facilities, most of the Hanford Site, in 1976, was designated as a National Environmental Research Park, making it available for environmental studies by scientists in the Pacific Northwest and the nation at large. A portion of the Research Park is the 120 square miles of Hanford buffer-zone lands which have been held as an Arid Lands Ecology Reserve since the mid-1960's. This Reserve is unique. It contains the only protected expanses of native plant life characteristic of the area prior to disruption by man.

Another significant development has been the trend toward Hanford and the surrounding area being developed into an energy center—consisting of multiple facilities for the production of fuels, generation of electricity and management of waste products from these operations.

In addition to the broad technological base provided by the Department of Energy and its contractors, the Tri-Cities area now includes the privately-owned Battelle research and development laboratories; the Exxon fuel fabrication facility, gas centrifuge test facility, and development laboratories; and three Washington Public Power Supply System nuclear generating plants.

Department studies indicate that the Hanford Site can safely and environmentally accommodate other facilities as a part of such an energy center.

In conclusion, I would note that Hanford, in 1978, is continuing its transition from a defense-oriented manufacturing operation to broad-based energy research, development and demonstration. We, at Hanford, are cognizant of the problems from the past yet to be resolved and we are dedicated to resolving them. At the same time, we believe Hanford's land, facilities, personnel and technical expertise can make—and are making—a significant contribution to this Nation's energy future.

Jack Robertson

Our final speaker in this session is Dr. Richard Wood, Director, Energy and Technology Division of the Department of Energy's Idaho Falls Operations Office.

LOW HEAD HYDRO AND GEOTHERMAL

Richard Wood

In private discussions with people I have met here today, I find that many of you do not know that there is an Idaho Operations Office of the Department of Energy. We are located in Idaho Falls and are responsible for the operation of the Idaho National Engineering Laboratory. While I did not come prepared to discuss our programs as Mr. Fremling has about the Hanford projects, we have a history very similar to that of Hanford except we started a little bit later, in 1949.

Most of the work at the Idaho National Engineering Laboratory is associated with the nuclear programs—primarily the U.S. Navy Programs and the NRC Nuclear Safety programs. We do have responsibility for other activities: the Butte MHD project, the geothermal projects in the ten Rocky Mountain states, and the hydroelectric program that has recently been started in the Department of Energy. I have been asked to discuss those last two programs today.

By way of comparison with Hanford we have slightly over half the budget and manpower that they have at Hanford, so you see that we are quite large in that area. The geothermal and hydroelectric programs are very significant and important to this conference. You have heard lots of references to the hydroelectric generation in this area, and of course we are all proud of that fact; but in particular, the geothermal resource potential in this region is very significant, and we believe that there is a lot of application for this resource so we are interested in seeing it expand.

I will first address hydroelectric energy; its potential, current program, and future plans. There is currently about 57,000 megawatts of hydroelectric capacity in this country, and we who obtain our power from BPA should recognize that we have the cheapest electric power in the United States. The Army Corps of Engineers estimates that about 54,000 megawatts of new electrical capacity could be obtained by adding generating capacity to existing dams with the power potential of each dam greater than 5 megawatts. New dams of this size could add a potential 51,000 megawatts. While estimates for dams with outputs less than 5 megawatts are less accurate, they indicate a potential of 27,000 megawatts from existing dams and up to 170,000 megawatts from new dams. This gives a total potential capacity from hydroelectric in excess of 300,000 megawatts. This is about six times the current hydroelectric capacity. Hydroelectric production currently provides about 10% of the Nation's electricity production and could thus potentially provide up to 40% or 50% of the current usage.

Now, I do not believe, nor advocate, that we should develop all of this potential. I believe most of the people of this country want to maintain some free flowing rivers and do not want to see every stretch of every river dammed. We will also find that there are other reasons for not obtaining power from every potential dam site. Economics, environmental concerns, preservation of fish, etc., are concerns that will restrain some of the potential development. But, an increase of a factor of 2 or 3 in current capacity would be a significant addition to our energy production system.

The current DOE program is restricted to low-head hydroelectric. This is defined as dams or systems with heads of 20 metres or less and power capacity of 15 megawatts or less. This particular regime was chosen as the area that needed seed money and development assistance. This area has been developed significantly in Europe but largely ignored in this country because of the availability and economics of the larger systems. This area of hydroelectric generations favors the tubular turbines over the Kaplan turbines, and one of the problems to solve is to develop U.S. manufacturers for these tubular turbines. There are several types of these turbines and they each have their own set of advantages and disadvantages. From a strict efficiency point of view, the tubular turbines are only slightly better than the Kaplan turbine but have larger flow variation potential. The major advantage of the tubular turbines is the significant reduction in the civil works required and the aesthetically pleasing low profile of the power plant.

Now, let me talk about some of our current programs. First, we have a resource assessment program underway at the University of Idaho to provide a detailed evaluation of the potential for low-head hydro in the Columbia River Drainage. This study will be used as a model and expanded to other areas of the country as required. Next, we are studying some of the institutional-legal and environmental problems, and specifically we are trying to reduce the FERC permit-licensing process and time for approval. Third, we are funding feasibility assessments to better evaluate the problems and potential for low-head hydro in this country.

With regard to feasibility assessments, we received 203 timely responses to a Program Research and Development Announcement and we selected 56 proposals for negotiations. We are currently in negotiations with these proposers and would expect agreements on most of these within the next month. The total value of these contracts is about $2.9 million.

Next we are funding demonstration projects. The first project is underway at Idaho Falls and I will discuss this project a little later. We expect to issue a Program Opportunity Notice within the next two weeks for additional demonstration projects. This PON will fund two or three projects in the 1–15 megawatt power range. Further feasibility assessments and demonstration request-for-proposals are under consideration for next fiscal year.

And lastly we are developing and expect to soon implement an expanded engineering development program. The purpose of this program will be to reduce the cost of low-head hydroelectric power facilities through simplification and standardization and to pursue innovative ideas for advancing hydroelectric development.

Now let's turn to the City of Idaho Falls Project. This project includes three dams with a 7 megawatt turbine in each dam. This is a run-of-river project and is designed for nominal minimum flow. Since the flow of the river is controlled throughout most of the year by large upstream dams, the water supply is very reliable. The City's upstream dam is totally out of commission because of deterioration and damage from the Teton Dam flood. This dam and power plant will be replaced and will maintain a low profile with the turbine below water level. An island formed by this dam is to be made into a park for recreation purposes. The power plant on the City

Center dam is to be replaced and extensive rework performed on the dam. The lower plant has had the dam reworked since the Teton flood and the power house will be left intact. A new power plant and turbine will be added, but the existing power plant will be used whenever the flow is sufficient to operate both plants.

The city of Idaho Falls approved a revenue bond election by a 95% majority for this project; and the project is approved by the city for $48 million for the three dams. I must comment that the cost of low-head hydro is not cheap. The cost of this power in Idaho Falls is about $2,000 per kilowatt. But with $2,000 per kilowatt on hydro, the type of financing that he city has, the tax and interest rates and so on, that figures out to about 0 mills per kilowat hour. That's twice what we're currently paying in Idaho alls through Bonneville Power, but it's half of what it would be if we went to nuclear or coal-fired plants, so it is economically competitive in the case of Idaho Falls. Every case is different because of the amount of work that has to be performed on the dam, the amount of power you can get out of it, and so on.

Now let's look at geothermal energy. Geothermal energy in the limit is one of those essentially infinite resources. I once made one of those inconsequential calculations that shows that cooling the earth by less than one millionth of a degree would provide all of the world's annual current energy consumption. Geothermal energy as we normally conceive of it in terms of mining the hot water or heat from the rocks is a slowly depletable resource, as the time scale for heat conduction to replenish the thermal heat balance is on the order of 50,000 years.

The only significant use of geothermal energy in the United States is at the Geysers in California where there is in excess of 500 megawatts electric of installed capacity. The Geysers is a dry steam resource as is Yellowstone, and it is doubtful if many (or any) other similar resources will be found in the United States. There are many applications of heating with geothermal water; the two most prominent and long-term are the heating districts of Boise, Idaho, and Klamath Falls, Oregon.

The general national lack of enthusiasm for, or application of geothermal energy is primarily because the only locations where the resource appears to be available to any large degree near surface (i.e., to within economical drilling depths) are in the recently geologically active areas, such as the western states. Yet this region represents a very small fraction of the Nation's energy consumption. However, it should be recognized that this is the prime area for future population and industrial growth. Thus, development of appropriate energy resources for this region is of paramount importance for future growth and for overall national energy self-sufficiency.

There are at least five different types of geothermal resources: (1) Dry Steam, (2) Hydrothermal, (3) Geopressure, (4) Hot Dry Rock, and (5) Magma. As mentioned, we only know of one dry steam system that is available for commercial production. The Geopressure system is confined to the gulf coast states, and the methane contained in the fluid is of more significance than the geothermal fluid. Work is underway primarily at Los Alamos Scientific Laboratory on the Hot Dry Rock and Magma systems.

The resource common in the Northwest, and the one which the Idaho Operations Office is involved in developing, is the moderate temperature hydrothermal system. The known resources in the Northwest are generally at temperatures less than 150°C. This temperature range will generally be most useful for space and process heating. It is, of course, much more efficient to use heat energy directly than to produce electric power. While the high enthalpy systems are more attractive to developers, particularly for electricity projection, there are some distinct advantages to the moderate temperature resource. The most important advantage is the abundance. Another distinct advantage is the lower dissolved solids. The need to replace system components, to abandon plugged wells, or to utilize expensive materials to alleviate corrosion and scaling is much reduced. These moderate temperature resources generally lie at more moderate depths, meaning less time and expense in drilling production and injection wells.

The geothermal development program includes: (1) resource evaluation, (2) engineering development, (3) institutional and legal problem resolution, (4) environmental investigation, and (5) demonstration projects. Woven into the fabric of this program is industrial cooperation and technology transfer.

Resource evaluation in the western states contains two major elements. The first is a state-coupled program in which contracts are written with each of the fourteen western states to provide the data for known or prospective low to moderate temperature resources in each state. This program, funded by DOE, is worked in conjunction with the USGS and NOAA. The University of Utah Research Institute is funded by DOE to technically monitor and coordinate this program. The product of this effort will be large individual state maps that identify these known and prospective areas and the probable temperatures.

A second element in resource evaluation is the industry coupled program, administered by the Nevada Operations Office and again utilizing the expertise of the University of Utah Research Institute. This program is a cooperatively funded case study drilling program to identify potential higher temperature resources that might be useful for electric power production. The first area studied was the Roosevelt area of Utah. The second which is out for proposals now is the Northern Nevada area. The third area to be investigated is the Snake River Plain. Other specific areas are planned for the future.

Engineering development work is being performed at several laboratories and universities with the ultimate goal to reduce the cost and improve the economic viability of geothermal energy development. Work is underway to: (1) improve measurement techniques for locating geothermal reservoirs prior to drilling, (2) reduce drilling costs, and (3) improve efficiency and reduce costs of the plant construction. Two of the significant items of engineering development underway are the fluidized bed and the direct contact heat exchangers. Because of the lower temperatures and potential corrosion and scaling problems, the heat exchangers tend to be large and expensive. The fluidized bed tests indicate no scaling problem in the Raft River fluids, but they are still large and expensive. The direct contact heat exchanger in

which the working fluid (i.e., isobutane, pentane, etc.) is mixed directly with the geothermal water offers significant cost savings in hardware and solves the scaling questions. There are problems to solve with this system such as the geothermal fluid carry-over, the working fluid carry-under, and the non-condensable gas accumulation. To date the tests are looking good and there is optimism for success with this system.

Demonstration projects are being pursued on two fronts. First in the non-electric or direct use area. To date there have been seventeen studies completed and six are under contract. Thre has been one Program Opportunity Notice selection completed, and negotiations are underway to award eight emonstration projects. These projects range from district heating projects) school and hospital heating and one process heat project. One of these is at Klamath Falls, Oregon, and another at Ore-Ida at Ontario, Oregon. A second Program Opportunity Notice is out for proposals at the present time. Proposals are due at the San Francisco Operations Office on July 18, 1978. For information on this request for proposal, contact Ms. R'Sue Caron, Department of Energy, 1333 Broadway, Oakland, California 94612, PON No. ET–78–03–2047. It is expected that projects such as these will demonstrate the economic viability for direct use of the moderate temperature geothermal fluid.

In addition to the direct use demonstration projects, there is other work underway to utilize this resource for direct heat. We have done work in Boise, Idaho, which indicates the viability of significant expansion of their space heating. We are working with Hill Air Force Base and Mountain Home Air Force Base to consider geothermal space heating in these areas. We encourage all Federal agencies to consider geothermal heating in any addition or retrofit projects. Most importantly we are going to drill a deep well next fiscal year on the Idaho National Engineering Laboratory site. The deepest water well that has ever been drilled on the Snake River Plain is about 1500 feet. There are many evidences and reasons to believe that high temperature exists under the plain, but whether or not water is associated with this temperature must be determined. If we locate a hot water resource at the INEL site, we intend to utilize it for space and process heat, first at the Chemical Processing Plant and subsequently other areas on the site.

The second part of the demonstration program is concerned with the viability of electric power production. The higher enthalpy systems (200°C and above) are easier from a thermodynamic efficiency point of view, but usually have significantly more dissolved solids which involves large potential scaling and corrosion problems. A 50 megawatts electric demonstration project is under consideration at the present time.

At Raft River we are pursuing plans to build two 5 megawatts electric test loops. The construction bids for the first loop will be opened this month with construction planned for twenty months. The first loop will utilize standard tube and shell heat exchangers, while the second loop is planned for direct contact heat exchangers and condensers. The temperature of the Raft River geothermal fluid (150°C) is projected to be on the lower end of the temperature range of economic viability. This is one of the primary

purposes for studying this temperature range for electricity production. We are currently drilling the sixth well at Raft River and will drill one more this summer. We plan on four production wells and three reinjection wells. The geothermal fluid at Raft River is of a quality that could potentially be used on the surface; but since the area is defined as a critical underground water area, we plan to reinject the water. However, that is one of the significant parts of this project. We must learn how to reinject, how much power is required, and how to keep from plugging the wells.

The Raft River test loops will use the binary gas isobutane for the first 5 megawatts electric loop with other gases possible for the second loop. We currently have a small turbine generator system operating at Raft River utilizing tube and shell heat exchangers that has produced about 40 kilo watts electric of power, and we are using this loop for test purposes. A 500 kilowatts electric system utilizing direct contact heat exchangers will be constructed and tested at Raft River following testing in Southern California. One of the economic difficulties of power production from a moderate temperature geothermal resource is the economics of size. Fossil and nuclear plants become cheaper per unit power as the size increases. However, a geothermal plant requires long pipelines from the numerous production wells which mitigates against large plants. It appears that the optimum plant size may be about 50 megawatts electric. Numerous, dispersed small plants in the 50 megawatts electric range do have advantages in reducing long transmission lines and in losing smaller blocks of power during maintenance outages.

One goal common to all of our research efforts is to support the contention that geothermal can be one of the most environmentally acceptable forms of energy. Yet geothermal resources bring with them their own environmental problems. These problems may not be as major as the disposal of radioactive wastes, the rehabilitation of lands that have been strip-mined, or the removal of pollutants from combustion processes; but the technical challenge may be just as difficult. At the Geysers, for example, hydrogen sulfide in the geothermal steam is high enough that complaints from local citizens have resulted in delays in issuing of power plant construction and operating permits for plant additions. At the Wairakei field in New Zealand, pumping of the geothermal resource without subsequent reinjection has led to highly disruptive subsidence and noticeable fluid depletion. Both of these are high-temperature geothermal developments, and both are economically competitive with fossil fuels as presently operated. Environmental correctives will extract an economic penalty.

In the Raft River area and in Boise, as for most moderate temperature resources, hydrogen sulfide levels are not high enough (<25 ppb) to lead to problems. But larger quantities of geothermal water are needed for a given amount of energy (compared to high-temperature resources). Subsidence, and disposal of slightly salty geothermal fluids in such large amounts, is a concern. Therefore, reinjection of the waste geothermal fluids is part of INEL's geothermal development scheme.

Reinjection is not without its own environmental concerns. Lubrication of a dry fault by reinjected fluids conceivably could trigger earthquakes.

Communication between the zone of reinjection and shallow ground water systems could lead to degradation of the water quality of those systems. Therefore, as part of INEL's geothermal environmental program, there is continuous monitoring of local seismic activity, ground elevations (to second order) within a mile of all geothermal wells, and periodic chemical monitoring of wells and streams in the area. To assure that the various environmental considerations are appropriately considered and that the monitoring program is adequate, INEL has engaged a number of organizations in its geothermal program in participatory, consulting, or advisory roles.

In addition we've been looking at other things such as raising fish in the geothermal waters. We find this works extremely well because the water does not have any bacteria in it, and the fish grow with very little loss of life; we have a very high production rate. Also, we've been doing some soil-warming experiments using the geothermal waters to see if we can extend the growing season in Idaho. (After seeing this balmy weather and having had a snowstorm in Idaho Falls on Monday night, it's quite a change!) We're also looking at other applications, such as working with trees, and seeing how rapidly we can make them grow.

While there are many significant issues to resolve in the institutional-legal area, we haven't yet been involved to any significant degree at INEL. We do believe that the institutional-legal problems are some of the most significant hindrances to the development of this energy resource. A second very important hindrance is the high risk involved in well drilling with no more confidence than currently exists that a resource will be found.

Coincident with the efforts discussed today there also exist contracts with various universities to provide development plans on a state and regional basis. This operational research effort in this region is being performed by the States and coordinated by the Oregon Institute of Technology. This work will be used in defining the strategy and future direction of the geothermal program.

Today, I have not discussed the Geothermal Loan Guarantee program which is designed to stimulate private industry development of the geothermal energy.

One last item I would like to mention is a program we have at INEL called technical assistance. Our contractor is authorized to provide up to 100 manhours of advice and assistance to individuals or companies, upon request, relative to geothermal application in their specific case. This program is providing a catalyst to enable geothermal potential to be evaluated and point potential users to private industries who can help them. This effort is paying big dividends and if combined with regional outreach and the energy extension service could indeed speed the development of this resource significantly.

In conclusion, I believe that low-head hydro and geothermal energy are important contributors to our energy mix to reduce our dependence on fossil fuel. They cannot provide a major part of the Nation's energy requirements, but they may be able to assist significantly in meeting the energy requirements of the Northwest.

QUESTIONS

Conrad Driscoll, KAOS Radio, Olympia: Mr. Fremling, could you comment on Doctor Mancuso's study of workers at Hanford, for people who aren't familiar with that study? He showed in a study over eight or nine years, that workers at Hanford have a higher cancer rate. And, Mr. Wood, I would like to know what the length of production is for low-head hydro dams, and what capability they play in storage of water? I'd like you to answer that in relation to the fact that dams are not permanent structures, as we saw with the Teton River Dam.

Fremling: The issue raised about Dr. Thomas Mancuso's study is a ver complex one. Basically there has been some debate over a long period c time about the effects of low level ionizing radiation. In the mid-1960's the Atomic Energy Commission, concerned about that debate, contracted with Dr. Thomas Mancuso of the University of Pittsburgh to do a study in which he would take data compiled at Hanford over the years and seek to determine whether adverse effects could or could not be seen. Dr. Mancuso spent the next twelve or thirteen years gathering further data and developing his methodology, in preparation for reaching some conclusions about what the data showed. In 1974 a study was done in the State of Washington by Dr. Samuel Milham. It was a mortality-based study which tended to show that there might be excesses of certain types of cancer amongst Hanford workers, but it did not take into account radiation or anything else. It was part of a much broader study of all sorts of population categories here in the state. In essentially *all* cases, not only Hanford workers, Dr. Milham found excesses of certain types of cancers. At about that time Dr. Mancuso changed his staff and engaged Dr. Alice Stewart and Dr. George Kneale of the United Kingdom to work with him. He then performed another study using different methodology than the one that had been developed over the preceding twelve to thirteen years—using a methodology very similar to Dr. Milham's. He concluded that there were excesses of certain types of cancers of the pancreas, colon, etc. A study done at the Pacific Northwest Laboratory which was not mortality-based, but which is population-based, did not come up with the same results. Hence, there is a big debate going on as to whether Mancuso has indeed found excesses or not. The significant difference between a population-based study and a mortality-based study is that if you look only at the deaths, and you're dealing with a population which is healthier than some other population, you would expect to find a higher ratio of mortality from cancer and that's what Dr. Mancuso's study showed. This is because if we are eventually able to succeed in ending many of the causes of death other than cancer, then cancer will get all of us.

The results reached by Dr. Mancuso, the results reached by the Pacific Northwest Laboratory, and studies done by Mancuso's former staff, are now under consideration by a blue ribbon panel, quite independent of any other organization, aimed at determining what the facts are in this debate with the results then to be factored into the work of bodies which establish radiation standards—the International Commission on Radiological Protection, National Committee on Radiation Protection, and so on. I can't

tell you that there are or are not effects of very low levels of radiation. What I can tell you, though, is that more work has probably been done and more is currently known about radioactive substances and their effects than any other hazardous substance in the world. To date there has not yet been established any evidence which the internationally or nationally-recognized bodies consider significant enough to effect any changes in their standards. But, nonetheless, pending all of this we are continuing the policies at Hanford and elsewhere of maintaining radiation exposures as low as practicable, which means that we engineer, design and minimize those exposures wherever we can.

Wood: With reference to the second part of your question, there are I believe, something like 50,000 existing low-head hydro dams in the country and every one of them has its own particular purpose, potential and application. The dams in Idaho Falls, for instance, are specifically for power production and so the storage water is not considered. A good share of the low-head hydro dams are of that type. In New England, primarily, the dams were built just for production of power and were not considered for storage; but there are other dams that are used for storage, for instance for peaking application. So every dam is different and has its own particular application and you have to look at it. As far as safety, certainly there is a risk from dams just as there is a risk from any power source. We have seen evidence of that risk; and in fact today the Jackson Lake Dam is being held down because of a potential risk that has just been discovered in that area. So risk does exist; but the smaller dams of course, have a lower risk than the great big ones.

Fremling: One other point I want to mention. The question of the effects of low level radiation is not exclusively a Hanford issue. The question of low level radiation really pertains not only to nuclear work throughout the country but also to the effects of ionizing radiation to which all of us are subjected in medical and therapeutic X rays. Hanford's involvement is due to the fact that a very large body of data has been accumulated since the very beginning at Hanford which made it very useful in performing this kind of study.

Joan Hohl, Washington Public Interest Research Group: Mr. Fremling, as you are probably aware, since the Department of Energy has announced it was searching for a national waste repository, many states have passed laws saying that they do not want to be considered as a national waste repository, and many more have introduced legislation recently. If legislation were passed in the State of Washington saying that the citizens in this state don't want their state to be a national waste repository, would the Department of Energy honor such a law since federal land would be involved?

Fremling: I can't really speak for what the Department would do, when you get into fairly thorny legal issues and everything else; but at least today in those states where governors and/or the legislatures have taken strong positions that they do not want the Department to continue its exploratory work

in their states, that work has been discontinued; and some states have been informed that no decisions will be made to go ahead with repositories or exploration if the state government objects to it.

Obviously, ultimately there *will* be a repository somewhere for radioactive waste; and if all of the states were to pass that sort of legislation, I think we'd be in a very interesting situation where there would undoubtedly be questions raised in the court about federal pre-emption in the field of nuclear regulatory matters and so on. But our position right now, is that we are working *very* closely with the Washington state government. They are providing us with participation and overview on all the work we are doing in basalt studies, and we have no intention of moving forward without thi kind of cooperation.

Eleanor Adler, Louis County Crab Shell: Mr. Fremling, the public has been told that nuclear power is to be a stop-gap measure and that eventually we are going to start using solar. It interests me that you mentioned the future construction of a fusion material irradiation test facility. Can you tell me when you expect that to be constructed, at what cost and when does Hanford and DOE expect fusion power to be a viable source of energy?

Fremling: I am not familiar with the idea that nuclear is a stop-gap until we go solar. I think you will hear more people say that we ultimately have to get to the resources which are renewable. That includes a number of variations on the solar theme as well as others. The facility to which you refer is a facility for testing materials which could be used in later power-producing devices using fusion. That facility is going to cost about $83 million and it will be completed in the early 1980's. In terms of the actual construction of fusion reactor devices, scientific feasibility has not yet been achieved, which means that fusion is not yet where Fermi was in December of 1942. Feasibility is expected to be accomplished late in this decade, probably by 1979 or 1980. Once that has been achieved then all the engineering will necessarily have to be done in order to get the facilities built that will actually generate the power. Fusion will not be a sizable power source until after the year 2000.

Robert Walton, Washington State Senate Energy Committee: Mr. Wood, you mentioned six sites that have been identified in the Pacific Northwest for feasibility studies for low-head hydro. Could you tell us what those sites are?

Wood: There are three in Washington: P.U.D. #1 (Okanogan) has one of them, City of Spokane has one, and the South Columbia Irrigation District has one. Then the Confederated Tribes of Warm Springs Indians down in Oregon, the City of Seward, Alaska, and the Boise Project Control in Idaho have others.

Barry McClain, Seattle citizen: For how many years could the present nuclear power plants give electrical energy with the present supply of uranium and how much electricity do the power plants produce?

Fremling: As I am sure you are aware, there is a debate going on now about whether or not there will be sufficient uranium 235 to fuel all of the nuclear plants that some people believe we need, and so there is strong support in some quarters for going ahead with the breeder reactor as a means of enhancing that supply and thereby extending the capability of nuclear power well beyond the year 2000. I really can't tell you what the total would be. The projections have changed pretty dramatically over the years in terms of how many thousands of megawatts of nuclear energy will be produced, but the installation capacity that has been generally used of late by the Department and its predecessor agency was 380,000 megawatts of installed nuclear capacity about the year 2000.

Jude Nolan, KAZAM Radio: Mr. Wood, in your discussion on geothermal power, I was wondering how that would be applicable in urban areas, or if there is a problem in transporting the hot water long distances? Is that a factor which will make it not as applicable? Also, what about the environmental and ecological effects of using hot rocks, getting that heat out of the earth? Has there been any discussion of how that would affect the earth in general? Or is that too far down the pike?

Wood: Again, it is a matter of economics how far you can transport the water. Iceland heats many of their cities with hot water and they transport fifteen miles. They are even talking of going up to fifty miles. You don't lose a lot of temperature in transporting water—maybe a degree to two degrees per mile depending on how much insulation you want to put on it. So you can transport it quite a ways, but the economics again depends on what the resource is and what the application is at the end—fifteen miles is not out of range. Your second question related to the environmental effect of using hot dry rock. In a real sense it is negligible, but in an individual localized area it could be significant. As far as taking heat out of the rock, I don't know of any work that is under way on environmental aspects at the moment. That particular work is being performed by Los Alamos in the hot dry rock program.

Jude Nolan: If fifteen was not out of the question to transport geothermal energy, still in a really large metropolitan area fifteen miles would be nothing —like Chicago and New York where it is wall-to-wall cities.

Wood: In Iceland, that is fifteen miles before they get to the city borders; their resource is fifteen miles out of the city.

Eric Stachon, Forelaws on Board: Mr. Fremling, I have a little article out of Sunday's newspaper in which Washington's Governor Dixy Lee Ray stated that Washington has more nuclear waste sites than any other state except Nevada, and that "There hasn't been a single bug harmed by it." In light of the fact that we have experienced a leak of a gallon or two at Hanford, do you agree with Governor Ray's statement?

Fremling: It is slightly more than a gallon or two; but those leaks have had certainly zero impact on the public, no impact on the outside environment, no impact on the on-site employees, and I doubt if they have harmed too many bugs. What we are talking about is a contaminated pocket of earth

well below the surface of the ground and well above the water table which is stabilized. True, it's not a very desirable circumstance to have quantities of radionuclides in the ground, but while it is in the ground it is not harming anything.

Stachon: You are saying none of those leaks went into the Columbia River?

Fremling: That is correct. That is not to say there haven't been radio-nuclides which have gone into the Columbia River. There were radio-nuclides that went into the river as a result of the reactor operations. In the once-through operations, short half-lived radio-nuclides went with the cooling water, but there again the concentrations were so low and the dilution factors were so high that the effects have been inconsequential.

Conrad Driscoll, KAOS Radio, Olympia: If Hanford is going to be a permanent storage depository, it seems to me that we don't have the right to leave our waste for generations way beyond our lives, specifically, we don't really know what shift the earth is going to take. It seems to me that to count on the basalt being a permanent physical structure that isn't going to shift at all and that it is going to be a radio-actively contained area, may be making some presumptions over 25,000 years.

Fremling: I would submit to you, sir, that Hanford already has more radioactive waste than any place in the world and the question is not *whether,* the question is *how* do we deal with those wastes. Now as to whether or not commercial wastes come to Hanford and are placed in basalt repository, that is clearly a decision that it going to have to be based on the best possible technical and public judgment as to whether or not the basalt is an acceptable medium for doing that.

Walter Gordon, Gordon and Cross Engineers, Tacoma: I understand that the people in Denver are daily exposed to more radiation from the sun than the workers at Hanford. Has there been any study made of death by cancer in Denver on a population basis compared to Hanford employees? Secondly, I understand that the weapons waste at Hanford is such that if you were to store all the commercial power plant waste from the United States in Hanford that by the year 2000 it would still be a small proportion of the weapons waste already at Hanford.

Fremling: If all of the nuclear power plants to be constructed between now and the year 2000 were to have their fuel reprocessed, liquid waste produced and those liquid wastes solidified and made available for replacement in a repository, there would be about half the volume of what we already have at Hanford. There would obviously be substantially higher concentrations of radionuclides in those wastes, probably on the order of 30 to 65 times in terms of Curie content. But in terms of volume you are right. We already have twice what you would get from the commercial sector.

On the first part of your question about Denver, Colorado—I could be off by a few millirems, but the average citizen in the United States—just from natural background—gets about 140 millirems and you can increase that on the order of fifty millirems by living in Denver, Colorado. If a maximum individual were to live in the city of Richland and go out of his

way to get as much radiation as he could from the operation at Hanford, during the last year he would have gotten .04 millirems, to give you an idea of the low levels we are talking about now. The occupational exposures run a bit higher than that: they can run as high as three rems. But generally speaking, if you are talking about the average Hanford employee, I think moving to Denver might be well thought out before making that kind of move.

Gordon: I am going to Denver in August. I guess I should worry about being in Denver for a month.

Fremling: I don't think you should worry about living in Denver and I don't think you should worry about working at Hanford. That's my reaction.

Barbara Zepeda, Washington Democratic Council: I just watched my mother die of cancer of the pancreas last year. She worked in a decontamination lab at Hanford at Redox for fifteen years, and it isn't very pleasant to watch. This is not a disease that has ever been in our family before and I do think there is some concern that hasn't really been adequately addressed today. However, my specific question concerns the idea of irrigating the Horse Heaven Hills. How would that affect the storage of wastes in that area?

Fremling: Not at all. The Horse Heaven Hills are south of the Columbia River; and we are north and west about forty miles away from the section of land that you are talking about.

I would like to comment on the first part of your statement, however. I certainly share your concern—the thought of someone dying of cancer is not a pleasant thing for any of us to either know about or experience. If one had reason to conclude that that were caused by the kind of work which was done, we certainly ought to be doing something about it. But we do not have that kind of evidence at all; in fact the evidence is overwhelmingly to the contrary. On the other hand, there is very strong evidence to link the smoking of cigarettes with death and cancer, and yet you go in the outer room or outside here and you have no problem at all finding people who are filling the air with smoke for other people to breathe.

So I think what people have to do in terms of nuclear energy is recognize that nothing is totally safe in this world of ours. You have got to evaluate the benefit and the risk; and some how or another we have to take the risk from nuclear in proportion to the other kinds of risks to which we are exposed. 55,000 people every year are killed in automobiles, but I don't see people singing on the highways and telling people to stop driving. We have never had anybody killed at Hanford in a nuclear-related incident, and we have never had anybody killed in a civilian nuclear power accident in this country; but we have got the singers and the marchers.

Dr. Bradley: I wonder if anybody in the audience knows how much radiation exposure one would get from one flight on the Concorde?

Fremling: I can tell you what it is in the 747. It's six to seven millirems on a round-trip flight to Washington, D.C.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

Luncheon

Thursday, June 1, 1978, 12:30 p.m.—2:00 p.m.
Presiding: Dean Dale Comstock, *Central Washington University*
Introduction: Congressman Mike McCormack
Guest Speaker: Governor Dixy Lee Ray, *Washington*

Dale Comstock

Welcome to this luncheon today. We're delighted to have a very nice turnout, and the nice weather that we're having for this two-day conference. It really has not been very conducive to sitting inside and enjoying these lectures. I'm very appreciative of the fact that everyone has stayed on very well and has not withdrawn to the beach.

The first speaker I want to present to you is Congressman McCormack, whom I'm sure is well known to everyone in the State of Washington and throughout the United States. He served in the Washington State Senate and in the House of Representatives from 1956 until 1970, when he was elected to Congress from the 4th Congressional District. He is a member of the House Committee on Science and Technology and the House Committee on Public Works and Transportation. In 1971 he was elected Chairman of the freshman Democratic Congressional caucus, and in that same year was selected to chair a House Task Force on Energy. In 1975 he was appointed Chairman of a new subcommittee on Energy, the first second-term member to chair a major subcommittee in modern history. Congressman McCormack is the author of the Solar Heating and Cooling Act, the Solar and Geothermal Research Demonstration Act, the Electrical Vehicle Act, and is co-author of the Energy Conservation Extension Service, a pilot program of which is operating in the State of Washington at the present time. Congressman McCormack is clearly qualified on energy-related matters, certainly in his area and throughout the United States, to bring us a few comments from the Washington scene and to introduce our Governor. Before I turn the podium over to him I would also like to recognize the support and assistance that he has provided to Central Washington University over the years.

Mike McCormack

Thank you, Dale. Governor Ray, ladies and gentlemen, distinguished guests. Thank you for inviting me to join with you today. I want to congratulate Central Washington University and the Department of Energy for

preparing this program for all of us, and I want to congratulate all of you who are here participating.

It is critically important that we come to understand the nature of the energy crisis, and what we can and cannot do relative to it. It is certainly a pleasure for me to be invited to introduce Dixy Lee Ray, but before I do that, I have also been invited to also make a couple of comments. They will be brief. What I would like to do is to bring you up to date on the Department of Energy 1979 Authorization/Appropriations activity in the House of Representatives.

One of the problems that members of the Department of Energy have is that they are restricted to presenting the official line. We become acutely aware of this when they come and testify before us. We take some pity upon Assistant Secretaries who come in and tell us that their programs shouldn't have any more than a certain number of dollars, when we know perfectly well they need more than that, but they are obligated to present the Administration's position. We know that when they speak publicly, they address these programs from the position which has been presented by the Administration to the Congress for Fiscal '79. We in the House have our own ideas about some of these things, and we have been working on these programs too; sometimes for longer than those testifying before us. Here is a brief update on DOE authorizations for research, development and demonstration.

In the area of conservation where we are spending $287 million this year, the Administration requested an increase to $357 million. In our committee we increased it by another $93 million up to a total of $450 million for fiscal 1979 for energy conservation, research and development. This includes a new program for automobile research and development, it includes a major fuel cells demonstration program, a major program to support municipal waste conversion to energy or energy intensive fuels, expansion of the Energy Conservation Extension Service to all fifty states (we have a pilot program here in Washington), and also the electric car program which is now underway. We are pleased with those increases.

In solar energy we are spending $378 million this year. The Administration requested a cut to $341 million. Instead we increased the present allocation by $135 million over the Administration program to take it up to $476 million for Fiscal '79, and then added $53 million for bio-conversion programs. This of course includes solar heating and cooling, thermal electric conversion, wind energy, a new major photovoltaic energy program, ocean thermal conversion, and bio-conversion programs. We also have a major new ten-year photovoltaic energy bill which I authored and which has come out of our sub-committee. The bill would have been passed out by the full committee today, but we didn't have a quorum present, so we will do it next week. The bill would establish a ten year, billion and a half dollar solar photovoltaic energy program.

We are now spending $107 million. The Administration requested $130 million—we increased that to $146 million. We have increased lowhead hydro programs. Fossil programs have been increased to include synthetic

fuels programs of all sorts with special emphasis on solvent refined coal; and the nuclear program has been increased, of course, to include the Clinch River breeder project. So the entire Department of Energy research, development and demonstration program as it comes out of the House Authorization and Appropriations Committee will now total for this coming fiscal year, approximately $5 billion, 800 million, up about $500 million from this year. This will also include basic energy sciences, high energy physics and the entire spectrum of projects which have attracted much attention—gasohol projects, conservation of all sorts, and of course conversion of wastes to useful fuels and energies. We are pleased with our progress.

The rest of my comments are by way of introducing our Governor. As I read the biographical sketch on Dixy Lee Ray I was almost overwhelmed by the long list of honors which have been bestowed upon her. My problem is how to choose among the long list of accomplishments and awards that she has received: about a dozen Doctors of Science from leading and prestigious universities across the country; a half dozen more in other disciplines such as laws and the arts; an endless array of honors from Phi Beta Kappa, Ladies Home Journal Woman of the Year Award, First Citizen for Seattle in 1973, the YWCA Gold Medal, the National Campfire Girls' Woman of the Year, the top ten Most Influential Women in the Nation, the 1978 honoree of the Beta Gamma Sigma and on and on.

I think much more important than reading all these citations, are the underlying traits that make all these awards seem so natural. I have known Dixy Lee Ray for many years—from the time she was Director of the Pacific Science Center, through her membership on the Atomic Energy Commission, and her appointment as Chairman of the AEC. I remember many of the conversations that we had—late conversations sitting in my office talking over the problems of the Commission and what needed to be done, and how Dixy kept saying "they appointed me Chairman, they asked me to be Chairman, I mean to be Chairman, I mean to do the job." What a tremendous impact that determination had in Washington, D.C.! Following that, she served as Assistant Secretary of State and then returned here to be elected by her own people, as Governor of the State of Washington.

There are words which fit Dixy—integrity, common sense, hard work, responsibility, honesty, courage—courage to tell the facts as they really are. At times like these, I think these qualities of integrity and common sense and hard work and responsibility and courage are needed the most, especially in positions of public leadership and in public leaders in order to achieve responsible and rational energy policies. I think we in the Northwest and in Washington State in particular are indeed fortunate that our Governor is Dixy Lee Ray.

THE WASHINGTON PERSPECTIVE ON ENERGY

Dixy Lee Ray

Thank you very much. I, too, am pleased to have been asked to participate in this program. I'm delighted that so many of you are here and

that there has been such a wonderful demonstration of interest and participation in these important questions of energy, particularly from the perspective of the Pacific Northwest.

The State of Washington's perspective on energy is essentially a regional one.

Our principal energy resource is the Columbia River power system, and it is a regional source. Our utilities, public and private, work with each other and with BPA and the surrounding states in unusual and exemplary cooperation. And our state's Congressional delegation—led by Senator Jackson and Senator Magnuson—also work together closely and cooperatively with our state and with the state government.

In the course of the past year's active public discussion on regional power legislation, it has been our differences, rather than our many areas of agreement, that have, as usual, attracted the most attention. But I believe our common interests are greater than those things that divide us, and that our proven ability to solve problems on a regional basis will in the end prevail. I see the differences between the Pacific Northwest states as narrowing, our consensus widening. Like Senator Jackson, I believe that we are going to have regional power legislation in the Congress this year.

And I believe it will be legislation that benefits the individual customer as well as the region as a whole.

Let this be understood: the State of Washington and our neighboring Northwest states must each be free to protect our own individual interests. But this doesn't mean that we should not join together to try to improve economic opportunities and the quality of life for all of us, for all of the region's citizens, electrical energy is one of the very important areas of our common opportunity.

I want to concentrate today on electric energy, for the simple reason that the Pacific Northwest is more than twice as dependent on electric energy as is the nation as a whole. Over half our total regional energy needs are met with electricity. Most of those needs are supplied by hydroelectric power, although now and in the future increasing amounts will be supplied by coal-fired and nuclear power plants. By comparison, only about one-quarter of the total U.S. energy needs are met by electricity.

Slightly less than half of our region's energy needs are supplied by petroleum and natural gas, compared with about two-thirds for the total U.S. energy consumption.

This implies several things: it means, first, that in terms of minimizing our use of scarce and nonrenewable fossil fuels, we are better off than the country in general, thanks in large measure to the Columbia River hydroelectric system.

But it also means that our region's economy—jobs, productivity, and our entire standard of living—are *twice* as dependent on electric energy as the United States in general. *Think of that:* the Northwest is more than twice as dependent as the country as a whole on an adequate supply of electric energy.

I want to emphasize that point because it underscores the special Northwest need for careful planning of electrical generating capacity. With over 80% of our principal energy supplied by hydroplants—and thus dependent on adequate rainfall—our electric energy production system itself is less predictable and less dependable than the system in other regions, Streamflow, snowmelt runoff, and therefore energy production can vary enormously depending upon weather in any particular year: streamflow at Grand Coulee Dam in mid-April of 1978, for example, was about triple the low streamflow of 1928-29. But the current 1977-78 operating year on the Columbia system began in the middle of the worst drought in the century. Had that drought continued, we would really be in desperate straits today; and drought conditions could return.

Because climatic conditions can and *do* vary, our energy system and thus our entire economy is uniquely weather-dependent. Just as inadequate natural gas supplies forced thousands of people out of work in the Ohio Valley not long ago, lack of enough rainfall *could* do the same thing here—*in almost any year during the next decade.* And may I say, parenthetically that we in the Pacific Northwest do not have that same kind of shortage, or face that same shortage, in natural gas.

The Columbia River and its tributaries give us a great hydroelectric resource. But this resource is also a great problem. We can plan on it—to a degree—but we must also plan *around* it. We dare not take it for granted. Regionalism—sophisticated cooperation among the Pacific Northwest states, and with the federal government, and especially involving all of our utilities—is absolutely essential.

With that background, I suggest that Washington's—and the region's—perspective on energy must focus on two principal items: the adequacy of our energy supply, particularly our electrical energy supply, and the cost of that supply, to all customers.

Let me highlight what the present projections in BPA's latest "Power Outlook" indicate for regional power supply, under critical water conditions—that is, conditions *less* severe—but critical—than last year's.

First, careful analysis shows that if critical water conditions occur in *any* year of the next decade, we could be short of electricity by the equivalent of up to three large thermal plants, that is, plants of up to 1,000 megawatts electrical capacity. Or to put this in somewhat different terms, we could be short—if we had a critical low water year—more than four Bonneville Dams in some years, and two Bonneville Dams in most years of the next decade. And this assumes construction of all the presently planned new plants on schedule, and electricity growth of about four percent annually. But we know that the schedule for most new plants under construction has already slipped.

If thermal plants are delayed by one additional year, the situation gets worse. In that event, there would be five years in the next eleven when we would be short the equivalent of *four* Bonneville Dams or more, and we could be short every year.

If plant construction is delayed by an additional two years, deficiencies get still worse. In that event, *eight* of the next eleven years could find us short the equivalent of four Bonneville Dams *or more,* if critical water conditions occur.

Low growth or no-growth advocates may argue, say, for calculating a less annual growth rate—3% or 2%. Given the increase in our electrical use during these last years, which runs well above 4% even with strong conservation measures, and given the fact that we are not static in our population, given that we do not have optimal economic conditions for all of our citizens, a projected rate of 4% electrical growth is not too optimistic. But if it were half that, at 2% we would still have to double our capacity by the end of this century. At a 3% rate of growth, we would be extremely short during the 1984-85 period and for most of the next decade in all years when critical water conditions occurred. It is true that load-growth of electricity has slowed, compared to the last decade, and our regional load projections do reflect that trend. But the planned construction schedule for increasing the capacity to take care of low water critical years and reasonable growth has slipped even more. Most alarming is that the strong economic growth in this region, which we now seem to be resuming, is happening while our energy problems are deepening and increasing.

I am *very* concerned that we do something about the adequacy of power supply. If we are going to be responsible, we must; and time is short. But we also need to do something about the *cost* of that supply—and recognize that when electricity is in short supply, the cost will certainly not go down.

Because new plants cost much more than existing ones, and to the extent we can use energy more efficiently, we can help to control the consumer costs. That's one reason why energy conservation is so important and is the foundation of all planning. But we need to define much more precisely and specifically, just what conservation efforts there will be, and what these conservation efforts will achieve. We need to recognize that conservation alone cannot and does not mean we won't need new plants. Conservation is one way in which we can help to control costs.

We can also reduce costs by creating a better regional planning process—one that better matches resources to regional needs; one that focuses the region's expertise on plant construction problems; and one that finds effective ways to avoid unnecessary delay. Each one-year delay in the construction of a new power-generating plant, at current inflation rates, costs consumers the citizens, the rate-payers $100 million in increased construction costs, and many times that over the life of the plant. That's money out of people's pockets and an expense we don't need!

We can also reduce the cost of financing new plants for public or private utilities, by increasing the security for investors through regional financial backup. Who would benefit? Not the utility investors. They'd just be taking a little lower return in exchange for a more secure investment. But it would *certainly* benefit the customers of both public and private utilities. Lowering the cost of financing new plants by even a quarter of a percentage point could save the region millions of dollars annually in unnecessary costs.

That's something that we should really think about.

Finally, the cost of supply among utilities is inevitably tied to the big hurdle of allocation. Allocation—the question of who gets much of the low cost existing federal, BPA power, now that BPA's existing contracts are expiring is of utmost importance. Allocation must be included as part of regional power legislation, to avoid a long and unproductive struggle involving both BPA and the courts, between utilities—public or private, new or existing—*or* between consumers and their political representatives.

Of course, I support the rights of public bodies and cooperatives—organizations that our state helped to foster—to priority in supply of BPA power. But I am Governor of *all* the people of this state, and mindful of the need for some accommodation with our neighbors in the region. That is why I have supported H.R. 9020 and S. 2080, and its program of conservation, regional planning and allocation. Its essential concepts, if not its exact provisions, have attracted a broad and increasing base of support.

If some sharing of the benefits of low cost federal power is a prerequisite to passage of a comprehensive regional power plan, then by all means, let's do some sharing! But we cannot share merely by taking from Washington residents to benefit those in other states.

Let's do it by passing the benefits *directly* to all consumers. And let's do it without the battle cries from the public-private power wars of years ago. If we rekindle those fires, under the guise of an allocation battle, every worker, every business, every state in the entire region would be the loser.

There will *never* be complete equality in the distribution of low-cost federal power—there simply is not enough to go around. Nor is there a good argument to support *complete* equality, given the history of the region and the choices that each community has made, sometimes years in the past. Any allocation program must *not* be at the expense of existing customers of our public agencies. But there must be *some* sharing, there must be pooling, if we are truly to move ahead and serve the interests of all our people.

What direction to take? The answer does lie in careful planning and cooperation, with our neighboring states, and with the federal government. To attack these problems we need to enact regional power legislation, and we need it soon.

- We need a strong, concerted effort at conservation, focussing much more specifically on exactly what we mean by conservation programs, and identifying them—well defined, specific programs, programs supported by government and by the utilities, and, most of all, by consumers themselves.
- We need an effective mechanism for regional electric energy planning which leaves utilities responsible for utility problems, and leaves the Government responsibile for government problems, without trying to mix them.
- We need a *balance* in planning. We *don't* need a horse-and-rabbit stew—you know the kind: one horse and one rabbit—with the utilities, legally on the hook. Because they must supply service, they become the rabbit.
- We need to make more effective use of BPA as a vehicle for efficient regional pooling.

- We need the authority for BPA to purchase energy from nonfederal plants, and to help finance construction programs and promising renewable energy sources. BPA purchase must not, however, override the compelling individual interests of the states.
- And we need a fair, prompt distribution of benefits from the federal power system, so we can avoid unproductive fighting over a limited resource.

Here is Washington's perspective on energy, then, in a nutshell: We need regional energy legislation. We need to worry about the dollars in our paychecks as much, I would say, more than the nickels and dimes on our utility bills. We need to resolve the allocation issue in order to get on with promoting energy conservation, planning and constructing new resources and new plants, and creating needed new jobs.

The time has come to build on our past and to fulfill the bright promise of the Pacific Northwest region. It *is* a coherent region, geographically and electrically. It is one people—our people—and we need a sensible regional power program quickly, if we are to remain both prosperous and vital, economically and environmentally sound.

Panel on Regional Power Planning

Thursday, June 1, 1978, 2:15 p.m.—3:45 p.m.

Presiding: Sterling Munro, *Administrator, Bonneville Power Administration*
Governor Dixy Lee Ray, *Washington*
Lieutenant Governor Ted Schwinden, *Montana*
Congressman Mike McCormack, *Washington*

Sterling Munro

Here we are again. For those of you who have had enough of Governor Ray and Sterling Munro, we have some additional new attractions. We heard Congressman McCormack relatively briefly at lunch, so we have another shot at him now. And we will all be exposed to the risk of your questions and the additional risk of our answers. The subject matter of this panel is "Regional Power Planning", which I take in the broadest possible context of the subject—almost anything goes.

I'm very pleased to introduce Lieutenant Governor Schwinden for a statement. This is his first opportunity; he's had to listen to us. I have to point out that we asked Congressman McCormack to join us on this panel because we really felt it would take three Washingtonians to handle one Montanan. It is a great pleasure to introduce the first Lieutenant Governor of Montana who, under the new Montana law, was elected jointly with the Governor.

Governor Schwinden, we are going to promote you today. Anybody who can survive so effectively as a Roosevelt County, Montana, grain farmer and President of the Montana Grain Growers Association is obviously a helluva guy. He's served as a Democratic member of the House of Representatives in Montana and a State Lands Commissioner, was Chairman of the Montana Bicentennial Advisory Council during the Bicentennial celebration, and now is Lieutenant Governor. It is certainly a series of jobs that almost challenges Secretary Schlesinger's series of hopeless occupations. It is a great pleasure to have you here, Lieutenant Governor Ted Schwinden.

Ted Schwinden

Thank you very much, Sterling Munro, Governor Ray, Congressman McCormack, and participants who are now winding down, and perhaps in some cases wearying of the conference, which I think has been productive. I'm delighted to be here. I want to make it clear, Sterling, that the 3 to 1 ratio is not going to prevail in allocation. I think one of the delights of being here

was the opportunity to leave Montana yesterday morning as it had been for several days—wet and dreary and overcast. It has been such a pleasure to come to the "Phoenix" of the Pacific Northwest and enjoy your magnificent sun for the last two days.

I appreciate the opportunity to in a sense perhaps respond to the very excellent comments that Governor Ray made this noon; her topic, of course, was "The Washington Perspective on Energy and Regional Planning". In a few minutes I would like to try to briefly summarize what I hope are not only the perspectives of Governor Judge and myself but of Montana people, on this very critical issue of energy and future regional planning for energy in the Pacific Northwest. I share these perspectives today, of course with a very distinguished group, but a group almost literally of non-Montanans, because I checked the registration list quite carefully and I think we add up to a sum total of four in the entire registration for the conference.

So, as Mr. Munro mentioned, I bring you greetings from Roosevelt County —from the hinterlands in many respects of the Pacific Northwest. I can't help sharing what I felt was a touch of irony in listening to Secretary Schlesinger last night, and to some acute observations that Mr. Munro made this morning. The Secretary said last night in discussing our energy use in this country that we have never had to worry about energy (he was, of course, referring to abundant supplies of cheap energy); and it occurred to me that it was not until 1953 that the REA began the first delivery of electricity to my farm operation in Eastern Montana. So when we talk, Sterling, about planning twenty and twenty-five years ahead—we haven't, at least for some of us, had an opportunity to even begin to enjoy the energy euphoria; yet we're now meeting in conference and trying to determine how we're going to survive for another twenty or thirty years and provide electricity, at some exorbitant price, if at all. I think as we begin to look at planning for our energy future we had best remember what Mr. Munro pointed out this morning—how quickly the situation can change. That electricity that was so cheap and so abundant in 1953, less than a generation ago, is now threatened by a host of circumstances.

Perhaps the first thing I should do as a representative of the State of Montana, part of our Pacific Northwest region, is to assure all of you that Montana does recognize its responsibility to share its very abundant resources not only with the Pacific Northwest but with the entire rest of this country. And certainly for the purposes of this conference and for this panel about regional planning for energy in the future, the abundant coal reserves of Eastern Montana, and also as Mr. Munro pointed out, the transportation corridors in many cases to bring that power to population centers of this region are most significant. While Montana has and does recognize this responsibility to share, please also understand that we do not intend that Montana, and in particular Eastern Montana which is my home, is going to become an energy grainery or an energy colony for either the region or this nation. Energy planning in the Pacific Northwest has to be, as Governor Ray ably pointed out this noon, a give and take process whereby each state recognizes and each state respects the individual needs of the other states and the remainder of the people throughout this region.

Montana, therefore, is obviously very deeply interested in the various proposals to grant to the Bonneville Power Administration the right to purchase, for example, thermal power. BPA's purchase authority may well be one solution to the projected power insufficiencies that face this region, but since BPA is a federal agency, it is not, in a real sense, directly accountable to Montana people. So granting purchase authority to BPA could adversely affect the ability of the state and the people of Montana to determine, for example, our own state energy policy, to control the siting of energy facilities within our state, and to set retail energy rates.

In trying to plan for energy supply and demand in the future, it is clear, as Senator Jackson and I think almost every speaker that I've listened to at this conference has said, that conservation must be the foundation of energy policy in the Pacific Northwest and indeed in the United States. Because of the many economic and energy supply interconnections among the states in our region, the conservation efforts of any one state alone are going to be insufficient. A regional conservation approach is necessary. It's necessary to insure that the real or imagined conservation efforts of one state are not negated by the consumptive habits of its neighbors in the area.

About a month ago in Billings, Governor Judge presented the energy concerns of Montana in testimony to the Senate Energy and Natural Resources Committee hearing held on the Pacific Northwest's regional energy legislation. The Governor and I have actively supported the adoption of Pacific Northwest energy planning legislation, but that support is conditioned on that legislation addressing the concerns of Montana people, and I'd like to very briefly summarize some of those concerns.

First of all, Montana must be assured of equal participation in any regional decision and policy-making authority established by the Congress.

Secondly, any legislation must maintain state siting authority, including the ability to say "no". I was interested in reading last night that Governor Ray, in comments to the media yesterday, basically has taken that position. Governor Straub, in testimony on behalf of the National Governors' Association Subcommittee on Energy Facilities before the Congress a short time ago, basically also supported that position. As Governor Ray said this noon the areas of consensus on regional energy planning I think are far broader than those areas of disagreement, which always tend to get identified and, in many cases, exaggerated.

Thirdly, Montana is concerned that the state authority to set retail power rates should not be interfered or tampered with or preempted. Incremental pricing at the wholesale and retail levels should be encouraged so that the actual cost of energy generation and transmission is reflected in the energy price.

Fourth, conservation and renewable resources should be established as foundations for regional as well as state energy policies. Conservation and alternative unconventional energy sources which, again, have had substantial discussion during this conference are both potential substitutes for new, large, central electrical generation facilities in the Northwest. Planning to meet new load growth should consider reducing demand through pricing and conservation, and increasing supply through alternative sources.

Fifth, because the costs of construction of new power plants are rapidly rising, certainly some form of BPA power purchase authority may be desirable, but again, we feel that authority should be conditioned. First, the regional authorities should certify the regional need for additional power. Secondly, all state siting laws and regulations must be met. Thirdly, there must be sufficient deterrents in legislation that would minimize any plant efficiencies. Fourth, any increased access to capital or reduced capital costs for power plant construction resulting from BPA purchase should be equally available for conservation and alternative energy sources and included equally in cost comparisons.

As a sixth Montana concern, whatever compromise is finally reached on allocation of the federal hydro system energy, it must include recognition of the Montana preference for power generated at Hungry Horse and Libby. Furthermore, I don't favor the allocation methods which would freeze allocation patterns for long periods of time, such as the thirty-five year contracts in the proposed PNUCC legislation, I guess for the very reasons discussed—the dramatic changes that have happened in the last twenty-five years and will, undoubtedly, happen in the next thirty-five. We have to maintain flexibility—flexibility so that both Montana and the entire Pacific Northwest can respond to changing economic conditions in our region.

Our seventh concern involves the accountability and the responsibility of any regional authority established by the Congress. A regional authority, whatever it's called, however it's composed, should be controlled by the public and be accountable to the region's residents via the political process.

Public accountability is a critical component of any regional energy bill. It has been suggested, perhaps with increasing frequency in the last few weeks, that our regional energy problems could be solved without creating a new publicly accountable regional power authority. Those who suggest that course say that BPA could be the basis of a new regional energy plan which would, first of all, make BPA responsible for compiling regional energy forecasts and balancing the region's energy needs and resources. It would grant to the Bonneville Power Administration the authority to purchase the output of thermal plants and it would establish a revolving conservation fund that BPA could administer.

A BPA-oriented approach is certainly tempting. It might indeed be easier to win Congressional approval of such legislation—legislation providing only for BPA purchase authority and a revolving conservation fund—than it would be to develop and to win passage of an alternative bill based upon a new regional authority.

We cannot accept that approach. We cannot accept it because it clearly neglects the critical issue of public accountability. Because BPA in a real sense of the political system is not accountable to the people of the Northwest, it is not the appropriate agency to set regional energy policy nor establish regional conservation standards and goals. The residential, commercial, and industrial electric consumers of our region are primarily responsible for repaying with interest the investment in the federal generation and transmission system. The citizens of this region have also borne the impacts of federal dams and the BPA transmission lines. And it is those same citizens whose

economic well-being depends directly upon an adequate energy supply as again the Governor pointed out this noon. Any regional energy plan, therefore, must include a regional authority that is directly accountable to the people of the Northwest through the political process. That regional authority, and not Bonneville Power Administration, should be responsible for regional energy policy, for the establishment of conservation standards and goals, for energy forecasting, and for the balancing of regional energy supply and demand.

Now certainly one most difficult barrier to the development of alternative regional energy legislation is the question of allocation of power from the federal hydro system. Members of the Pacific Northwest Utilities Conference Committee (PNUCC), which drafted the legislation which is now before the Congress, have split somewhat over the allocation issue, and that's totally understandable. It's clear that this issue must be resolved if we're to develop a regional consensus for an alternative bill.

Montana's primary interest in the allocation issue is in the prompt and effective resolution of that issue, so that as a region—as the four states of a region—we can present a unified alternative bill that's not going to be blocked by bickering among our respective states. I know and I think everyone who is familiar at all with the legislation recognizes, that resolution of the allocation issue is only going to occur through negotiation and through compromise, and that process is going to be difficult, to say the least.

Disagreement among the states concerning the entire prospect of energy planning in the Pacific Northwest is not unreasonable to expect—I suspect it's almost logical to predict. I can understand, for example, the desire of those people who live west of the Cascades to obtain as cheap an electricity as possible from as far away as possible. Yesterday at lunch Bob LeResche from Alaska said of the states—his own state in particular, but he used the generic term—that we must keep our special interests separate. This noon Governor Ray said we must protect our own individual interests as states. I agree, but if we're going to construct a practical and a realistic energy policy, we're going to have to cooperate—perhaps as Governor Ray has said, in an unusual and exemplary cooperation—to meet the needs and the desires of our neighboring states as well as our own. To do less, I submit, is to ensure failure or to invite a federally-imposed solution. And I'm not prepared to decide today whether or not those are one and the same thing. Thank you very much.

Sterling Munro

Thank you, Lieutenant Governor Schwinden.

I thought I might just take advantage of my role here as moderator only to comment on one point in your intriguing and excellent presentation which I certainly think confirmed the validity of your reputation for considerable expertise on these issues. Without commenting on matters involving any proposed or pending legislation, which I must exempt myself from doing, I would hope only to comment with regard to existing statutes under which the Bonneville Power Administration functions. I hope I will somehow be able to persuade you that if we aren't, we certainly should be responsive at

the BPA to the people of the Northwest. I would hope that we would do a better job if we can in that regard. I obviously agree with the statement that we are not directly responsible to the people of the State of Montana, but I must also say that the elected representatives of the people of the State of Montana who serve in the Congress of the United States have made it *very* clear to me that they hold me responsible on behalf of the people of the State of Montana. Of course, currently that is in effect, BPA's Board of Directors in the Congress of the United States, and most particularly, the elected representatives of the people of the Northwest who serve in the Congress of the United States.

Dixy Lee Ray

I would just like to comment briefly on that part of your presentation, Governor, that referred to public accountability. It may be a little bit simplistic, but as you outlined what you mean, all I can say is it adds up to politicizing the system. I do not believe that governors, or members of the legislature, or people elected or appointed by them are any better qualified to make forecasts of electrical energy, to assume responsibility for the allocation process, or to determine where and how electricity is to be generated than the public at large, and I don't believe those kinds of decisions can be made by committee. I believe those kinds of decisions should be made by the people responsible, that is, the owners and operators of utilities, whether public or private. And I would object seriously to any kind of system which made, for example, state governors into a Board of Governors of a regional power plant. No way.

Sterling Munro

Congressman McCormack, your turn.

Mike McCormack

First of all, I appreciate being invited to sit in today, but I can hardly pinch-hit for absent members of this panel. And, as a matter of fact, I'm not nearly as well qualified on this subject as the other persons who are sitting up here because it hasn't been directly under my purview. I'm not a member of the House Interior Committee, and I've been waiting for it, or the Senate committee to come up with specific legislation that we could consider. Two thoughts came to mind as I listened to Lieutenant Governor Schwinden's presentation. It strikes me, Ted, that you are saying "Replace Bonneville with a Northwest regional interstate compact to manage the electric energy resources of this area." May I ask, is that a fair way to describe what you are suggesting?

Ted Schwinden

No, I don't think it is quite fair because I have not suggested that the governors of four states be a Board of Governors. I have not suggested that any particular format of authority be the perfect solution, but I guess Gov-

ernor Ray and I do disagree on what she calls politicizing, and I guess I've always regarded it as an integral part of our system. I think there's a difference—and I recognize your sensitivity, Mr. Munro—I think there's a difference between responsiveness and accountability. Accountability is what the other three people here face each time we ask the people to continue us in office. And they have the perfect opportunity and often exercise it, as you know, to remove us from office. I think the responsiveness (and I certainly meant no criticism of BPA's responsiveness in terms of performing their statutory obligations) is an entirely different issue. I plead guilty to politicizing. I don't plead guilty to a harsh criticism of BPA for failing to respond, but I think as Governor Ray said this noon, it's going to require exemplary and unusual cooperation among the states to develop a regional energy plan or policy. I think those discussions between the leadership of the states—a discussion that has to take place with the private sector—should not be tied down early with any preordained ideas that it ought to be an interstate compact, a Board of Governors, or anything else. And I'm not suggesting those. The only point I was trying to make is that I do not want that regional authority to be isolated from the people.

Mike McCormack

May I suggest that I cannot envision any other legal structure. If I may interpret what you're saying, it is essentially to dismantle BPA, take what is BPA today and put it in the hands of an agency created by the local state governments. If that's the case, then it seems to me that you're saying interstate compact. If it's not the case, then you seem to be saying that you would still have a federal agency such as BPA.

Ted Schwinden

Perhaps we're just not on the same wave length and I'm not suggesting this as Montana's proposal for an authority. I'm suggesting that it could be structured much like our regional commissions. It could be a person appointed by each governor, confirmed by the Senate or by the legislature, representing each state, and perhaps a federal representative designated by BPA or by the Congress, whatever, as well as voting or non-voting members of the private sector. And I don't think you have to have an interstate compact; I think the Congress would have the authority to set up that type of structure.

Mike McCormack

Of course, it requires the Congress to set up a compact. A compact, as you recognize, is an agreement between states with the ratification of the federal Congress giving them specific authority to do a certain job. Now I fail to see how the federal government would create an agency and simply say, "The states will do this." and then back out. It seems to me the only way one could operate as you describe, with the states making policy and actually running the thing, would be under some sort of a compact.

Ted Schwinden

I guess I just don't agree that that's a necessity, but it's certainly a possibility.

Mike McCormack

May I just make one other comment, then? I think that one of the hazards that we run into when we talk about any reordering of the structure has to do with the Public Preference Clause. I think this is one of the facts of life that we simply must recognize regardless of our perspective when looking at this subject. The fact is that we cannot solve this problem in a vacuum, and we cannot change the Public Preference Clause without impacting public power systems all over the country. They are going to be extremely resistant, and that would include the Administration. I don't throw that in as a monkey wrench in everybody else's thinking, but it must be faced.

QUESTIONS

Munro: Thank you, Congressman. I should report, I think, that in a rump session of this panel prior to this meeting there was an agreement reached on allocations, so it's not necessary to delve into that issue. It was agreed that Montana would get what it thinks it's entitled to, and Idaho will get what it thinks it's entitled to, and Oregon will get what it thinks it's entitled to, and Washington will get what it thinks it's entitled to. Therefore, with that kind of unanimous agreement, I don't know why we have so many of these petty disputes.

Are there any other profound observations like that from members of the panel? Perhaps now it's time to turn to the experts in the audience. We will entertain questions, commentary, or whatever. This is an opportunity not to be missed, I would think, with the pedigrees available here.

Barry McClain, Seattle: There has been planning for the year 2000 since the 1962 World's Fair. Why aren't energy conservation planning programs being implemented for the year 2020, the year 2040, and so on? What's to be done about the energy situation during those years? Do we need another World's Fair here with energy conservation resources as a theme? Is the U.S. going to be able to protect its security and economic status during the year 2020, 2040, etc.?

Munro: I'm probably the best one to answer that question since I've already confessed my lack of foresight and great difficulty in seeing five years and ten years ahead. I must confess I am concerned that we're not able to do more about the year 2000.

Fred Schmidt, University of Washington: I have a question which is really for the entire panel, but rather specific in particular cases. The issue is one of cost which clearly is of interest to the entire Northwest. Lieutenant Governor Schwinden remarked that in 1953 the electricity from REA was cheap, and that in the future it will be expensive. First, I'm curious to know if you happen to remember how much it was in 1953.

Munro: Lieutenant Governor Schwinden, I ought to warn you if you're going to answer that question that I think the questioner is going to suggest to you that electricity is cheaper today than it was in 1953.

Schwinden: Point of clarification. I did not say that's when REA came; I said that's when it was delivered to my farm operation in eastern Montana. I don't remember the actual rate because at that time, there was a very high minimum for a new operation in a very sparsely settled area, which, in almost every case, covered a relatively few amount of kilowatts. I just don't remember anymore. I guess that minimum was probably in the $12 to $15/month range, something like that.

Fred Schmidt: OK. Now, on the other hand, if we look to the future then we have Governor Ray and Congressman McCormack who are experts in the cost of nuclear power. My question is, can either of you find any real, intrinsic reasons for believing that the cost of nuclear power will rise in the future in absolute terms?

Ray: None whatsoever, particularly if we maintain some kind of common sense. I'd like to say that costs are always relative, and while we're talking about rising costs, we should also remember we're talking about rising costs of everything. We are in an inflationary period; we see no reason to believe that's going to change in the future. We're also talking about relative costs between the Pacific Northwest and the rest of the country. I don't have up-to-date figures, and so the numbers I'm going to use are about two years old. Perhaps Congressman McCormack or somebody in the audience can bring me up to date, but as of 1975–76 the average cost of a kilowatt hour out of the TVA system, which is perhaps the second most inexpensive system in the country, was running about 33 mills per kilowatt hour. And that same two years ago the costs in the Northeast, around Boston and so on, were running around 50 mills per kilowatt hour; whereas two years ago people in New York City were paying 88 mills per kilowatt hour, and it's gone up since then. And we're worrying about maybe costs of more than 20 mills ten years from now. We're still marketing power from some of our mid-Columbia dams at two mills per kilowatt hour. I think you've got about four mills at Bonneville. Nuclear power costs are running around ten, twelve. Costs are really relative. What runs costs up are two things: delay in construction, unreasonable and continued and redundant opposition, and uncertainty that affects the bond market. There is no technical or intrinsic reason for real costs to rise.

McCormack: May I comment also very quickly? I believe that the absolute costs of nuclear energy (compared to other major forms of energy, that is, petroleum and natural gas and coal) will go down if we pass a Nuclear Licensing Law. If you take a look at the Washington Public Power Supply System and the five plants now under construction, you would learn that the added costs, caused by the delays from harassing law suits would run well over a billion dollars. I think the Nuclear Licensing Law that Jim Schlesinger was talking about yesterday may be the most important piece of energy legislation we have before the Congress. If, under a new law, we

can cut the lead time on the construction of nuclear plants to seven or even eight years, which is the Administration goal, and if we can eliminate schedule uncertainties, and if we know that a federal court judge someplace is not going to hang up some utility for two or three years, thus causing increased costs in the bond market—then, I believe you'll find the absolute cost of nuclear power will decline as compared to its cost today. Coal will clearly go up because we haven't yet reached as far as we are going to have to reach to clean coal up to make it safe enough—as safe as nuclear already is.

Unidentified questioner: As far as the economics go in nuclear power, I don't really understand when we have 70-odd nuclear power plants now in the country and 690,000 estimated retrievable tons at $30/ton of uranium in this country . . . . Is that a roughly correct figure? I've been looking at the figures and it's my understanding that we only have in this country enough uranium to run roughly 68–70 plants, and I'm wondering how . . .

Munro: Your question is "Where's the fuel coming from?"

Questioner: Yes, where's the fuel coming from and how, when we're going to be getting into another energy dependency on other countries. Not bringing in the breeder question, where is that uranium going to come from?

Munro: I'm sure Congressman McCormack won't be able to restrain himself in wanting to answer that question. We have a couple of pretty good experts on that subject here.

McCormack: I'll be very brief. Our estimated known and probable reserves of uranium are about 1.8 million tons. There's been some discussion in the Administration recently that this might be as high as 2.4 million tons but their case has not been very well made, and we in the Congress are still using 1.8 million tons. That's enough for 300 plants or so. That's the reason we must go forward with the breeder program and with fuel reprocessing. That is enough uranium for the entire life of those first 300 plants, and with fuel reprocessing and a breeder program, we will be able to program your fuel in such a way that you can fuel a large number of plants—400 or 500 plants for the year 2000. But this assumes the existence of a breeder program, and of course it assumes reprocessing. There may be more uranium out there. We're undertaking an intense program of exploration to try to determine how much uranium there is in the country. I want to say that the dollar cost of uranium has almost nothing to do with the case. We could easily operate with $100 a pound uranium as far as economics of nuclear power are concerned. The only restraint on uranium production is the environmental impact of mining extremely large amounts of rock to get a tiny bit of uranium out of it. We could mine the state of Tennessee and grind it up and make all the uranium we wanted, but the people of Tennessee might object. The environmental impact of mining is a more serious restraint than dollars. That's why a breeder program is an advantage.

Dick Nelson, Washington State Legislature: I'd like to address this to either Congressman McCormack or Governor Ray. We talked about costs. There are other costs that are mentioned as potentially adding to the total cost of

power generated by nuclear plants including reprocessing, waste disposal, research and development on the next generation whether that's new fuel cycles or breeder reactors, development of uranium, thorium fuel supplies, safety standards (which seem to be escalating) severe earthquake standards, and decommissioning, to name those that I have heard about. I wonder if there are estimates on how those other costs would add to the estimated costs for nuclear power.

McCormack: First of all, all safety features such as seismic stability are included in the original costs of the plant, so when you talk about capital outlay of a billion dollars a plant that already takes into consideration engineering and building the plant so it resists any credible seismic event in the area. The fuel reprocessing operation comes out to about two mills per kilowatt hour, so it's easily included. Decommissioning a plant is a very small percentage of the cost of the entire plant. The fact we must remember is that a nuclear plant produces about $225–250 million worth of electricity every year for its entire life. The benefit cost ratio is very high including all costs.

Nelson: Could you speak to waste disposal?

McCormack: Yes, waste management is quite simple. It's the biggest nonproblem we have in the country today. The fact is, we have all the technology at hand. By next February at Hanford we'll be pouring full-size containers of commercial nuclear wastes, as glass in steel containers. We already have contracts out to tunnel into the basalt at Hanford for repository studies, both for fuel elements and for glassified wastes. The glassification of wastes is very simple and increases the cost of nuclear electricity by only about one mill per kilowatt hour. No one has come up with any scenario to get any of those wastes into the biosphere, once the glassified material is put down in deep and stable geologic formations.

Ray: I would just like to add, Representative Nelson, that while there is a great deal of half-information and misapprehension with respect to the costs of nuclear power, I think the answers are best gotten from the utilities that are in fact operating nuclear power plants, have built them, and have had years of experience with them. And uniformly they find that the electricity generated by the nuclear plant is cheaper than that generated from either coal-fired or oil-fired plants. There's a great deal of solid experience and factual evidence to support that.

McCormack: Dick, I might say that I want to agree. We have an abundance of information on the fact that nuclear electricity is much cheaper than coal. It is also much cleaner and safer. As I have said, it will become even cheaper. There is one other point. The total costs of federal R & D for nuclear energy is a very small percent of the total cost of constructing, fueling and operating 300 to 500 plants. To suggest that federal R & D makes nuclear energy competitive is misleading at best, and we are spending more federal dollars on other energy sources.

Munro: Ted, of course we're delighted that you don't have any problem with coal-fired plants.

Schwinden: We solved that just like we did the allocation problem, didn't we?

Dolores Hurtado, Oregon Common Cause: I'd like to express some concern about the question of regional power planning and the potential impact that it will have on the consumers, the citizens of this area. As far as I can perceive there is a vacuum of public unawareness of the issues, of the ways that this regional power decision will impact both on the way of life and particularly on the pocketbook of the consumers. I'm concerned that there has been very little in the way of media discussion, that there's been very little outreach by most of the agencies that are involved in discussing these issues, and I'm appalled at the low level of understanding or awareness by most citizens of what kind of impact will be made on them by the proposed regional power approaches. I would like to point out that there have been a variety of scenarios, a variety of approaches, a variety of assumptions which have been laid out by different groups, some saying that if we conserved more we would spend less because conservation is a much more cost effective way of producing additional energy.

Now I think these kinds of assumptions, these kinds of different approaches should be laid out, should be debated, should be brought out into the public arena so that there is some public awareness, some public participation in the decisions which so vitally affect us all. I would really like to ask the panel members for any plans or suggestions that they would have for enhancing public education and awareness of the issue.

Munro: Well, I know they're attempting to move in that direction here today; and I agree with you that people are not very well informed on a subject of massive importance. I have to observe that I know my colleagues in the utility business are sometimes appalled by the amount of public interest and involvement that seems to confront them on every hand. Of course, their perspective is different from the general population. We all need to do a little more in this regard to explain to each other what we are trying to accomplish, and why; and I know Common Cause will be trying to help us in that regard.

McCormack: I very much respect what you say; I think it's important, but I think you should know that Bonneville tried desperately to involve the public as far back as early in Chuck Luce's administration. I was one of the persons invited to serve on what we called the Bonneville Power Regional Advisory Council. We involved literally hundreds of persons from different walks of life in the BPA area, and tried to get them to come to meetings for policy discussions and explanations. It was virtually impossible to get much participation unless they were already professionals or had a special interest in the subject. It was virtually impossible to get press coverage, above superficial aspects of the meetings. It's very difficult to get public involvement.

Hurtado: I agree. The reason why the time may be a little more ripe now is that people are concerned about their rising electric bills, and they are looking for vehicles for doing something about it. And I think if they are given some alternatives which are drafted in terms of, "if you conserve it's going to cost this much, if you build it's going to cost this much"—

these are some of the issues that they should be aware of and it might be an incentive for them to work a little harder at insulating their attics.

Munro: It almost seems to take a disaster to get the kind of attention you're asking for. (*Hurtado:* I think we're getting close.) We are trying to avoid the disaster. Therefore, if we can succeed in avoiding the disaster, even if the public isn't aware of it, that's probably better than having the disaster in order to get their attention.

Unidentified questioner: It turns out that my question is related to the previous one, but I would like to address it to Governor Ray and Mr. Munro and Congressman McCormack. I've attended for two days now and heard in many of the speeches a foundation for energy conservation. There are a number of people who have been speaking to us who are depending in some degree on energy conservation efforts by the public. I'm with the State Office of Environmental Education, so being in education I've made the observation that one of the best ways, short of outright regulations for encouraging conservation, is simply to teach people what energy is and where it is used and how it's related to them. I found that, especially with students, we're dealing with a whole population of students now who think light just comes from the switch, and water comes from the faucet, and gasoline just comes from the tank, and food just comes from the refrigerator, etc. They're quite divorced from the origins, especially the energy origins, of almost all the things that they do in a day. Given the concern that's been expressed by the speakers for energy conservation and my observation that one of the best ways to get that conservation is to teach people about energy, why are there so few funds now allocated towards energy conservation education or energy education at all, and what would your respective agencies be doing to remedy that situation?

Ray: I'd like to say that lack of funds is no reason why where energy comes from should not have been taught in our schools for many many many years. What you said is quite an indictment of public school education, and I think you are quite right, but that is not because there have not been funds. There have been courses in science taught, there have been courses in environment taught. It has been an oversight, shall we say, on the part of teachers? It is an indictment that a large population today thinks electricity comes out of a plug in a wall. Not very many people take physics, but most of them take general science; and if that has not been taught, it is a failure of our education system. And that is not because there were no specific dollars marked, "Now with this dollar you teach where electricity comes from or how it's made."

I also want to say that our State Office of Energy has an enormous number of educational programs that it is participating in and helping to fund. There are many things that are providing materials to schools, providing information, providing programs of a variety of kinds. While there isn't time here to detail all of them, I'd like to point to Mr. Larry Bradley who's sitting right there. Raise your hand, Larry. He can provide you a lot of information on where these kinds of materials can be obtained.

Stan Gustafson, Northwest Solar Systems: A recent report prepared for the Department of Energy stated that if only 25% of the new residential and commercial construction included solar energy, supplementing 60% of the space heating and domestic hot water, you could conserve an equivalent of 14 megawatts of electrical power. In view of this, do you foresee an increase in the use of solar energy as an immediate effort to conserve electricity, and if so, to what degree? Directed to Dixy Lee Ray, please.

Ray: In the first place, solar energy today, as you well know, is not a replacement for electricity, but for space heating. There is nothing to prevent anyone from making use of it. The technology is well developed and available, and there is all manner of encouragement for people to look to this alternative. It does mean an effort on the part of the individual home owner or building owner. There are many incentives under both state and federal programs. I don't know what else could be done. The state does not buy people furnaces, and we have a constitution that requires that the state may not lend its credit. But there are many ways in which the availability of solar assisted heating and cooling can be applied in homes and buildings, and it's available.

Unidentified questioner: Governor Ray, you are obviously concerned with delays in siting and construction of nuclear power plants and the costs to the consumer that are incurred in that. I have two comments on that, or perhaps questions. Is it not true that the consumer at present is an involuntary financer of nuclear power plants through his or her utility bills at a rate that is guaranteed by the government to provide a rate of return for the investors?

Ray: No, I don't think that's a proper interpretation at all.

Questioner: As I understand it, the utilities can use the money that comes from our utility bills to help construct new power plants.

Ray: Costs of construction are not allowed in the base rate.

Questioner: That's not as I understand it from having talked to such utilities as Puget Sound Power and Light. Secondly, with the speedup in siting and construction, do we not run the danger in siting on faultlines such as have been discovered at Skagit and in construction errors such as that which is causing the shutdown at Trojan currently?

Ray: If you're worried about seismic faults, you'd better move outside of Seattle. You'd better not live in any city on Puget Sound because they're all built on seismic faults.

Questioner: And do you feel comfortable with that fact?

Ray: You bet! I've lived here for sixty-three years and intend to continue for quite a bit longer.

Questioner: What about the fact that building on fault lines and the fast processing of construction causes the shutdowns such as at Trojan which is no doubt costing us money because there is a delay in power.

Ray: I think you've got a mixed metaphor there somewhere. I don't know of any seismic problem that's shut down Trojan.

Questioner: Not siting. Excuse me if that's what I said. What I meant is construction. They have found that Trojan does not meet earthquake standards at present.

Munro: Trojan ceased operation on schedule for refueling. While down for refueling, the discovery was made of an apparent error in construction—not anything having to do with the reactor vessel of the plant or something of that nature, but having to do with the control room of the plant, a separate structure. The Nuclear Regulatory Commission will require, I assume, that that be reconstructed in order to meet earthquake-proof standards. And that is a matter that will be available for public hearing as I understand it before a final decision is made. Does that give enough specifics for your question?

Questioner: Yes, thank you.

Roney Heinz, Tippets-Abbett-McCarthy-Stratton, Consulting Engineers: Lieutenant Governor Schwinden, you talked about coal reserves at the beginning of your speech. To me those are some of the most important raw resources that Montana has to offer this area, your area, the nation. I have two questions; the first one will be background to the latter. I'd like to know the percentages of coal reserves in your state that are committed outside the Pacific Northwest—back east—and for how long they are committed.

Schwinden: You want to know the percentage of the reserves that are presently under contract for delivery to Detroit-Edison, and so forth? At the present time we're shipping about 88% of the coal mined in the state—some 27 million tons—out of state. I don't know the total lifetime on all those contracts. Some of them run past 2000; they're thirty-year contracts. That percentage will change when and if Colstrips 3 and 4—the two 700 plants—are constructed. Up to this point, the overwhelming majority of coal mined in Montana has been marked for export.

Heinz: Based on that now, you spoke of a more expanded authority which would deal with thermal as well as hydro power. Coal is a raw resource for thermal. Now in light of that, your resources would be a basis the same as the water resources for hydro, for distribution and allocation. Would that expanded authority also deal in your exports of that raw resource?

Schwinden: In your opening statement, I think you said those coal reserves—some hundred billion tons of minable coal in Montana—are the most valuable resource. I think they're the second most valuable. Most valuable are people. I think it's important that we wisely use not only our coal but our timber and our agricultural land and our water which is very scarce particularly in eastern Montana. When I talk about regional energy planning which you know is the title of our panel this afternoon, I'm talking about

the development in our states and in our region of—I'm trying to remember the very eloquent way that Governor Ray ended her speech this afternoon—meeting our future energy demands in an environmentally compatible manner. So in terms of the coal itself, Montana, on its own initiative and far in advance of federal legislation, took the necessary steps to assure that the land is reclaimed, and that the conflicts with agriculture for both the land and water are resolved. We hope that we've done the same thing in the siting of facilities, and in that sense certainly the coal reserves come into play. Polls and observation of public opinion indicate that most Montana people would prefer that when Montana coal is mined, that it continue to be burned at load center. One of the obvious reasons is the one that someone mentioned this morning—that you lose a half a plant just in transmission losses alone. But in that sense, yes, those coal reserves are a part of our overall regional energy policy planning. And that's why I mentioned them number one in my discussion.

Munro: We love those Montana people, Ted, and particularly cherish them individually because there are so few of them.

Val Fonseca, interested citizen, citizen advocate: I would like to speak to the subject of policy making. This morning I heard Mr. Munro speak as an administrator and clearly indicate the policy came to him. This afternoon I heard Governor Ray speak and say that she felt the policy on these matters of energy should come from our public utilities. Mr. McCormack commented to the point of legislation for the process. We do have a delay which is costly to us all. We're in the process of establishing regional policy. I'm concerned that as we defer back and forth between our elected representatives and our public utility administrators, we have more delay. Congressman McCormack, I would like to ask, do we need some legislative reforms so that we can choose our own policy or are we going to have a policy passed to us from D.C.?

McCormack: Under the present law, the Bonneville Power Administration is part of the Department of Energy which is administered by an elected President under laws that are written by elected representatives in Congress. This is quite the way the entire government functions, and the citizen response must come not only during elections but on a continuing basis to the executive branch and to the legislative branch. However, it's impossible for a Greek democracy to make managerial policy for any sort of a functioning entity such as a utility or a BPA. We simply have to have representative government do it. It's up to the people to make it effective, to make their voices heard, but there's no way to make engineering and economic decisions in an assembly.

Munro: I might observe, Congressman, that we do have a plural decision-making process in our country, not a singular one. We don't have a czar in energy or anything else. I doubt that we want one. And we have federal government, state government, local government. We've got individual utilities. We've got individual public interest groups. I think they all do and must contribute to the decision-making process. That may not be, or sound,

or is very efficient, but I think it does work and can work with all its frustrations.

Tom Eckman, Chairman, Washington Environmental Council's Energy Committee: I have a question for both Lieutenant Governor Schwinden and Governor Ray. Specifically, I'd like to know how much or what percentage of actual real dollars are allocated in each of the state's governments for energy conservation efforts, specifically, those that are appropriate to the state legislative revenues and not from federal government passthrough.

Ray: I'm sorry, but out of our $8 billion biennial budget, I don't carry all the breakdown figures in my mind. If you'll give us your name and address, I'll be happy to send you the proper figures.

Eckman: I understand Mr. Bradley is here. Could he perhaps answer that?

Larry Bradley: I like the question because I've been responding to it now for about three days. We are up for Sunset Law Revision, as you know. The office operates on about 80% federal funds, 20% state funds to handle the executive side of the office. The federal funds are used for the program on a contract basis with the Department of Energy. It's running about a million and a half dollars a year, most of which is going out for contracts to the universities to expedite the conservation program by first finding out how you conserve and what the people will buy; that's the most important part of it, so we don't get into a pontificating situation from Olympia. That's the Energy Extension Service program which amounts to now about $780,000 alone—all federal funds. So we are operating under the dictates of a federal program, and the whole conservation program is geared around that in order to make it uniform in the fifty states, which is quite important. The federal government at least in that aspect is asking us to get some sort of uniform plan going and we are complying with it, and I'm working with each of my counterparts in the other states.

Eckman: Correct me if I'm wrong. Are there any state appropriated funds going directly to energy conservation other than to administration?

Bradley: Indirectly, of course, they go to our state funds, but it is a very small amount. It would be $2 out of every $10.

Eckman: And Lt. Gov. Schwinden, your answer on this?

Schwinden: Well, I have some of the same problems that Governor Ray has, obviously. I can throw you some figures, but they're not honest. I can tell you what our Energy Office costs in general fund money, but not all their effort is directed toward energy conservation. Another cost that we have is a system of tax credits for conservation efforts; I don't know what that's costing us. I even hesitate to throw a figure—with our state weatherization program, tax incentives, non-federal, I'll wild guess one quarter million dollars of state money, but I'm probably 100% off either way. I'm sorry.

Munro: Well, that's close enough for government work. [laughter].

Schwinden: Sterling, that all depends on whether you're putting it up as a taxpayer or spending it as a bureaucrat.

John Szablya, Washington State University: I would like to comment on what the lady before me said about education and on Governor Ray's comment about the school system. I come from a country where the energy shortage has been acute for long, long years—decades—and may I give you just an example? How shall I teach my children to make good energy savings and to be resourceful, when my children and other children here go to a school which has a federally-aided program and each child must take milk whether he likes it or not? The garbage can stands beside the milk; he/she takes the milk, puts it in the disposal, and goes way. They *must* take milk, or the school is cut off from the program. My question is, how shall I teach my children and neighbor's children to save our resources, when the federa government forces children to throw away milk without drinking it? I woulc like Congressman McCormack to help me on this because I as a father have a serious problem in how to teach my children and my neighbor's children resourcefulness when this is what they come up against.

Munro: Take away their Corvette for a week.

McCormack: I'll be glad to try to help when I learn more about the situation, but of course I don't know anything about it today other than what you have just told me, so I'll help if you'll contact me on it.

I'd like to close with one point. President Carter has suggested that we cut our annual rate of growth of energy consumption from about its contemporary 3.6% to a bit below 2%. Now this would be an incredibly spartan program, an extremely aggressive conservation proposal, but I believe we should seriously strive to reach that goal. If we achieve it, we will cut our consumption by one third in the year 2000. Even if we do succeed, it will be necessary for us to double our domestic energy generation capacity by the year 2000 assuming no imports at that time. If we were to continue our imports at the present rate, which I consider to be impossible, we would still have to increase our production capacity by 70% just to reach the President's goal. While we must conserve in every way that we can, we must also plan to produce a great deal more energy or we'll be in even more desperate economic and political troubles than we are today.

Munro: I want to thank the members of the panel and I want to thank the members of the audience for a very interesting and lively discussion. Because I happen to be a member of the Board of Trustees of Central Washington University, I also have another pleasant duty to perform and that's to thank some other people who have made this event possible, including a number of my colleagues in the Department of Energy who did so much of the work for this proceeding: Jack Robertson, the Secretary's Regional Representative, Randy Hardy, who is Assistant to the Regional Representative, Lee Johnson, the Public Information Officer, Kathy Coronetz, Assistant to the Public Information Officer, and Robert Lindsay and Judy Tokarz from the Richland Department of Energy Office. From Central Washington University, I also wish to thank for a marvelous job also on arrangements, President James Brooks, Dr. Dale Comstock, Dean of the Graduate School and Research, who was the project director and principal contact person on

this program, Dr. Anne Denman, Associate Professor of Anthropology, and Mrs. Laura Wilson, Secretary to the Dean of the Graduate School and Research. I am very proud of all my colleagues and the great job they have done. Now this panel proceeding will end.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

Conference Wrap Up Session

Thursday, June 1, 1978, 3:45 p.m. — 4:30 p.m.

Presiding: Marianne Craft Norton, *Executive Director, Washington State Women's Council*
Larry Bradley, *Director, Washington State Energy Office*
Ken Hammond, *Professor of Geography, Central Washington University*

Marianne Craft Norton

I understand the chemistry of a warm day in the Northwest, and human nature. I also understand the import of what you and I can achieve in the last fifteen minutes. We have the responsibility of coming up with an evaluation session to provide further input into the one question—shall there be other energy conferences in other regions, and shall this be the first of several such conferences in the Pacific Northwest? I am asking each of the panelists to briefly provide a summary of the conference as they saw it, and then we will open it up for some suggestions from the audience. At this time I would like to introduce the first panel member—Larry Bradley, Director of the Washington State Energy Office, who has just joined us this afternoon.

Larry Bradley

Thank you very much, Marianne. I have had two people from the staff monitor the entire program since it began, and I was also in attendance at the interviews that were granted by Dr. Schlesinger and by Senator Jackson, so I don't feel left out very much about what has gone on. As a general observation on the whole program, I thought that the gamut of questions and topics discussed was very broad indeed, they touched of course on some provincial concerns that need to be dealt with, but in general the concerns are pretty well uniform throughout all of the West, including the southwestern states.

In considering conservation-pushing, Senator Jackson, for example, gave you an idea that this was a very necessary ingredient in the whole energy program, but it was not an answer or panacea to all the energy shortage problems. He could have gone a little bit further by saying that conservation is at best a one-shot situation. We must understand that in a mathematical sense, it does not repeat itself and get better with time—whatever you have conserved, you have conserved—that is it, and it is all over with. Mathematically, again, the amount of recovery is the most thorough, profitable and efficient conservation but it doesn't amount to very much.

I will take that back, or qualify it, with one statement. One of the areas of conservation that has a meaningful result would be co-generation, in which my office is very much involved. You have heard about Rocket Research's program—this is the one that my office endorsed from the office—on using the waste heat from the Intalco Aluminum Plant. There is a similar conceptual program under way now to use the waste heat off the transformers right across the street here to heat part of the Pacific Science Center. Now what is unique about these, is that those are *in situ* applications. In other words, the heat source has to be really close to where the use is going to take place, and that is not always the case in every available heat source area. So it does have its limits, but the savings in BTU's is sizable and I put co-generation in the conservation program, and I wish there had been a little bit more technical discussion on those prospects. Of interest to you all here should be the fact that we have asked Rocket Research, as an addendum to their existing contract, to identify co-generation prospects in the three Northwestern states.

Dr. Schlesinger covered the nuclear licensing problem quite thoroughly, and I think rather succinctly; of course I am deeply involved in that. One thing bothers me about the nuclear licensing problem as far as the federal government is concerned. Reference was made by Senator Jackson to the one-stop concept, and he expressed some admiration for the way Washington has conducted its licensing or certification procedures, since we are the only one of the states to have such procedures. I fail and have failed to see at any time, corresponding action by the federal government in putting together the multitude of federal agencies which harrass the states almost daily after we have completed our work by doing repetitious investigations, by going over and over again our technical problems to which the answers have all been made. They interview the same witnesses over and over again and obtain the same information for the record; their record is never matched with our record. In other words, there is a split in objectives between the federal government's approach by agencies; and the states approach by agencies. I would love to see a one-step agency at the federal government level.

As far as disucssions today, I was delighted at the young lady's question over here concerning education. Whether you know it or not, I will tell you —about a fourth of our population are school children or professional educators. There are 770,000 registered school children in this state, and about 40,000 professional educators to take care of them. Is it any wonder then, to answer her question, that almost half of my budget is going into the educational field? I am working with Dr. Brouillet with the State Superintendent of Public Instruction, and we are in the process of defining curricular changes at the present time. If you who are educators in this audience know of any more sacred cow than changing a curriculum, I want to know what it is, because that is the most formidable thing I have ever been confronted by. But we are making some suggestions. We have Dr. Richard Dietrich now under contract to us who is a professional educator in curricular matters. We are making some inroads into the textbook situa-

tion, and hopefully we will get down into the middle school level with good basic education of a technical nature which will lead to knowledge and understanding about conservation programs, or how to save in the home.

Now my caution is simply this: if we were to divide up the amount of energy that is used in the home amongst all of the energy that is used by people, it is about 30% of the total energy. Please understand that I have to deal with energy on a total energy basis, not just electricity. So we look to the homes for a lot of conservation savings. But let me tell you something, if you will just use your mathematical wits at this time: if we were to attain a 10% saving in energy use at the home level, meaning that out of every ten 100-watt bulbs, you turn one out, or you take a shower three times a week instead of seven, and you do accomplish a 10% savings, meaning some deprivation is involved, you must understand that the total energy saving is only 3%. Ten percent of the thirty is what it amounts to. So it doesn't seem to be a very meaningful goal, but in an aggregate sense becomes quite sizable. For that reason I am spending a lot of Federal money in conservation teaching, with home audit energy programs into three test areas at the present time—Spokane, Yakima, and Seattle. We have to-date audited nearly 7,000 homes against a goal of 15,000 before the end of next year. That should make a sizable inroad in the amount of energy used in the State.

I feel that the education part of this particular program needed a little bit more coverage than it has been given, or I don't think we would have heard questions like we heard this afternoon.

Marianne Craft Norton

Our second panelist is Ken Hammond, from the Department of Geography at Central Washington University.

Ken Hammond

Thank you. I want to thank all the participants here, too. I have really been pleased with the participation, and only the faithful remain to the end—I appreciate that. I will try to make several points fairly quickly.

I attended every conference session except where there were concurrent sessions. In a sense I have what may be called good news and bad news, because if there was one thing we heard, it was that the Pacific Northwest is unique in the sense that electricity rates are so low in the region; and we also hear they're not going to remain that way very long. It doesn't matter whether your electricity rates are only a penny as compared to someone else's three or four cents, but if they go up twice or three times, you notice it. So though Governor Ray felt we shouldn't be concerned about it, it is a legitimate area of concern. Just take your electrical bill and triple it, then I think you too will see reason to be concerned in spite of the fact that other people may be even more poorly off.

The second thing I heard is that we have a predominantly renewable hydro base for our electricity—that we have a relatively cheap and renewable base of power, but that it will not remain that way much longer.

We will be shifting to a thermal base and that thermal base will be both more expensive and at least a good share of it will be non-renewable. We are, according to the conference speakers, moving in many directions to increase supply. We heard about geothermal, lowhead hydro, breaking down the barriers for licensing procedures—all means to get supplies on the line much more quickly. I must say that basically what I heard were economic arguments, and I agree with the value of economic arguments.

However, I would like to inject the suggestion that we really ought to think also about net energy since certain energy sources require much more energy input than others to get the energy out, and today the economics may not reflect that fact. We didn't hear much about net energy and we should.

Supplies of most of our energy sources are finite and there are physical limits to all resources. We don't want to approach those physical limits if we can possibly avoid it. Once we get that far we have no real room for maneuvering. It is understandable then that the utilities especially and other folk as well want to keep a lot of slack in the supply system because once you get near the limits of electrical supplies you have problems. But there are limits to other resources as well and the same problem will prevail. I think we ought to be thinking about where those limits lie and try to avoid them in our use of all resources.

We talked a lot about conservation and certainly we are moving towards conservation on many fronts. But, I suggest that to be effective the people must *want* to conserve, and perhaps it's with children that you begin to build that ethic, with people whose minds are open to suggestions. It is really what is called an ethic—an environmental ethic or a conservation ethic. In some cases the savings might be small, but symbolic. For instance, I think it is symbolic that at this energy conference we threw away so many styrofoam cups. An enormous amount of energy is not involved, but nevertheless it is typical of our culture at the moment to throw away *lots* of things, and we did it here—kinds of things which perhaps should be reusable as well as recyclable. Both of those practices are necessary.

Conservation—Larry Bradley pointed out that saving from energy conservation may be comparatively limited, and if only direct savings are considered it is true. However, if you have the same ethic in the use of *all* resources so that you are conservative in the use of all resources, the total saving is much larger than might be credited today. I believe conservation has more potential than Mr. Bradley suggested.

Another thing we didn't hear much about is that all resources are tied together, that all systems are really energy transformation systems, whether they are physical systems or biological systems. The thing which keeps us going is the transformation of energy. Most of our energy really is free. It is coming from the sun warming the earth and being captured rather directly by plants. The extra energy which we use for amenities today—for mobility, for the extra things—is what we are really worried about, and rightly so.

Also, as Mr. Bradley pointed out, we heard the most about electricity. He mentioned his concern with all forms of energy. I suggest that our attitude toward use should be total energy management, not just electricity. It does

us no good to shift from one form of energy, saving in one area—let's say electricity—if there is going to be a greater demand on some other form, let us say gas or oil.

I hear expression of a fair amount of confidence that the problems will be solved. That is, we are moving technologically and culturally in many ways. One of the things that has been a bit disturbing however, is that pendulums swing in both directions. I realize this audience is made up to a considerable extent of people who want to get more supplies on the line; but in breaking down barriers to building production and distribution systems, the pendulum may swing too far in that direction just as some would argue it has swung too far toward slowing down production facilities for environmental reasons. Let's try to keep the swing a little bit less than it may tend to go.

The people seem to want an energy policy which is really a people policy. There were numerous indications that such a policy will be forthcoming, and panelists and speakers were suggesting that we will have a certain amount of technological innovation. This is all to the good, but in the long run we may have to think in really different ways. We now think about centralized power systems; let us think about decentralized power systems. It is, at least in theory, no more efficient to have an enormous solar collector system than to have a whole bunch of little ones.

If I heard anything today and yesterday (and I will end with this) it is that there need to be decisions made with regard to allocation, demand forecasting, rate setting, plant siting, alternative forms of energy. And most importantly, the people, the local governments, the states, the regions, want a say in these decisions. It seems to me that's fair.

Marianne Craft Norton

I would answer the question, "Should there be other regional meetings as a "yes." Jack Robertson told me that this meeting was considered the first, a sort of prototype, a model because we are the smallest of the regions in population, but largest in geographic area. I think the other regions should get together and discuss the energy issues. Should this also be the first of a series of continuing energy dialogues in the State of Washington? And as an "interested citizen"—that is the slot I checked on my evaluation questionnaire—I would say, yes, I think there should be continuing dialogues.

I have critiqued the two-day conference in three areas: program, participation, and process. As to the program—I think it was excellent. I peeked at a few of the evaluation questionnaires which have been returned and almost every one agrees. They felt that the information provided on the Department of Energy was top, and another area which was consistently checked as "very good," was introduction to where to find energy resources. I did hear a comment from one man in the back of the room yesterday who said, "I have heard nothing new that I could not have heard seven years ago," and I noticed that one of the questionnaires says "nothing new in the last two years." But again as a citizen I would have to disagree, because I remember seven years ago going to environmental impact hearings and listening to

people testifying on alternative modes of energy, and those people being ridiculed out of the room; and I have heard experts from the federal government advocate those very alternative modes today. Also about two years ago I had a son in high school who had to do a paper on solar energy, and our family had to move fast to find information on that alternative mode. I think times have really changed in that area.

With regard to participation: on the questionnaires I have checked, those who checked were *white* and *male;* and I think that shows you one of the shortcomings of a conference such as we have just had. The gross majority of those participants were members of government and of industry, and society is such that up to now those main players have been white and have been male. I think for future conferences efforts should be made to include more women, more representatives of people of color and more representatives from citizen, public interest, and environmental areas of concern.

On process, I think this of course goes back to the participants and to the program. From Senator Jackson we heard that we must relate to a new partnership role, involving the federal-state relationship as well as the business-public relationship. From Schlesinger we heard the importance of these decisions; decisions on energy policy will affect foreign policy, affect the economic concerns of our nation, and our social policy. From Governor Ray we heard that you must have a consensus on planning, and from Mr. Munro we heard of a need for a new relationship to do things we couldn't do before, and a sense of urgency.

Well, how are we going to do all these things? How are we going to handle the public? How do we view the public? When do we bring the public in? What is public and private industry accountability? I think these are problems not new to just the energy issue, but relevant to all efforts for governmental and public accountability. Senator Jackson said 51% of the public doesn't know that we import oil. We have heard other polls which have said that people doubt that there is an energy crisis. We have heard the statement, again by Senator Jackson, that Detroit is not responding to the energy crisis.

This gets back again to the point that Larry Bradley brought out—the education problem. Someone suggested that BPA has *tried* to educate the public; but from my perspective, I think that that is not a good excuse. You know, we all learned in school that, there is always a freshman class. In other words, you always have to orient the newcomers. In public policy, there is always a different group to come and that is not an aspect we should give up on and wipe off the board. If we are oriented toward public accountability, we should continue to work this issue and find new ways to bring the public along, and at the same time to provide creativity, commitment, leadership, and patience. Some of the suggestions on the questionnaires on how to do it were: to include a wider representation of participants; more opportunity to break into smaller sessions in which there could be give-and-take and more good feeling about making your point; better ways of handling questions from the floor; and a smaller informal format rather than the big lecture hall situation; inclusion in the program of those who criticize present

energy policy, as well as legislators, decision-makers and planners, particularly from the local governmental and state governmental area. I think if the audience has any suggestions, now is the time. Perhaps you can focus on one thing that you would change about any future sessions we might plan.

COMMENTS

John Jarstad, Puget Sound Council of Governments: I just have one comment. I think in this area we have more educational television stations per capita than anywhere in the country, and they were remarkably absent. I think educational TV should really put a conference like this on live from start to finish.

Dick Nelson, member of the Washington State Legislature: I would like to suggest something that I posed in the form of a question yesterday: that in a new conference we focus on what we can do with the *new* residents of Washington State, Idaho, and Oregon, Montana and other states in the Northwest. It may be difficult to do as Mr. Bradley suggested—develop co-generation with the existing facilities—but if we are going to double our population, then we have some great opportunities to do things differently, to correct those mistakes that we made before, to eliminate the wasteful living patterns (including residential and industrial patterns) that have developed in the age of cheap energy; to take into account energy efficiency when we lay out our suburbs, our cities, our industries, put jobs closer to people; and in general make this society as energy efficient as it ought to be. So that might be a theme for another conference, perhaps with more opportunities for citizens to feed back some ideas rather than to listen a lot to the ideas which decision-makers have developed. I would like to add just a suggestion for the "50% problem"—the fact than 50% of our people don't know that oil is imported in this country. I suggest that the State Energy Office or the legislature require a sticker to be placed on each gas pump in Washington state reading "This gas is courtesy of Saudi Arabia."

David Taylor, Pacific Science Center: First of all, I would like to rate the conference according to the objectives that are stated here on the evaluation. I will choose the second one first—"to describe the function, priorities and programs of DOE." I think this conference did an *excellent* job with that. I have a little more trouble with some of the others. "Relating the national energy goals to the local perspective"—I think that states related their own perspectives, and the national DOE related their perspectives, but I didn't really see the integration of the two. The third part was to provide an opportunity for regional feedback on current energy policies to aid in the development of future policies. I think a lot of what went on here related to what is going on with DOE in the various divisions, and I think it is important for us to know that, but we get an opportunity to respond to specific content material in hearings. I think this kind of forum would provide a good opportunity for feedback and inroads to process and means of getting our concerns to DOE on how they can better serve us, and how we can tie in a little better to DOE operations. That is the weakest area that I saw.

Norton: Would you consider this, then, maybe as a first step to providing a foundation to education on what DOE can provide, and then continue it with meetings held annually or more often to bring in that feedback?

Mr. Taylor: I am a little concerned about having very energy intensive meetings and very capital-in-people intensive meetings like this. I think many of us who work in the energy field know a lot of the content material. A basic summary of that to start off an area would be helpful, but then getting into small group discussions, establishing means of feedback to DOE and to the conference itself. The question and answer sessions mainly dealt with specific pieces of information from the various presentations, and I think we need to deal a little more with process and the concerns with how that cooperative mechanism can function—how we can get involved in some of these programs, how we can serve DOE and how DOE can serve us.

Glen Anderson, Washington State Association of Community Action Agencies: One of the things that struck me the most about the conference, and I think a suggestion for improving it, relates to the fact that has been mentioned a few times, that the public is not really aware of the scope of the energy problem; and I think there is a basic mistrust on the part of the public of "energy decision-makers." I think a basic reason that the public has such a mistrust, and feels that decisions are being made that affect peoples lives and their pocket books and their environments without due consideration of public feelings, is that, in fact, that is exactly what is happening. We have panelists who are experts, the decision-makers, and I am glad to have them here. I am glad to hear from them, but at the same time, this meeting was held, as someone mentioned, in a capital-intensive way. It costs a lot of money to register, and an ordinary citizen, a low-income senior citizen, for example, who gets hurt the worst from rising energy costs, is not able to come and shell out the kind of bucks that it takes for this kind of thing. We didn't have a peanut-butter sandwich alternative to the luncheons, for example. We didn't have people representing senior citizens groups, low-income people's groups, or ordinary consumer groups, or for that matter even middle class environmentalist groups, on any of the panels. I am really grateful that we had enough people who had the guts to come up to the microphone and look eyeball-to-eyeball with these experts, with these energy decision-makers, and ask questions. I just wish they had had a chance to be invited to be on a panel, to get someone on the panels who has a lot of background information, can converse with the rest of the panelists, and can make a detailed presentation.

The difficulty with the citizen coming to the microphone and asking questions to an expert, is that the citizen asks the question and the expert gets the last word. I think if we want to have public confidence in the energy decision-making process, we have to create opportunities for citizens, for the environmentalists, for the anti-nuclear power people, for low-income people, senior citizens, and whoever, to be on the panels. Let them be resource people, and let people in the audience have a chance to ask them questions; let those folks have the last word in responding. I think we need to develop a real sensitivity to the fact that if we are trying to see ourselves as pro-

viding energy for the people, we are trying to see ourselves as doing something that benefits our society and our economy, then we have to make sure that all segments are involved in this process. There has been lip service paid to it, but I am personally disappointed that it wasn't more evident in the structuring of the panels. I would like to see that at future conferences; I think that would help to break down some of the mistrust that exists.

Exhibits

A number of exhibits were on display throughout the conference. These were provided through the courtesy and cooperation of the following groups:

The Boeing Company
The Grumman Corporation
Northwest Colleges and Universities for Science
U.S. Department of Energy
ROCKCOR, Inc.

The conference sponsors express appreciation to these organizations for their cooperation and support.

Participant List

Northwest Regional Energy Conference
May 31-June 1, 1978

Abbott, Lorraine	Klickitat County Planning Department
Adams, Dean L.	Reynolds Aluminum Company
Agardy, Franklin J.	URS Corporation
Agen, Jerry L.	Seattle Public Library
Albaugh, Fred	Battelle-Northwest Labs
Alexander, C.D.	Reynolds Aluminum Company
Allen, Leonard M.	P.U.D. #1 of Lewis County
Allison, F.W. (Bill)	Central Washington University
Alm, Alvin M.	Department of Energy, Policy and Evaluation
Alvord, David D.	Idaho Public Utilities Commission
Ambrose, Tommy W.	Battelle-Northwest
Anderson, Anthony H.	Eastern Washington University
Anderson, F.H.	Allied Chemical-IDA Operations
Anderson, Glen	Wash. State Association of Community Action Agencies, Inc.
Anderson, Robert C.	Olympic Bank
Appel, June	Seattle City Light
Arfin, Emily	Environmental Management Consultants
Arnold, Harvey L. Jr.	Corps of Engineers, Department of Army, Portland District
Arntz, William C.	Department of Energy
Askew, A.F.	Atlantic Richfield Company
Ater, Jonathan A.	Environmental Management Consultants
Babb, Marion	P.U.D. #1 of Klickitat County
Bader, Dennis	Lindsay, Nahstoll, Hart, Neil & Weigler
Bagley, Nancy	League of Women Voters of Seattle
Bair, Ron	Mayor, City of Spokane
Barbuto, Nancy	University of Idaho
Barclay, D.E.	Idaho Power Company
Bardin, David	Department of Energy, Economic Regulatory Administration
Barich, F.J.	Chevron U.S.A., Inc.
Barke, Walter	Burlington Northern, Inc.
Baseden, Kathy	City of Tacoma, Office of Intergovernmental Affairs
Battson, Cahney	Seattle Energy Conservation Coalition

Bauman, Tom	Department of Energy, Richland Operations
Bean, Douglas E.	Idaho Petroleum Council
Beattie, Don	Department of Energy, Conservation and Solar Applications
Beaudry, Lee	Cascade Natural Gas
Beckelman, Bernard F.	ROCKCOR, Inc.
Beighly, Doug	Puget Sound Power and Light Company
Bell, Brian E.	Western Aluminum Producers
Belmondo, Bill	Renton School District No. 403
Belsky, Edward	Cooperative Extension, Seattle
Benedetti, A.J.	City of Tacoma
Benitz, Max E.	Washington State Senate
Bennett, Robert B.	Central Washington University
Bicknell, Jim	Seattle City Light
Billington, Ken	Washington P.U.D. Association
Bishop, G. Wayne	Seattle City Light
Bishop, Jim	Department of Energy
Bloom, Dennis	Washington State Planning and Committee Affairs Agency
Bodansky, David	University of Washington
Boldt, Jim	Washington P.U.D. Association
Bolin, Clarence	Bureau of Reclamation, Boise, Idaho
Boness, Fred	Department of Natural Resources, Juneau, Alaska
Bonn, John J.	Nalley's Fine Foods
Bowers, Gregory	Army Corps of Engineers, Seattle
Bracy, Dennis P.	General Services Administration
Bradley, Larry	Washington State Energy Office
Branham, C.H.	Puget Sound Power and Light Company
Brattain, Walter H.	Whitman College
Breckenridge, Leon	EG&G Division Energy Conservation
Breckenridge, Virginia	
Bredemeier, G.E.	Portland General Electric Company
Brooks, James E.	Central Washington University
Brown, Robert	Army Corps of Engineers, Seattle
Bruess, Les	Eastern Washington University
Bryant, H. Richard	U.S. Forest Service
Buchan, William	
Buckley, J.P.	Washington Water Power Company
Buday, Bernie	Metropolitan Development Council
Bull, Mike	King County
Bupp, L.P.	Exxon Nuclear Company
Buri, Bonnie J.	Washington Energy Extension Service
Butler, Lorna Michael	Washington State University
Butterworth, Blair	Washington Association of Community Action Agencies, Inc.
Butts, Bob	
Buursma, Cheryl	Seattle City Light

Caha, Don	Tacoma City Light
Calhoun, Robin	Seattle City Light
Cann, Parker	Washington State Senate
Caple, Verle R.	Reynolds Metals Company
Casas, Cohrado	Metropolitan Development Council
Chaffee, Clarence C.	Battelle Seminars and Studies Program
Chaky, Zachary R. Jr.	Directorate of Facilities Engineering
Chamberlin, Ann	Bonneville Power Administration Direct Service Industries
Chandler, Richard P.	Department of Energy, Region X
Charles, J.S.	Northwest Pipeline Corporation
Charnley, Donn	Washington State Legislature
Chick, L.W.	Municipality of Metro Seattle
Chiei, Fred Jr.	Department of Energy, Anchorage, Alaska
Church, Steve	Seattle City Light
Clark, Russell E.	Tacoma Community College
Claussen, Vera	Washington P.U.D. Association
Clayhold, Donald	Benton County P.U.D.
Coate, L. Edwin	Environmental Protection Agency
Cohen, Joyce E.	Oregon State Energy Policy Review Committee
Cole, David	Neighborhood House, Inc.
Cole, W.W.	Chevron U.S.A., Inc.
Coloff, Roger	Department of Energy
Colvard, Harold L.	Federal Aviation Administration
Comstock, Dale R.	Central Washington University
Cook, Tony	Washington Utilities and Transportation Commission
Cootes, Kent L.	Boeing Computer Services
Coronetz, Kathy	Department of Energy, Region X
Corpuz, Ray Jr.	City of Tacoma
Cowan, Edward	U.S. Environmental Protection Agency
Cox, Ken	Puget Sound Power and Light Company
Cragg, Brian T.	Natural Resources Law Institute
Craig, Steven J.	Washington State Energy Office
Craine, Lloyd B.	Washington Energy Extension Service
Crisson, Mark	Tacoma City Light
Cross, Robert	Alaska Power Administration
Culp, Gordon C.	Culp, Dwyer, Guterson & Grader
Curl, Deborah	Environmental Protection Agency
Curtis, Henry C.	Bonneville Power Administration Service Industries
Daniels, A.O.	Tacoma City Light
Dart, John R.	Directorate of Facilities Engineering
Davidson, Robert W.	Congressman Joel Pritchard's Staff
Davis, Charles	Oregon Public Utility Commission
Davis, Ralph	Puget Sound Power and Light Company
Dec, Theodore	Federal Highway Administration

Decher, R.	University of Washington
DeFreese, Don	Oregon P.U.D. Association
DeKlotz, Ralph E.	Vitro Engineering
Denner, Steve	Washington Energy Extension Service
De Saint Giles, Yves	The Boeing Company
Deutch, John	Department of Energy, Office of Energy Research
Dickeman, Raymond L.	Exxon Nuclear Company, Inc.
Dickinson, Shirley	Lake Washington School District No. 414
Dingfield, Barbara	Office of Policy Planning, Seattle
Dittrich, Toby	Western Washington University
Doherty, Howard V.	Clallam County
Dompier, John	John Dompier Oil Company, Inc.
Dompier, Marjorie	John Dompier Oil Company, Inc.
Donelson, Howard	The Boeing Company
DuBeth, Donna	Daily News, Longview
Dubois, Donald P.	Environmental Protection Agency
Duffy, Bill	Gonzaga University
Dugan, Patrick L.	Grays Harbor Regional Planning Commission
Dunsmoor, John E.	Pacific County P.U.D. No. 2
Durocher, Hector	Bonneville Power Administration
Dye, David L.	Boeing Computer Services
D'Zurilla, Don	Union Oil Company
Easton, Brud	Seattle City Light
Easton, Dugal E.	Seattle School District
Eaton, Vern	Cowlitz County P.U.D.
Eckman, Tom	Washington Environmental Council
Einarson, Gosta	Douglas County P.U.D.
Elles, Jane	Energy and Man's Environment
Ellis, John	Puget Sound Power and Light Company
Ellwanger, Ben S.	Planning and Community Affairs
England, William J	Exxon Nuclear Company, Inc.
Engstrom, Ken R.	P.U.D. No. 1 of Franklin County
Engstrom, W.C.	Boeing Engineering and Construction
Erickson, James H.M.	Central Washington University
Erickson, John	Washington State Planning and Committee Affairs Agency
Eschels, Curtis	Senate Energy and Utilities Committee
Evans, Richard A.	Vitro Engneering Corporation
Evans, Robert	Puget Sound Power and Light Company
Fairburn, Wayne	Central Washington University
Ferguson, Warren	Puget Sound Power and Light Company
Fiddler, Richard	Seattle Energy Policy Office
Finnegan, W.J.	Puget Sound Power and Light Company
Fisch, Rick	Nalley's Fine Foods
Fitch, Bill	Energy Facility Site Evaluation Council
Florea, Bruce	Washington State University

Flynn, Dennis	Washington Natural Gas
Fogelquist, Del J.	Western Oil and Gas Association
Fonseca, Valencia	Consultant
Forrest, Douglas R.	British Columbia Hydro and Power Authority
Forsen, Harold K.	Exxon Nuclear Company
Foster, John	Central Washington University
Foster, Steven	Army Corps of Engineers, Seattle
Foust, W.E.	Exxon Nuclear Company, Inc.
Frazier, Elsie	
Frazier, Homer	
Fredericks, Dan	Department of Energy
Fredlund, Penny	Pacific Science Center
Fremling, Alex	Department of Energy, Richland Operations
Frisbee, Donald	Pacific Power and Light
Fulcher, E. Marvin	Boise Cascade Corporation
Galbreath, Joseph J.	Rocket Research Company
Gaffikin, Jim	The Boeing Company
Gammon, Richard	Pacific Science Center
Garman, Gerald	Seattle City Light
Geballe, Ronald	University of Washington
Geniesse, James D.	Scott Paper Company
Getts, Robert	Shell Oil Company
Gibson, John	City of Seattle
Gilbrough, Noel L.	Army Corps of Engineers, Seattle
Gold, Ivan	Lindsay, Nahstoll, Hart, Neil & Weigler
Goldingay, Derek	CAMP Consumer Action
Goodnight, Jill	Battelle
Gordon, Mel	Pacific Northwest River Basin Commission
Gordon, Walter S.	Gordon & Cross Engineers
Graham, R.C.	Canadian Consulate
Gray, Gordon M.	University of Washington
Greco, Paul	Renton Vocational and Technical Institute
Gregson, Bob	Seattle City Light
Grimes, Mike	Metropolitan Development Council
Grimm, Dan	Washington State House of Representatives
Grinstein, Gerald	Preston, Thorgrimson
Gruen, Rolf B.	Community Services Administration, Seattle
Guier, David H.	Department of Emergency Services
Gussinger, Laurie	Washington State Association of Community Action Agencies, Inc.
Gustafson, Stanley	Northwest Solar Systems, Inc.
Guttormsen, Suzan	Brown & Caldwell
Hahn, Fred D.	Washington Department of Ecology
Hall, Kirk	Idaho State Energy Office
Hall, Lawrence E.	Puget Sound Power and Light Company
Hammond, Kenneth A.	Central Washington University

Hammond, Stuart	Central Washington University
Haney, M. Jay	Hanford Science Center
Hansen, Sig T.	Franklin County P.U.D. District #1
Hardy, Randall	Department of Energy, Region X
Harlow, Carol	Seattle City Light
Harnish, Arthur	Army Corps of Engineers, Seattle
Harris, John	Department of Energy
Harris, Lyman J.	Aluminum Company of America
Harrison, C.W.	United Nuclear Industries
Hart, Allan	Lindsay, Nahstoll, Hart, Neil & Weigler
Hausler, Ray	U.S. Government Accounting Office
Hayes, John	The Oregon Statesman
Heath, David Z.	MacDonald Miller Company
Hebeler, Henry (Bud)	Boeing Engineering and Construction Company
Hein, Lester	P.U.D. #1 of Mason County
Heinrich, C.L.	Portland General Electric Company
Heinz, Roney A.	Tippetts-Abbett-McCarthy-Stratton
Hertzberg, Abraham	University of Washington
Herzog, John O.	Pacific Lutheran University
Hickok, Linda W.	Portland General Electric Company
Hobkirk, Clair W.	South Columbia Basin Irrigation District
Hodel, Barbara S.	Hodell Associates, Inc.
Hodel, Donald Paul	Hodell Associates, Inc.
Hoff, Dave	Puget Sound Power and Light Company
Hogness, John	University of Washington
Hohl, Joan	Washington Public Interest Research Group
Holding, T.B.	Chevron U.S.A., Inc.
Holt, Russell	Bonneville Power Administration
Holtzapple, John	Kaiser Aluminum & Chemical Corporation
Horsley, John	Kitsap County
Hosch, Suzi	Washington State Energy Office
Hosey, Harry P.	Tudor Engineering Company
Howell, Virginia	Army Corps of Engineers, Seattle
Hoyt, Charles	Bureau of Land Management
Hudson, Ed	Puget Sound Council of Governments
Hume, Jarlath	Metrocenter, YMCA
Huntley, Elmer C.	Utilities and Transportation Commission
Hurtado, Dolores	Oregon Common Cause
Huxtable, D.D.	Rocket Research Company
Irby, Don	City of Bellingham
Irby, J.F., Jr.	General Services Administration
Ittner, Charles	KPFF Consulting Engineers
Iulo, William	Washington State University
Jackson, D.F.	Central Lincoln P.U.D.
Jackson, Henry M.	Senator, United States Senate
Jacob, Daryl	Seattle City Light

Jacob, John R.	Roderick Enterprise, Inc.
James, Arnold J.	P.U.D. #1 of Lewis County
Jamison, R.L.	Weyerhaueser Company
Jarstad, John	Puget Sound Council of Governments
Jennings, James	Highline School District No. 401
Jensen, Kenneth	Central Puget Sound Economic Development District
Jhaveri, Arun G.	City of Seattle
Johnson, Claire	The Boeing Company
Johnson, Lee	Department of Energy, Region X
Johnston, Merle D.	P.U.D. #1 of Lewis County
Jones, Allen	Cosmic Forces
Jones, Gail K.	Central Washington University
Jones, Jerry L.	Central Washington Universtiy
Judy, John W.	Tacoma Area Chamber of Commerce
June, William	Portland General Electric Company
Kaseberg, J.K.	Power Consultant
Kask, Mark	Puget Sound Council of Governments
Keiser, Robert O.	Chelan County P.U.D.
Keough, Patrick J.	Army Corps of Engineers, Portland District
Kiley, John E.	Bonneville Power Administration
King, John	Puget Sound Power and Light Company
Knight, David	Puget Sound Power and Light Company
Kolva, H. James	Eastern Washington University
Kosmata, H.R.	Washington Public Power Supply System
Krc, Glen D.	Environment and Energy Control Office
Lane, Arthur T.	City of Seattle
Langdon, J.C.	Oil Heat Institute of Inland Empire
Langdon, Nancy	Seattle City Light
Langus, James W.	Snohomish County P.U.D. #1
Larsen, John J.	Reynolds Metals Company
Lawrence, Mary	"Solar 78 Northwest" Conference and Exhibit
Lee, Kai N.	University of Washington
Lenaghen, Robert	Western Conference of Public Service Commissions
LeResche, Diane	Office of the Governor, Alaska
LeResche, Robert	Commissioner, Alaska Department of Natural Resources
Leslie, Les	Washington Utilities and Transportation Commission
Lindaman, Ed	Whitworth College
Lindsay, Bob	Department of Energy, Richland Operations
Lisbakken, R.B.	Pacific Power and Light Company
Logie, Pat	Seattle City Light
Lokan, Jane	Power Consultant
Lopeman, Jim	Sound Refining, Inc.

Lowe, John	The Boeing Company
Lowe, W.G.	Crown Zellerbach
Lysen, King	Washington State House of Representatives
McCargar, Dean	Oregon Steel Mills
McClain, Barry W.	
McCormack, Mike	Congressman, United States House of Representatives
McDonald, James M. Jr.	Battelle Seminars and Studies Program
McGill, Gary	U.S. General Accounting Office
McIntosh, Hugh	Seattle City Light
McIntyre, D. Harvey	Washington State Catholic Conference
McKay, Nancy	League of Oregon Cities
Mack, Richard	Central Washington University
Maden, Marc	Office of the Governor, Oregon
Maner, J.D.	Snohomish County P.U.D. #1
Manifold, Robert	Evergreen Legal Services
Manlove, Paul	Omark Industries
Markus, Henry	East Central Oregon Association of Counties, District 12
Marritz, Robert O.	Culp, Dwyer, Guterson & Grader
Marshall, George	Army Corps of Engineers, Seattle
Martin, Kent	Central Washington University
Martin, Thomas J.	Tom Martin & Associates
Maxwell, Fred	The Boeing Company
Meehan, Alan	Richmond, Yorkshire, England
Meek, Lorene	
Meek, Wayne L.	Simpson Timber Company
Mepham, John	TEKTRONIX, Inc.
Merrill, John R.	Housing and Urban Development
Metzger, Charles	Department of Energy, Region IX
Meyers, David W.	Idaho Association of Commerce and Industry
Meyers, Donald W.	Hanna Nickel Smelting Company
Miller, Douglas C.	The Boeing Company
Miller, Fred	Oregon Department of Energy
Miller, Junior D.	Puget Sound Naval Shipyard
Miller, Roy	Lakeview Light and Power
Miller, Tom	Seattle City Light
Miller, Will	Seattle City Light
Millet, Marietta	University of Washington
Millgard, James S.	Eastern Washington University
Mills, James	EG&G Idaho, Inc.
Monarch, Bob	U.S. Oil and Refining Company
Monroe, Connie	Seattle Department of Licenses & Consumer Affairs
Monson, C.R.	Kaiser Aluminum & Chemical Corporation
Moore, Emmett B. Jr.	Olympic Engineering Corporation
Moorman, Mark	Idaho Irrigation Pumpers Association

Mueller, Gerald	Montana Lieutenant Governor's Office
Mulgrew, Terese	Senate Energy and Utilities Committee
Mundt, John	Community College Board
Munro, S. Sterling	Bonneville Power Administration
Munro, Mrs. Sterling	
Myers, Lester R. Jr.	General Services Administration
Neff, Rogers	South Columbia Basin Irrigation District
Nelsen, Dorothy	Seattle City Light
Nelson, Dick	Washington State Legislature
Nelson, Lyle L.	Department of Energy, Economic Regulatory Administration
Nevin, Jerome F.	The Oeser Company
Newman, Kent	The Anaconda Company
Nolte, R.J.	Westinghouse-Hanford Company
Norman, Donald	Washington Public Interest Research Group
Norman, Hal	Pacific County P.U.D.
Norton, Marianne Craft	Washington State Women's Commission
Norwood, R.A.	Washington Natural Gas Company
O'Halloran, Michael	Boise Cascade Corporation
Okeson, Rud	Seattle City Light
Olsen, C. Stanford	Snohomish County P.U.D. #1
Olsen, Marvin E.	Battelle Human Affairs Research Centers
Olson, Donald L.	Washington Water Power Company
Olson, Roy	The Boeing Company
Olson, Russ	Puget Sound Power and Light Company
Orcutt, David R.	Army Corps of Engineers, Seattle
Oster, Nancy	Washington Public Interest Research Group
Osterman, Ralph G.	Georgia Pacific Corporation
Parker, Don	Walla Walla Community College
Parker, Robert D.	U.S. Navy, Seattle Branch
Parson, R.A.	Reynolds Metals Company
Pasquerella, Robin	Department of Energy, Region X
Patton, Sara	Seattle City Light
Peacock, William E.	Department of Energy, Intergovernmental Affairs
Pealy, Robert H.	Institute of Governmental Research
Pearson, Martin	Western Division, Naval Engineering
Perry, Ted W.	Hood River Electric Co-op
Peterson, Christina	Energy, Food and You
Phillips, James B.	Pacific Lutheran University
Piering, Pamela	CAMP Consumer Action
Pool, Steve	Seattle City Light
Pope, Richard	R.C. Johnson Associates
Porter, Albert N.	Northwest Pipeline Corporation
Poteat, John A.	U.S. Army Corps of Engineers, Seattle

Pratt, Robert B.	Washington Energy Extension Service
Price, Byron	Consultant Services
Prues, L. J.	Vitro Engineering
Pulkka, Greer	Simpson Timber Company
Quinlan, Clarissa	Department of Commerce and Economic Development, Alaska
Quist, Ron	Washington State Legislature Staff
Ragsdale, Jack	Washington State Planning and Committee Affairs Agency
Rasmussen, John P.	Kootenai Electric Cooperative
Rasmussen, Walt	Renton Vocational and Technical Institute
Ratcliffe, Robert E.	Bonneville Power Administration
Ray, Dixy Lee	Governor, State of Washington
Recchi, Joe	Seattle City Light
Rees, David	Washington Utilities and Transportation Commission
Regan, Rod	King County Power
Reinbold, Michael	Idaho Public Utilities Commission
Reinsel, Earl N.	U.S. Forest Service
Reis, F.M.	Snohomish County P.U.D. #1
Ressel, Boyd	Lincoln Electric Coop, Inc.
Ressel, Rosalie	Lincoln Electric Coop, Inc.
Revelle, Randy	Seattle City Council
Rice, James	Northwest Environmental Defense Center
Richards, Ronald N.	Clallam County
Rickel, Robert H.	Kootenai Electric Cooperative
Ritland, Keith	Seattle City Light
Robertson, Jack	Department of Energy, Region X
Robertson, T.M.	Automation Industries, Inc., Vitro Laboratories Division
Robinson, Paul D.	Army Corps of Engineers, Seattle
Robinson, R.K.	United Nucler Industries, Inc.
Romeo, Vincent L.	Grumman Energy Systems, Inc.
Romer, Henry	Consultant
Rooney, Bruce C.	University of Washington
Rose, Peter H.	Math Sciences Northwest
Roseman, Ronald	Evergreen Legal Services
Royer, Charles	Mayor, City of Seattle
Rulon, Jennifer	Washington Public Interest Research Group
Saalfrank, C.W.	Westinghouse Electric Corporation
Sadowski, Tom	Seattle City Light
Salina, Charles	Rockwell Hanford
Saltz, W.E.	Simpson Timber Company
Sanders, James L.	Pacific Power and Light Company
Sanders, Jeannette	Lewis & Clark College

Sargent, C.S.	The Boeing Company
Scace, James R.	New Resources, Inc.
Scharer, Marya	Seattle City Light
Schausten, Dan	Bonneville Power Administration
Schibig, Robert	Lakeview Light and Power Company
Schlesinger, James R.	Secretary, Department of Energy
Schmidt, Fred H.	University of Washington
Schmitz, B.W.	Rocket Research Company
Schnell, Peter	Publishers Paper Company
Schoepflin, Gary	NORCUS
Schrag, V.D.	Vitro Engineering
Schultz, Al	The Boeing Company
Schwinden, Ted	Lieutenant Governor, State of Montana
Seagraves, James F.	R.W. Beck & Associates
Seaholt, Dan	Tippets-Abbett-McCarthy-Stratton
Seifert, Rich	University of Alaska
Sellevold, Richard P.	Army Corps of Engineers, Seattle
Service, A.L.	U.S. Bureau of Mines
Sheppard, R.B.	Cascade Natural Gas
Sheridan, Mimi	Seattle City Light
Sherman, Marion K.	Washington State Legislature
Shilt, James	University of Washington
Shrader, John S.	Central Washington University
Skartvedt, Will	The Boeing Company
Skrinde, Rolf T.	Tracey & Brunstrom
Smirlock, Norton M.	Atlantic Richfield Company
Smith, Harris C.	URS Corporation
Smith, Ken	Ecotope, Inc.
Smith, Luther H.	Vitro Engineering Corporation
Smith, Paul	Eastern Washington University
Smith, W.W.	Rocket Research Company
Speer, Jack A.	Anaconda Aluminum
Squire, A.	Westinghouse Hanford Company
Stachon, Eric	Forelaws on Board
Stefani, John	Washington Natural Gas
Stein, Leonard J.	Army Corps of Engineers, Portland District
Steinborn, Daniel	U.S. Environmental Protection Agency
Stevens, David W.	National Governor's Association
Steves, L.H.	Exxon Nuclear Company, Inc.
Stewart, Arlis	People Power Coalition
Stewart, Liz	Ecotope Group
Stiles, Jack T.	Pacific Power & Light Company
Strand, N.O.	Washington Public Power Supply System
Stricker, George W.	
Strieck, Vern	Washington Natural Gas
Stryer, R.J.	Rocket Research Company
Sutherland, George S.	ROCKCOR, Inc.
Sutherland, Russ	Lakeview Light

Swartzell, Richard	Puget Sound Power and Light Company
Symbol, Paul	URS Company
Szablya, John F.	Washington State University
Tannahill, James H.	Grays Harbor P.U.D.
Taylor, David	Pacific Science Center
Teitzel, T.R.	P.U.D. #1 of Lewis County
Thomas, Greg M.	Bechtel Power Corporation
Thompson, Robert E.	Seattle Post-Intelligencer
Thompson, Steve	Department of Energy, Region X
Thorne, Robert	Department of Energy
Thorpe, James	Washington Natural Gas
Thrush, Paul	Bonneville Power Administration
Thrush, Mrs. Paul	
Thykeson, Orville	P.U.D. #1 of Mason County
Tips, David S.	Washington State Senate
Tobin, Louise	Central Washington University
Tokarz, Judy	Department of Energy, Richland Operations
Tuey, Jim	Washington Utilities and Transportation Commission
Tupper, George A.	Bonneville Power Administration
Urlocker, Vern	Seattle City Light
Urmston, Randolph	Attorney
Valentine, Sherry	Rural Alaska Community Action Program
Valett, Bryan	NORCUS
Van Decar, Ted	Puget Sound Power and Light Company
VanDerbeek, Jack	Grays Harbor P.U.D.
Vanderveer, Marie	Department of Energy, Region X
Vann, James M. Jr.	Aluminum Company of America
VanSant, Vernon D.	The Oeser Company
Vertz, Lola	P.U.D. #1 of Clallam County
Vetrano, James B.	Washington Public Power Supply System
Vogel, Elmer C.	Department of Ecology
Volpentest, Sam	Tri City Nuclear Ind. Council
Volpentest, William R.	
Von Reis, John	Washington Utilities and Transportation Commission
Walker, Don W.	Hood River Electric Co-op
Wall, Harry	Seattle City Light
Wallenfels, Helmut	Weyerhaueser Company
Waller, James O.	Army Corps of Engineers, Seattle
Walton, Rob	Washington Senate Energy Committee
Ward, Conley Jr.	Idaho Public Utilities Commission
Webster, Roy C.	Pacific Northwest Waterways Association

Weissman, Marge	U.S. Department of Transportation
Welch, John D.	Army Corps of Engineers, Seattle
Welch, John R.	U.S. Bureau of Mines
Westby, Harvey O.	American Society of Civil Engineers
Westland, Jack	Western Interstate Energy Board, Western Interstate Nuclear Board
Whaley, R.F.	Puget Sound Power and Light Company
Whall, Doug	URS Company
Whiley, Joan	Seattle City Light
White, F. Wayne	Central Washington University
Whiting, Bill	Central Washington University
Whitson, Arthur E.	Western Washington Solar Energy Association
Wick, Don	Washington State Association of Community Action Agencies, Inc.
Wickberg, Ralph H.	Idaho Public Utilities Commission
Wiley, Ray A.	Oregon Energy Conservation Board
Wilkinson, Robert	University of Washington
Williams, Anita	Lakeview Light & Power Company
Wilson, Carolyn B.	Environmental Protection Agency, Region X
Wolcott, John	Everett Herald
Wood, Richard E.	Department of Energy, Energy and Technology Division
Wooden, Donald K.	EKONG, Inc.
Wydick, Al	The Boeing Company
Wyss, George W.	
Yegge, John	NORCUS
Young, James G.	Weyerhaeuser Company
Youngquist, Walter	Eugene Water & Electric Board
Youngs, Robert	Seattle City Light
Zepeda, Barbara	Washington Democratic Council

☆U.S. GOVERNMENT PRINTING OFFICE: 1979 O— 284-446/6632