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Proceedings

Open Workshop on Solar Technologies

23 and 24 October 1979
Washington, D.C.

Sponsored by the
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OPEN WORKSHOP ON SOLAR TECHNOLOGIES: OCTOBER 23 AND 24, 1979; WASHINGTON, D.C.

SPONSORED BY THE
U.S. DEPARTMENT OF ENERGY
ASSISTED BY THE
SOLAR ENERGY RESEARCH INSTITUTE

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WORKSHOP PROCEEDINGS

23 and 24 OCTOBER 1979

PREFACE

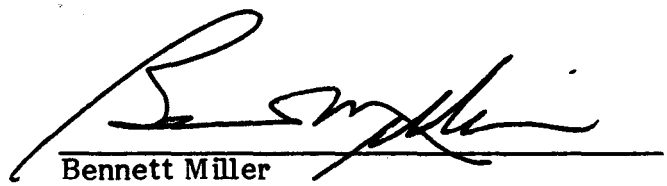
On 23 and 24 October 1979, issues of major importance in the planning and conduct of solar technology programs were discussed in a public meeting conducted by the U. S. Department of Energy (DOE). These issues centered largely on policies related to cities and employment. One of the results of this experimental meeting was the knowledge that public participation can be useful in the formulation of government policy.

Sixty individuals from a wide variety of backgrounds agreed to take part in the deliberations of six separate panels—three each on certain aspects of cities and employment. A significant portion of the participants represented public interest groups, while lesser numbers were from government and industry. Interested persons were publicly invited to observe. About 120 additional persons responded, bringing the total to 180 participants.

Each panel's report, submitted independently, is published herein. The remaining materials were prepared by the staffs of the Department of Energy and the Solar Energy Research Institute (SERI). This document also includes excerpted and edited portions of the recorded transcript of the meeting, in which the authors and editors have attempted to retain the essence and flavor of the actual transcripts. We hope that these excerpts will enable readers to understand the tenor of the discussions and the divergence of opinions that prevailed within each panel. The DOE has responded to the recommendations in a report to be released separately.

We are convinced that it is worthwhile to solicit and receive public policy recommendations through meetings such as this. On behalf of the Department of Energy, I want to thank everyone who took part and helped to make the workshop a success.

We intend to employ such processes in the future. Improvements undoubtedly are possible in the methods and procedures followed, so we welcome public comments. Please direct such comments either to me or to any DOE or SERI staff member whose name is listed in the Appendix.



Bennett Miller
Deputy Assistant Secretary
Office of Solar Energy
U.S. Department of Energy

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WELCOME

Bennett Miller
U.S. Department of Energy

This workshop is the second in what I hope will be a continuing series of annual events that assist the Department of Energy in understanding your views on specific issues that bear on the federal energy program, the way in which that federal program is structured, and the way in which we can help to promote and accelerate the use of solar energy.

At an open workshop last year we focused on the upcoming FY80 budget, on what would make sense in the way of FY80, FY81, and FY82 programs, and on soliciting your views about how the programs ought to be structured. This year we have focused more on issues and that change derives from a singular goal. The Domestic Policy Review—commissioned a short time before we held last year's meeting—is now completed, and the result is a dramatic statement from the the Carter Administration to establish a goal of meeting 20% of our energy needs by the year 2000 with solar and renewable energy.

It is an ambitious goal. I think that everyone here understands the magnitude of such an undertaking. Achieving that goal will require a commitment on the part of everyone involved in solar energy, and a fair number of people who are not. In other words, from today on, every increment of energy that is added to the U.S. energy supply system will have to be solar-related.

In the context of the Domestic Policy Review and the aggressive program outlined by the President, we began to think of the major issues with which we needed some help. From a long list of such issues, we chose two to discuss in some depth at this particular meeting. If this forum and format are sensible, we may want to convene these relatively small workshops more regularly and more frequently than once a year.

Two main workshop topics were chosen: solar energy in the cities, and solar energy and employment. First, if distributed solar energy systems are to make a major impact between now and the year 2000, they must make an impact in the cities because 75% of the people in this country live in major urban and suburban environments. How can we get solar energy sensibly into the cities? How can we accelerate the city planners' appreciation of the role that solar energy can play? How can we interest builders? How can we involve people? How do the technologies fit?

The second topic, that of the intimate relationship between solar energy and employment, seems to be another important issue that we need to understand as we begin to lay the groundwork for this ambitious program of the next 20 years. Some say that we can use solar energy to help solve some of our employment problems because solar energy is labor intensive. It is not immediately clear to me that those two things follow. Unless the system is treated in its overall economic sense, the employment increases that we would realize in the early stages may later be followed by unemployment increases resulting from diseconomies in the choice of energy systems.

We have divided both of these topics into three subtopics and have asked a number of eminently qualified people to address these subtopics in a relatively formal way. This morning's presentations will serve as the basis for discussions that will take place this afternoon. We would like to return tomorrow and hear your recommendations regarding these two issues.

It is important to emphasize that we do not view this as a Department of Energy workshop. We are the listeners, and to the maximum extent possible we want to remain in that mode. Thus, we urge that you focus your attention on the problems as you see them, and that you present to us the considered opinions of the group. Please do so without regard to the present status of federal programs or the possible views of some of the federal bureaucrats. Since it is your workshop, it is important to us that we hear your concerns and recommendations clearly and unequivocally.

I will now turn the podium over to Ms. Omi Walden, formerly the Assistant Secretary for Conservation and Solar Applications, who has now moved up to work directly with Secretary Duncan as his Special Assistant for Conservation and Solar Marketing.

INTRODUCTION I

Omi Walden
U.S. Department of Energy

It is a pleasure to be here this morning and to welcome you on behalf of Secretary Duncan. I know from my discussions with him last week that he had hoped to welcome you personally. This is the type of citizen involvement in public policy formulation that I think he wants to see happening more frequently within the Department of Energy. He has a very good reason for not being here this morning, as does one of our other organizers, Denis Hayes, the new Director of the Solar Energy Research Institute at Golden, Colorado. Secretary Duncan is with Denis Hayes at SERI for his first on-site briefing on the Institute and its programs.

This workshop represents a rather unique opportunity for those of us within the Department, as well as SERI and the regional solar energy centers, to listen to local and state officials and those of you within the private sector.

I would like to add another concern: How do we ensure having solar systems in the marketplace that are available to low-income people and to the elderly on fixed incomes? Since this area is a particularly difficult one to deal with effectively, we would appreciate your marking it as a topic that needs special attention. We will not serve our country or people in other countries if we do not make a concerted effort to address the needs of low-income groups and the elderly as we pursue the development of commercialization of solar systems.

It is always a pleasure for me to take part in beginning this type of dialogue, because I think the Department can do a better job if we initiate discussion on such crucial issues. We have a lot to learn from the expertise and talents that are in this audience. As Adviser to the Secretary for the marketing of both conservation and solar technologies, I want to assure you that your input will be incorporated in our plans.

Most importantly, we would like to know if you think this approach is substantive and helpful. We would like to pursue this process if we agree that it is productive. Thank you for your interest and participation.

INTRODUCTION II

Norman Lutkefedder
U.S. Department of Energy

It is often thought that cities with high-rise buildings obstructing the sun and high population densities are inappropriate sites for solar technologies. On the contrary, in most cities about half of the residential housing comprises chiefly one- and two-story buildings. There are, however, barriers to solar energy utilization in cities which are quite often absent in the rural areas. These barriers relate to city ordinances, zoning codes and standards, and utility services. These barriers must be overcome if solar energy systems are to penetrate the urban market. Today, solar water heating (and, in many cases, solar space heating) can address the urban market in many parts of the country.

I would like to go over one particular program which I think is of interest. The DOE pilot program that is especially applicable to the nation's urban areas is the Solar Utilization Economic Development and Employment Program (SUEDE). Representatives of several federal agencies participate in SUEDE, which is an interagency-sponsored program initiated in October of 1978. The objectives of the program are to promote energy conservation and self-sustaining economic growth in low-income or distressed communities.

SUEDE projects are designed to extend business opportunities by providing economically disadvantaged businesses with the technical assistance and training necessary to enter the solar market, to expand employment opportunities through solar job training leading to unsubsidized employment, and to increase the use of solar energy in low-income communities and thereby reduce the burden of rising energy costs which are particularly damaging to low-income families.

The SUEDE pilot project was funded in FY79 at $4.8 million; approximately half the funds were provided by DOE and the Community Services Administration (CSA), and administered by the U.S. Department of Labor (DOL). Funds under the Comprehensive Education and Training Act (CETA) of DOL were used for training, while the DOE and CSA funds were used to purchase and install materials, components, and equipment relating to solar utilization.

The potential employment impacts of rapid solar commercialization could add significantly to the jobs, revenues, and industrial base of American cities. We estimate that 700,000 people will be directly employed by the solar industry in the year 2000, and another 500,000 will be employed indirectly in the manufacture of materials through solar hardware, advertising, and other components of the industry. Approximately 30% of these employment gains will occur in large cities, and most of this employment will occur in areas that are considered urban centers.

Solar installation will require skilled mechanics, plumbers, and construction personnel. Industry experts agree that rapid commercialization will happen through the use of existing mechanisms, such as labor unions, since it is necessary to develop quickly the trained labor needed by the solar industry. The type of skills required by this industry can be supplied by the hard-core unemployed of the nation's large cities. However, it takes two to three years of training to turn an unskilled worker into a skilled plumber, pipe fitter or journeyman. Government programs have encountered difficulty in training the hard-core unemployed for these professions. Thus, solar energy should not be viewed as a panacea for employment problems in the nation's cities, but as one of many opportunities for increasing urban employment opportunities in the next 20 years.

In summary, I believe that over the next two decades, the transition to solar energy will have a significant impact on the nation's cities and urban areas. DOE has initiated a number of programs dealing with the problems of solar energy applications in these specific areas.

DISCUSSION

Bennett Miller, U.S. Department of Energy
Ken Sullivan, U.S. Department of Energy
Omi Walden, U.S. Department of Energy
Arnold Nadler, Arnold Nadler Associates
Bruce Anderson, Total Environmental Action
Rhoda Karpatkin, Consumers Union

CHAIRMAN MILLER: I think that people sometimes lose sight of the fact that the solar technologies all work and have worked for many, many years. The technologies are old. We just need to drive the costs down to the point where they are competitive with existing alternatives. For example, the performance of biomass-derived energy is not in question. The key is the cost of the development and harvest of faster growing trees.

MR. SULLIVAN: What is being done to make it simpler and easier for the cities to participate in solar energy and energy conservation aspects?

MS. WALDEN: We have legislation pending before Congress entitled the Energy Management Partnership Act (EMPA), which provides block funding to state governments to design their own energy programs to best meet state and local needs.

This particular piece of legislation earmarks funding that, for the first time, would go to local governments. It would establish a floor or minimum amount of funds going to each state that must go to local governments for what I call capacity building: recruiting the planner to address local opportunities and to pursue other sources of funds in the public and private sectors.

DOE recently has been working on an expansion of this effort: the Community Energy Grants Programs. To develop such a legislative initiative for consideration, I asked the staff to look at models such as the Economic Development Administration, in which funding is provided by grants made to local governments or to nonprofit organizations. This model provides considerable flexibility for pursuing economic development and opportunities, and also provides what I call brick and mortar money. This type of program can be implemented rather quickly if the idea is a good one that meets certain criteria.

In summary, we recognize this major problem: energy, by its very nature, is diffused and local; therefore, to pursue these opportunities we must organize the financial and human resources at local levels.

MS. WALDEN: In terms of cutting the red tape, I believe that the Request for Proposals (RFP) and the Program Opportunity Notice (PON) are

the best ways to establish a personal rapport with staff. If a question or a problem arises, there is a specific individual to contact either by telephone or in person. I have always encouraged people to do this to help alleviate the burden of red tape.

MR. NADLER: Some time ago, in connection with building energy performance standards, I went to the New York regional office of DOE for some basic information and obtained almost nothing. It would be helpful if the regional offices around this country were wired into DOE headquarters so that one could easily gain a comprehensive understanding of current major programs, and also could be put in contact with the right people at DOE in Washington.

MS. WALDEN: Those regional offices were originally organized in 1973 to handle the fuel allocation program and to have a response capability in emergency situations. As we moved forward, the Federal Energy Administration and now DOE have not made maximum use of the regional offices. They have been largely understaffed, and communication channels have been inadequate. Secretary Duncan recognizes that we should place greater emphasis on the decentralization of program management. He also has made a commitment to frequent meetings with regional representatives.

With respect to the Building Energy Performance Standards Program, I don't think that lack of communication is the problem as much as the process of development of proposed regulations. We are very limited in the amount of information that we can release before the announcement of proposed regulations.

MR. ANDERSON: There is no funding for FY80 for the SUEDE program, and I think this is a deplorable state of affairs. The SUEDE program is probably one of the most significant programs to be developed by the Federal Government in the area of renewable energy. It combines three important areas, and we are dealing with all three of them here.

One is employment, and particularly addresses the underemployed and underskilled. The second area is urban applications. The third is retrofit. I think most of us here at the conference should make sure that the program gets back on the track.

MS. KARPATKIN: As I understand it, the purpose of last year's workshop was to see how the FY80 budget should be structured. Will you tell us what happened to the results of last year's group, both in the budget process and in the budget outcome?

CHAIRMAN MILLER: I believe that the meeting last year provided us with information that was useful in developing positions which eventually were realized as budgetary programs.

PANEL

NUMBER

ONE

SOLAR ENERGY IN THE CITIES

Invited Paper by David Morris
Institute for Local Self-Reliance

Summary

Four primary points are covered by this paper:

- First, given the current population density of cities, it is possible to use direct solar energy to provide a significant portion of their total energy needs.
- Second, it is in their economic self-interest for municipalities to reduce the amount of money spent on imported energy and to recycle money spent on energy, whenever possible, within the local economy.
- Third, cities possess sufficient political, economic, and financing authority to eliminate most obstacles in the way of self-reliant energy systems, and to accelerate the use of conservation/solar.
- Fourth, the rapid increase in energy prices between 1973-1979 has given rise to a situation where the self-interest of society with respect to conservation and renewable energy resources does not coincide with the self-interest of the individual resident or businessperson. In order to eliminate this duality of interests, the cities must develop financing mechanisms and direct ordinances that meld the self-interest of the individual consumer with that of the city as a whole.

Cities and Solar

Some experts have questioned whether cities have a low enough density to support significant use of direct solar energy. The answer, depending on the city's location, is yes. About two-thirds of all residential structures within urbanized areas are single-family dwellings. The average density of our larger cities, with populations over 100,000 people, is seven people per acre. Although the central core of cities such as Chicago and Manhattan may have densities higher than several hundred people per acre, the density rapidly declines as we move further than a mile from the downtown center, such that peripheral urban neighborhoods have about the same density as the suburbs—about 10-20 people per acre.

Surveys in the Southwest and southern California have found that rooftops are often well oriented for using direct solar energy, and that there is sufficient rooftop space to provide all the needs of a family of four. A study in Colorado Springs found that solar shading, at least in that sprawling city, was not a problem. Studies performed on Baltimore and Washington, D.C., by the Institute for Local Self-Reliance concluded that more than 40% of work-related automobile transportation energy could be gained from photovoltaic cells on gas stations, parking lots, and parking garages if electric vehicles were used exclusively for work-related commuting.

Municipal Energy Economics

Between 1973 and 1979 the price of crude oil increased by 800%. This rapid price rise has not yet been reflected in the price we now pay for energy, because of the lag time in

regulated rate structures and the regulation of domestic oil and gas supplies. Thus, the self-interest of society often does not coincide with the self-interest of the individual customer. The best example occurs in the Pacific Northwest, where inexpensive hydroelectric power has traditionally produced energy at one cent per kilowatt-hour (compared to a price of five cents on the average in the country, and 11 cents per kilowatt-hour in New York City). Having exhausted their hydroelectric capacity, the Pacific Northwest must turn to coal or nuclear generators, which produce electricity at five to seven cents per kilowatt-hour. The customer does not pay this price, but rather, the combined price when the costly (but so far, small amount of) coal power is rolled into the inexpensive hydropower. Thus, the customer pays about two cents per kilowatt-hour and measures the feasibility of solar and conservation in comparison with this price. The commercial enterprise can deduct energy expenditures from taxes, thus in effect lowering the real price of energy to the business by as much as 50%. The utility can earn a return on its investment for power plant construction, but not for conservation or solar investments, and this again skews the investment decision-making process.

Thus, although it costs society from five to seven cents per kilowatt-hour for new energy, the various components of society—primarily businesses and residences—pay only less than half of this cost in the Pacific Northwest. The role of the city is to develop financing mechanisms to blend the various self-interests involved.

Studies done in Washington, D.C., found that 85 cents of the energy dollar is exported from the local economy, never to return. Only 15 cents on the energy dollar returns in any form, for profits, dividends, taxes, wages and salaries, and purchase of local materials. This figure could vary somewhat if a city owned not only its own distribution system, but its generation system as well—but the difference would only be slight.

A city reduces the importation of energy benefits in several ways. In the process of investing in conservation and/or solar energy, it can divert money from more capital-intensive and coal investments to those which are more labor-intensive, and require smaller and more locally oriented business. Although greater numbers of jobs are created by investment in conservation and solar energy, in proportion to the amount of money invested or number of Btus generated, the impact on the local economy depends in larger degree upon its composition. For example, in one study of Washington, D.C., it was found that in the five-year transition required for an effective energy conservation program, there would be an actual reduction in the work force. The reason is that the District of Columbia is a service-based economy, and the service sector is the most labor-intensive sector. In addition, the economy has very few manufacturing facilities, so that many of the raw materials for conservation and/or solar power would be purchased from outside the city. Thus, in the process of achieving a reduction in imported energy, one would be diverting capital from more labor-intensive spending patterns to more capital-intensive occupations.

However, this would not be the case in other cities. In addition, many jobs are created after conservation and/or solar energy conversion takes effect. That is, the dollars that are not exported to pay for energy can recycle within the local economy. A dollar saved is worth more than a dollar to the local economy because of the multiplier impact. A gross income multiplier was found in Washington, D.C., which has a population of less than 700,000.

In order to assess the true impact on the local economy, one would have to trace the investment flow as well. For example, Oregon allows a 25% tax credit for solar energy, which is additive to the 30% federal tax credit. In terms of financing solar energy, more

than half the cost is picked up by government units outside the city. In addition, financing mechanisms established by Oregon and many other states permit more money to flow into the local economy, increasing the attractiveness of energy self-reliant strategies. This compares, for example, with a state-mandated exemption for solar energy buildings from property tax increases, which has the effect of forcing the local economy to absorb the solar energy subsidy.

Financing Mechanisms

The city must develop attractive financing mechanisms to encourage solar energy development and conservation. There are many ways in which this currently is being done. Experience to date finds that tax credits, tax deductions, and lower interest payments have not been very successful in developing solar energy. The best type of financing is one with a low or no down payment, and repayment over a sufficient term that the monthly payments can be made through energy savings.

Community development block grants are being used in several cities for low or no interest loans for conservation. Solar and conservation can be part of the Section 312 rehabilitation financing. Utilities in Oregon will install conservation at no cost to the homeowner. These investments are put into the rate base, where a return is earned on the investment. The homeowner repays the loan when the house is sold. TVA provides 20-year, 3.75% financing for solar hot water systems, and TVA estimates that it is saving $1200 per system by avoiding the need for costly new peaking facilities. Portland, Oregon, is examining the use of tax increment financing and industrial revenue bonds for conservation financing. Pollution-control bonds can be used in Minnesota for solar and conservation financing.

Removal of Obstacles by City

Several cities have passed life-cycle costing procedures for evaluating solar and conservation economics in leased or purchased buildings. Most of these cities have, to date, offered no budget for the installation of conservation/solar measures; consequently, the maintenance or general services department can do little to implement the requirement. The Federal Government can do little to implement the requirement. The Federal Government uses a four-year payback requirement for its own installations. Baltimore uses a five-year payback. Minnesota recently switched from a five-year to a ten-year payback. In Minnesota the agencies estimate the required investment to meet the payback goals and submit this to the state legislature for special appropriations. Cities must find mechanisms for dealing with investments in conservation and/or solar energy, which are capital investments, when energy expenditures traditionally have come from the operating budgets.

In the Anacostia project, a neighborhood-based energy extension service in Washington, D.C., it was discovered that over $10 million were available for energy-related activities within the neighborhood, but that no coordination existed among the various sponsors of vocational training, housing rehabilitation, weatherization, and so on. Cities must see energy as an item that cuts across traditional departmental areas of responsibility.

Building codes are often quite idiosyncratic, relying on the subjective analysis of inspectors for approval of new technologies. In many cities, solar greenhouses have been disallowed because of setback requirements. In others, wind generators were prohibited

because of height limitations. Cities that have established Planned Unit Developments (PUD) as a method for changing zoning requirements could integrate energy assessment as one of the criteria for evaluating PUD application. Decisions must be made regarding the need for double-walled heat exchangers for solar hot water systems, and valves to stop back pressure from putting toxic liquids into city drinking water, because the system that includes them will be more expensive.

Since solar is a new industry, people are concerned with warranties. Cities could develop a guaranteeing insurance mechanism. Southern California Edison Company is now doing this. That investor-owned utility does not install solar, but will service systems that have been installed properly. TVA is planning on doing this in Nashville, coordinating financing of solar systems with banks. The city could easily be guarantor through its water department, since water departments are almost always municipal in nature and have the plumbing and engineering capability to service most solar hydronic (liquid) systems.

Preparing for New Legislation

Cities should be aware of several important new pieces of legislation: the Energy Extension Service, the Residential Conservation Service (RCS), and the Public Utility Regulatory Policies Act (PURPA). The Energy Extension Service, previously restricted to 10 demonstration states, is now starting in all 50 states. The RCS program mandates that utilities offer audits to their customers, arrange financing, and provide information on energy savings. The PURPA legislation requires that utilities purchase power generated by small power producers at a reasonable price, that they permit the on-site system to interconnect with the grid system, and that they provide back-up power at a reasonable price.

These Acts may well give rise to new audit services and technical assistance networks for city inhabitants. In addition, PURPA could give rise to new organizational forms for energy generation. Cities should evaluate, for example, the air pollution impact of decentralized cogeneration systems and the organizational dynamics of a neighborhood energy cooperative that pools household-generated excess electricity and sells it to the city-wide utility. The concept of small power production may be particularly important to cities that own their own utilities.

SOLAR ENERGY IN THE CITIES: ECONOMIC DEVELOPMENT*

Speech Given by
David Morris
Institute for Local Self-Reliance

I thought that I was to talk on cities and economic development. The topic of city revitalization is too broad and abstract and vague for me, so I can't really talk about that; but I will speak about a fragmentation and a distinction in the energy field that one causes by talking about solar energy and not talking about energy self-reliance.

What has been going on in the country appears to be partially a result of the Department of Energy's funding policies, but is also the result of divisions within the energy movement. The solar activists and conservation activists are very much at odds with each other, and the active solar activists who tend to be engineers are at odds with the passive solar activists who tend to be architects. It seems that we shouldn't talk about solar energy, but about energy self-reliance.

The SUEDE program, for example, was mentioned this morning as a good case of interdepartmental cooperation and is indeed a good program. It has one drawback, and that is that it can't practice conservation. SUEDE operates toward solar energy, and so people who have been building attached greenhouses have found that insulation probably would have been a much better investment, but SUEDE can't insulate. It is supposed to build an attached greenhouse, and there is a toll-free number for solar information but not for conservation information. If you have a south-facing piece of glass that is considered a window, you are in one division of DOE; if you have a collector, you are in another division of DOE. I hope for the last of conferences that talk about solar cities and for the beginning of talk about energy self-reliance for cities, which is a combination of everything from cogeneration to energy conservation to direct solar. Basically, this means talking about stopping the outflow of money from cities and beginning to recycle it as much as possible within the local economy.

I would like to make a second observation here at the beginning of the talk. If we are to develop policies tomorrow for solar and city programs at the Department of Energy, we would do well to address some of those issues in our talks today, and I don't mean policy issues. I mean organizational issues.

I don't know all of the people invited here, so I might be in error, but I didn't note anybody on the panels from HUD, from FHA, from VA, or from "Freddie Mac," the secondary mortgage market. There was no financial institution on the panels. There were no builders, zoning officials, local public officials, company officials, or apartment house owners. What is needed in a city is not here today—at least not formally on the panels. I think this reflects in some way the difficulties of the Department of Energy, which has no mandate to work in cities, doesn't work in the private sector very well, and has no financial mechanisms internally that fund research and development projects or planning and evaluation projects. It is very difficult for an organization like that to start changing course and try to do things that are concrete. I think the comprehensive community energy management program is an example of how money can be eaten up. It is

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*Because David Morris's speech to the conferees differs in some respects from his submitted paper, we have included the texts of both in this report.

extremely important to work with those people who make things happen in the cities. Hopefully, they will be invited to the next conference.

Until very recently, cities have looked only at their own institutions and their own expenditure patterns, and so they have looked at the sizes of vehicles, conservation of their own municipal buildings, and their transportation systems. Only now are they beginning to look at the general local economy and how they can get involved in it.

Those studies that are now being done on energy in cities are dealing with the city as a nation. That metaphor leads us to a question of opinions, and we are finding that a dollar spent on energy is one of the worst spent dollars in terms of its impact on the local economy. In our study on Washington, D.C., we found that the District of Columbia, excluding the Federal Government, spent $700 million in 1977 for energy of all types. The figure is now above $800 million for this year. Of that amount, only 15% came back into the city and 85% never returned for any benefit—defined as local taxes or salaries—to the local economy.

One can talk to city officials about street dollars and cents, but not about Btus. City officials don't respond to global crises, but to internal budgetary items, and we must begin to talk about stopping monetary outflow and recycling funds.

In Detroit, $1.2 billion are being spent on energy of all types, and almost all of that is leaving the local economy. Compare that with the city's operating and capital improvement budget, consider the benefits that things like the Renaissance Center are bringing to Detroit, and then evaluate the benefits that storm windows, insulation, and solar energy could bring to the city for the same amount of money.

Detroit is one of those cities that treats itself as a nation. It requires most public employees to live within the city on the same basis as we are using for energy. That is, if public money is being spent on hiring, employees should spend that money primarily within the city borders. The City of Detroit also permits a higher bid for city procurement of goods and services from local contractors and small businesses. For example, someone located in the city may charge a higher price for goods, and the city will purchase them because the dollar recycles within the local economy; so there is ample precedent for the type of action that we are talking about.

The city can create jobs by investing in conservation through solar energy, but may not create those jobs right away. Our study in Washington, D.C., indicated that there would be a reduction in jobs in the process of achieving conservation because investment would be diverted from one of the most labor-intensive service-based economies in the country to one that is more capital intensive. Employment within the District of Columbia would be somewhat reduced until the increased spending power that people have with the money that they have saved increases both employment and discretionary income. To some extent, one must divorce the initial impact of heavy investment in conservation and solar energy from its ongoing impact.

We found that cities do well with energy self-reliance procedures because cities have financing mechanisms. In some ways, cities run utilities—if not the electric, then the water utility. For example, Santa Clara's water utility is leasing the solar systems there.

Since a city has the ability to borrow and to develop a significant financing mechanism, I think that many of us who are involved in cities need to begin to work on those mechanisms. People will not accept conservation measures or solar systems unless there is a

way to do that without increasing the amount of money that they currently pay for energy. Thanks to OPEC, one can develop financing that allows people to repay the loan with energy savings. This arrangement is necessary, but not sufficient for moving aggressively towards solar energy and conservation.

The financing mechanisms available in the country have worked, but they have worked only marginally. San Diego Federal Savings and Loan has a policy that allows you a home improvement loan for a solar system on the back end of your home mortgage if they are holding the mortgage on your house. There is no down payment and no initial cost for the solar system. As I understand it, between 10 and 50 loans have been made in the last couple of years—only a handful of responses.

In California, when a new subdivision goes up the builder can take a 55% tax credit from the state and the customer. The buyer can take a 30% tax credit from the Federal Government. That is an 85% tax credit, and is not working in terms of accelerating solar energy and conservation to the point that we would like.

Utility financing mechanisms that permit the utility to install only conservation measures could be extended to finance residential solar systems with no down payment. The charges could be included in the base rate, and then paid back at no interest when the owner transfers the property. Although that utility financing mechanism has a spotty record in terms of encouraging people, it is better than nothing. Maryland is one of the few states in the country that exempts solar technologies from property taxes on a statewide basis, and they permit the counties and cities not only to exempt solar technologies, but to exempt property taxes on the building itself up to the cost of the solar system. Such an ordinance exists in Hartford County where, for three years, one can deduct the property taxes up to the cost of the solar system—which means they are free. Hartford county officials, after a year of that policy, are beginning to think about going door to door to explain to people what they could do. We find that financing mechanisms are necessary to induce people to make transitions in the kind of predictable way that allows cities to do planning.

Financing is necessary, but it is not sufficient inducement. What we need in cities is to move toward mandating. I hope the Department of Energy will, in its policies, take into account what that means. In order to mandate solar energy or conservation within cities, the political constituency must be organized. This does not involve a quarter of a million dollars to a computer center to run models on energy data. It involves political organizing, and the Federal Government is not the best agency to be engaging in political organizing at the local level.

Mandating makes sense from three perspectives. First, there is a national security crisis. It appears that we should treat it as such, and that means we should not rely on voluntary measures. As I travel around the country and talk to people like the American Legion, I hear this response: "There can't be an energy crisis, because the Federal Government isn't requiring anything except an increased automobile efficiency standard by the middle 1980s." They understand that issues of national survival require appropriate measures.

Portland, Oregon, has enacted a mandatory conservation measure. It doesn't take effect until 1984, but it is the first in the country to do that for conservation. Davis, California, has enacted a mandatory conservation measure that takes effect in January 1980. The involvement of local governments in energy self-reliance is advantageous. An inefficient vertical transfer of information once allowed cities to direct their questions

about the activities in neighboring cities to the Federal Government. Over the last year and a half, the cities have been transferring their information horizontally, and the Federal Government is running so hard to catch up with the local governments that I find it amusing.

Competition is extraordinary. Eugene, a university town just south of Portland, prides itself on being the Davis of Oregon. After Portland enacted its ordinance, the conservative daily newpaper ran three editorials in a row, saying, "How did this happen? How could we be upstaged by industrial Portland? We are supposed to be more innovative." Within two days Eugene had set up its own energy task force. Its government started with mandates enacted very quickly, and people complained about the lack of citizen participation and political organizing aspects of energy, but the horizontal transfer of information had brought results.

There are 3000 counties and more than 8000 cities in this country, and one would assume that they would be more innovative, more diverse, than would a Federal Government. Knowledge is accumulating. If people want to know about a city plan, they go to Davis; if about utility financing mechanisms, they go to Oregon; and if people want to know about the technologies and certification processes, they go somewhere else. We are beginning to find that people throughout the country are saying, "Okay, we can share and piggyback on each other's learning curves. We don't have to reinvent the wheel when it comes to solar energy and conservation."

There is a second reason for mandating. The first was national security, and the second is equity. Low-income people still don't seem to have center stage even at this point in our history. As I talk to people from New England, they think the energy crisis will not be a problem this winter because there will be sufficient stocks. All of the arguments are about whether there are sufficient or insufficient supplies of fuel oil, and very few people are talking about the fact that for 25% of the population, that doesn't matter. The point is that they won't be able to pay for it.

The low-income people in this country get the hand-me-downs. They get the used houses, the used refrigerators, and the used cars. Those goods may function well, but they were designed in a very different era when energy was cheap. If we do not enact mandatory requirements right now, then within 5 or 10 years the middle and upper middle class will be able to purchase an appliance, a house, and a car that is energy efficient, but the poor will get the hand-me-downs which they will not be able to afford to operate. So I think that we need to begin to look very closely at mandating in terms of equity, simple decency, and justice.

There is a third reason for mandating, and that is from the utility point of view. It is easy to argue that it is cheaper to move toward solar energy rather than to invest in a synthetic fuel plant. The utilities can be persuaded of that; perhaps not overnight, but within a relatively short time. They respond with concern about their lack of control over conservation measures. The utilities have control only over new power plants, and it is their mandate to meet the energy needs of the worst case. If people fail to put in storm windows, and new houses are not designed energy efficiently, the power supply will be insufficient within 5 or 10 years.

Mandating resolves that problem. Specific performance can be integrated in the demand projections that would come from mandating conservation in city utility plants, planning efforts, economic development, and job training efforts. So I think that mandating makes sense, and that the issues of mandating and of giving cities the authority to

aggressively move toward energy self-reliance is a good theme for this year's conference. In the coming presidential campaign, the role of big government is going to be discussed incessantly. We are providing a balance here by focusing on local government, which involves a different role.

I do not advocate a service delivery system, but suggest defining crisis as such and moving toward combating it. In Portland, a nonscientific telephone survey was taken before the ordinance was passed, and they found that 44% of the people supported mandatory ordinances and 43% opposed them. A similar poll taken in Seattle on recycling found that 47% opposed mandatory recycling requirements and 41% supported them, which is very close to the country on the initial polls. I think that it behooves the Department of Energy and the rest of the Federal Government, when they work on the local level, to understand that this is not only a technical problem, but it is a political problem as well.

One must create not only a constituency and consumer market for solar and energy self-reliance, but one must create a political constituency that would facilitate city implementation of the types of measures and ordinances that will move us toward an energy self-reliant future within a very short time.

DISCUSSION

Lawnie Taylor, U.S. Department of Energy
Dennis Meadows, Dartmouth College
David Morris, Institute for Self-Reliance
Ken Sullivan, U.S. Department of Energy
Dave Engel, U.S. Department of Housing and Urban Development

MR. TAYLOR: For all of the space heating projects in SUEDE, selected sites must first be weatherized.

MR. MEADOWS: What do you consider to be the most effective modes of lateral communication for city or county officials interested in finding out what their options might be?

MR. MORRIS: The first is newsletters, which the private sector should undertake. The second is speaking at professional association meetings such as the Municipal Finance Association, the International City Managers Association, the technical meetings of the people who work in cities, and the National Association of Home Builders. But I found that what is required in many cases is person-to-person contact.

I am working with the Philadelphia Solar Planning Project where we decided to bring in big-city neighborhood organizations basically to transfer information horizontally. Those of us who are not bankers, for example, cannot persuade a banker. But somebody who has been skeptical before and has gone through that learning curve can say, "Two years ago I felt the same way you did about these things."

I would strongly suggest that the Department of Energy and city programs adopt a policy to grant between $15,000 and $25,000 to each city for travel only; primarily to bring people into selected constituencies within the cities that require it. That is not for conferences, however.

MR. SULLIVAN: We (Rockville, MD) use the volunteerism aspect. We have established an energy commission—a base within the city—and they are talking to the state and county energy offices and are learning as much as they can.

MR. ENGEL: To what degree do you see local governments willing to assume the political hot potato of regulating and mandating energy conservation and solar energy?

MR. MORRIS: I think zero support exists for mandating solar policy in 99% of the cities, but one does not move into a city with talk about mandating.

Very few of the cities in the country are making any significant energy conservation efforts that require a capital investment. Most of these cities will look to the Federal Government and will not move unless federal monies are available. But this is the kind of thing that catches on very quickly. If cities see other cities doing that, they begin to think in terms of doing it themselves, and local government can move much more rapidly than the Federal Government can.

There are probably several hundred cities that are involved in some substantial way in investing in energy self-reliance as a particular policy. The major problem in cities is the rental stock, which cannot be handled without mandating.

PANEL EXCERPTS

PANEL NUMBER ONE

SOLAR ENERGY IN THE CITIES: ECONOMIC DEVELOPMENT

PANEL MEMBERS

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City of Detroit, MI

BOB DRAKEFORD
Mayor, Carrboro, North Carolina
President, North Carolina Conference
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LARRY YOUNG
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PAUL DANELS
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LARRY HOBART
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EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and DOE.

FIRST DAY

MR. DRAKEFORD: I agree with Mr. Morris . . . it disturbs me to see very few local officials here. It is important to have mayors, chief city councilmen, legislators, and Senate or House of Representative members involved in these discussions. Otherwise, solar implementation and city revitalization are not going to happen.

We need the bankers, the real estate people, and the builders; but we also need the politicians. Also, I think it is important that we have the poor and minorities involved. (p. 6)

MR. YOUNG: Municipal leaders are forced to reduce services or to take money from education, employment, welfare, and housing in order to meet the rising cost of heating buildings and moving vehicles. The social programs are an endangered species in the current political climate. They are delayed and diminished partly as a result of the energy crisis. The programs have not suffered nearly as much as people on low, fixed-income budgets that were insufficient to begin with. Therefore, I approach the panel question not from the viewpoint of whether solar energy is viable for the city, but whether the city will be viable without the alternatives of renewable energy. I doubt that it can be.

I make the following recommendations: One, that the viability of a massive central program funded by a windfall profit tax be re-examined critically and in comparison with solar energy options (in my opinion the cost and benefits are more favorable to solar energy); two, that solar advocates intensify their public relations to convince the citizenry that solar development is practical in the near term, if not the immediate future; three, that the solar energy planners emphasize the involvement of minority and small businesses in the development of a solar industry; and four, that successful demonstrations of appropriate technology, including solar applications, be funded broadly in urban and rural areas. (pp. 8-10)

MR. DANELS: The major cry that I hear is for better information and assessment capabilities of the relative economic impact of energy

technologies on low income people, community organizations, and cities. These segments of the society do not have that technological capacity right now. They are given bits and pieces of information from various interest groups. For example, environmental people say solar is clean, the utilities say solar is not advanced enough and some other people say that solar is here now. The question is, whom does one believe? (pp. 15-16)

MR. MORRIS: The city must begin looking at a local economy rather than the amount of revenue it gets. I would like to ask DOE to stay out of cities, because I don't think DOE has expertise in that area. There are agencies that do have the expertise: HUD, most particularly, and EDA. DOE does not have the money for legislation capital the way HUD and EDA have, nor the contact with people who implement programs. Also, the basic transfer of information is from people in the field who are not convinced and are skeptical. I think that toll-free hotlines are appropriate, but many of them are going to be overwhelmed. But the dispensing of information about what is going on in the country should be contracted, and perhaps that can best be done by SERI in Golden, Colorado. I also think that a newsletter should be funded, but it should be a private sector newsletter.

Another recommendation is for a policy to give a majority of all contracts in the Department of Energy to small businesses, with a certain number set aside for the minority business community. The Federal Government should have a coordinating committee on energy. I don't think HUD or DOE should do it. Farmer's Home Administration has an influence in cities of under 50,000 population, and the Department of Transportation is a major actor in this field. There has to be a way that some of this can be pulled together. The problem with HUD is that they focused on cities and not on sub-city units. My final point is that we should come out with a policy on mandating specifically on rental units. We need the Federal Government to act as a coordinating mechanism to transfer the information and also to be able to pull together and target base financing and research and development funds in the sector. (pp. 17-23)

MR. DRAKEFORD: I have a real problem with talk about getting into HUD or EDA, because neither of these agencies thinks that a city of under 25,000 exists. DOE is at least beginning to look at small towns. (p. 24)

MR. MORRIS: The question is whether you want to spend the 12 years to develop the expertise, or whether there is a way to use the Department of Agriculture or Farmer's Home Administration. DOE is the only agency that has no understanding of cities.

Almost every other agency has worked with the small and large cities before. (p. 24)

MR. HOBART: In the United States today, there are some 3,600 individual electric utilities. Of that number, 2,200 are publicly owned electric systems—mainly systems which are owned by cities in municipalities that provide and distribute electricity within their boundaries. Another 1,000 of those systems are rural electric cooperatives, and the balance of the electric utilities in the United States are privately owned companies that supply, in total, about three-quarters of all the electricity in the United States.

I believe that there has been a serious underuse of the city as a vehicle to achieve some of the common aims that we are talking about during this conference. Cities are uniquely qualified to deal with many of the energy problems that we have been discussing and that are going to be plaguing us for many years to come.

Financing opportunities and low cost approaches to energy problems that cannot be realized in other ways are available through cities. Cities are not subject to federal income tax, and they have access to municipal bonds financing. Cities frequently have lower operation and maintenance charges. (pp. 25-26)

People are making their own kinds of energy accommodations, but individual action is often not the most efficacious route to travel. I think all of these things emphasize the unique characteristics of cities and the chance to use them, not simply as a method of policing what we do. I think that cities have been short-changed in a variety of ways in the federal program, particularly in financing worthwhile endeavors in the energy field. I don't see why tax credits couldn't be available to cities that lease such equipment or provided in such a way that the small-scale hydro program, for example, is implemented. The cities have lost a vocal position on these matters, and the conversations that take place within the Senate Finance Committee, the Ways and Means Committee, and other places fail to take into account the fact that cities are the natural and desirable tool to effectuate the ends that we are all interested in. (pp. 29-32)

MR. BURNETTE: There is a major problem in perception within city governments. People need to understand the issue of self-reliance in relationship to economic development.

A good way to address this issue is to conduct case studies that point up differences in local economies, about the differences that can be expected from a city that has a municipal utility

and one that does not, between cities that operate with different mixes of employment, between cities that have different social and welfare problems, etc. The second issue is how the commitment of city government to solar can be obtained. One thing that seems to work is to place someone who has expertise in energy matters as close as possible to the managing director or the mayor. The third issue is a fundamental one of creating consumer demand. There must be Outreach into neighborhoods. The level of interaction needed simply does not presently exist.

What the Philadelphia Solar Planning Project has done is to place people into departments of city government to articulate solar policy issues for them. We must get the technology "in the street" close enough for the consumer to touch. I also think it is fundamental to make local solar industries visible in a city.

The last issue I would like to address is how technical assistance can best be delivered in the cities. The audit is plainly not an accurate way to deliver technical information needed for informed action by a homeowner. We are finding that people don't fill out audits properly. They are not interested in audits; they are interested in technical service. A more useful approach is to develop an energy consumption profile particular to the housing stock of a given city, and to use that as an index or first approximation with which to compare actual utility costs and the effects of the many variables at work in each individual house. One of our great needs right now from DOE is a seed granting capability. Without such a financial capacity it is hard to encourage innovation as the opportunities occur. (pp. 33-40)

MR. NADLER: A common misconception is that capital intensive projects don't use labor—that capital is a substitute for labor. In reality, there is not substitution. Rather, capital is used to pay for labor embodied in a project. The relevant distinctions involve types, time, and locations of the labor—e.g., on-site contrasted with that employed by the suppliers of equipment and components purchased for the project. A capital-intensive project typically uses more specialized and skilled people, such as engineers, managers, technicians, skilled machinists, and heavy construction workers. They are employed at the front end of the project before it starts to generate revenues, thus requiring front-end financing via borrowing or some other mechanism.

Another error is overemphasis on community economic self-reliance. Should a community in Minnesota try to grow its own oranges? Should Miami Beach try to offer snow skiing? Should every town have its own automobile assembly plant? It makes sense for a community to attempt energy self-sufficiency only

if it really can develop a comparative economic advantage that way. Though some community self-sufficiency is desirable, modern civilization is predicated on commercial interdependence and concomitant social interactions among communities, regions and nations.

One of the ironies about solar energy is the role of the Department of Energy. In part, the purchaser of a solar system is buying insurance—protection against fuel oil or natural gas supply interruptions or rapid price increases. But DOE may be perceived as protecting us from such fuel problems, thereby substituting for the solar insurance. DOE should emphasize the vulnerability message: that we are susceptible to supply interruptions from unstable nations. Thus, a solar purchase should be measured not only against fuel cost savings today, but also as fuel insurance for tomorrow.

MR. PENDLETON: Poor people and minority people need the cities because the cities often are much more efficient places to live than elsewhere. Energy issues are important to minority communities because they spend a larger share of their resources on necessities. It is assumed that grass-roots people want to convert to some other source of energy. I think there has been so much reliance on traditional sources of energy that conversion to some other source might be difficult. We need a better and simpler explanation of what solar energy is and what it will do for the country. But I don't know how you go to the poolroom or the barber shop or the beauty parlor and explain the value of solar energy. Perhaps DOE can help with this in a way that will make it financially feasible for landlords to retrofit a rental unit. Now people are tearing down perfectly good units; they can't convert to condos because of nonconversion ordinances. They tear the things down and put something new up and then sell it; that is certainly not for poor people. There is also a minimum-wage-law problem revolving around teenagers, particularily minorities, that needs attention.

We think that there need to be some stronger links where solar energy loans are provided at the time a business is capitalized—certainly at a lesser rate than the business loan. There might be some way of selling this, along with the business loan package. (pp. 40-54)

MR. ENGEL: DOE has a history of dealing with states and has used the states as its mechanism for the delivery of services. Anyone who knows the political process realizes that all regulations concerning us here are at the local level. Yet, you see DOE going to the states to address the building codes and zones. They are deceiving themselves. Renewable energy programs in the cities will require heavy public investments. In any city, there must be public investment. The basic question is

whether there will be a political constituency to allocate so many scarce public dollars to the city. Is there an equitable distribution of resources? (pp. 57-60)

MR. SULLIVAN: You've got to give cities something simple that they can turn to and have a whole shopping list called, "Here Is What You Can Do in Your City." (pp. 63-64)

MS. HARRIS: There is a source for your shopping list.

OBSERVER: It's a book called Solar Energy: Options for Local Government, and it is available from Western Sun.

MR. DANELS: In terms of service delivery, there are some very, very basic needs that must be met. There is a whole community-based mechanism that one must go through. HUD presently uses community-based mechanisms, and DOE also can do so. (p. 68)

MR. GUY: For the record, conservation is very important. I think that should be one of the emphases here. Another is the piggy-back mortgage idea. A homeowner could add this to his mortgage so that he is not going to need so much money up front. (p. 69)

OBSERVER: I witnessed the large-scale DOE demonstration program, and I don't think it was a howling success. A lot of those projects still are not working. Some of them are maintenance nightmares. An elected city official who pushes one of these projects on his constituency may not get elected next time. (p. 70)

MR. PENDLETON: I don't think we've used the Outreach approach adequately. If we didn't do any more than pay kids $1.25 an hour to take information around to houses or to take it home, that distributes it much better through an Outreach Program, rather than asking people to come to a place for a meeting. (pp. 73-74)

MR. BURNETTE: Simple, local consumer guides that contain information specific to a community are needed. If there were four-page digests on issues that had to be dealt with by city officials or committees, such as solar zoning, building codes, tax options, etc., one could go into a committee meeting and educate the people around the table very, very quickly.

There are aspects of economic development for which information on solar energy must be packaged. (pp. 74-76)

MR. HOBART: There is a big opportunity available to the cities to educate residential users of energy on the benefits of energy conservation and use of renewable resources. That opportunity emanates from the residential conservation education that is going to be required from electrical utilities over the next couple of years. (p. 76)

MR. BURNETTE: The energy audit, however, is not sought by consumers, and it is not followed up with technical assistance after the auditing process. We are finding that people don't fill out the audit correctly and the information isn't reliable. There is a much better index. The tax files tell you what the buildings are, simple calculations tell you what the basic heat load of the building would be, and it is not very hard to determine from the utility data whether they are functioning at a certain level of efficiency. You don't need an audit for collecting data on energy consumption, and unless there is a following through, the audit has doubtful value. (pp. 77-78)

MR. HOBART: Whether you want audits or not, utilities are compelled by law to provide them, and people are going to use them in some cases. If they are, then you should seek to have what you think is important presented in those contacts with consumers. (p. 78)

MR. PENDLETON: Now, we are bringing in new industry from other places as well as trying to create jobs locally. One drawback to our economic development is the cost of new construction in housing. Perhaps the energy costs of new construction can be handled if we have better information. We cannot generate jobs, either in industry or in building living units for people, unless we talk about new patterns of living and new sources of energy. (pp. 78-80)

OBSERVER: One way an issue becomes important to people is when it is dealt with in the political arena. I hear people here talking like technicians. These are political matters, and they are going to have to be dealt with at the neighborhood level at some time. So I would like to ask whether there are programs or whether it is possible to conceive a program that can be adapted to the needs of neighborhoods. (pp. 80-82)

MS. COUSAR: At HUD, we are discovering that we don't need new legislation. Our programs are targeted to different kinds of needs, on low to moderate income people. We are also in the business of economic development with urban development action grant programs. We have been open to financing energy conservation, solar energy, and economic development projects

as single entities, but we have run into the same kind of issues and problems that you are talking about today in terms of the accurate information for each project as far as what is "doable", what is feasible, what works, the economics of solar. (pp. 82-83)

We are financing the construction of solar plants and development of solar industries, where the private sector is joining hands with the city and saying, "We think this is 'doable,' and we are going to invest in this activity." Our role is a very simple one—to provide the catalytic money to reduce the risks—but there has to be some study on the front end of that to explore feasibility. We are beginning to build those bridges with DOE right now. I am wondering how it is going to happen at the local level. (p. 85)

MR. DANELS: In a previous conference, I strongly objected to a lot of solar advocacy because I think it conflicts with the cutting edge of the environmental ethic in this country—an understanding of the problems of sprawl, the problems of unplanned, unzoned types of land use in this country and what it causes in terms of energy problems and our dependence on energy of all kinds to do anything—just to get around. (pp. 85-88)

MR. ENGEL: The politicians' overt advocates say that it is a political problem. The technical people still say it is a technical problem. I am aware of the basic technical constraints and technical limitations that exist on solar heating and cooling. There just isn't enough roof area available for heating and cooling. (pp. 88-89)

MR. BURNETT: Knowledge about passive retrofit does not presently equal the knowledge of passive in new construction. There are three areas where knowledge of passive retrofit is needed: design, the technical ability to do the retrofit, and the political force and financial pools needed to do it. Additional research and demonstration on heating and cooling in urban areas is absolutely necessary. There is a great need for additional DOE R&D work on systems suitable for urban areas.

I would like to answer Mr. Nadler with respect to self-reliance. Nobody is saying we should shut down the borders of a city. What they are saying is that we should not export all our resources to someone else. The politicians will not respond until there is neighborhood action, and without that kind of action I don't think change will be fast enough. (pp. 89-92)

MR. DYKEMA: Constituency-building requires some sort of involvement at the neighborhood level. One of the ways to do it is to build a constituency in your city. (p. 92)

CHAIRMAN LEDERER: There are vehicles now within the city where monies are being funneled directly into the neighborhoods. The problem is how to service the whole community as a political community, when we have produced counterproductive forces where neighborhoods fight the city and in some cases don't know what they are fighting for. I am, however, in agreement that it can be done productively, and constructively.

If a way can be found, I am in favor of having sub-communities self-sufficient so they can tend to their needs, particularly in the larger cities. The danger is that in some of our cities today we can't be assured of that. We have five or six anarchies going on in different parts of the city. Wood burning stoves are not suitable heating for tenements in the South Bronx, for example. This technology is not suitable for old cities. (pp. 93-94)

MR. SULLIVAN: You should work on the people who are elected, rather than starting a grass-roots level. (p. 94)

MR. DYKEMA: That may be possible in certain cities, but there are many cities where it is not. The best I could hope for initially is building an awareness of the concept—initial programs that begin by accustoming people to the concept of rational energy use, whatever that may include. If it happens to be solar energy; excellent. There often is a real fear on the part of the city government that people will begin to take the regulation of their lives into their own hands. That terrifies them. (pp. 94-95)

MS. COUSAR: The person who runs the Energy Loan Program in SBA informed me that he had around $5-$7 million for the whole country to make loans for this purpose, and there were something like 500 applications for every loan he could make. Without the staff to even evaluate this kind of thing, what would happen? Small businesses in the energy area need help, and if they are willing to take the risk on the private side, they need some amount of support from the Federal Government. If they are not getting it at this time, I think that is an area of attention that is needed. (pp. 100-101)

MS. LACHER: DOE actually has done some research on local government energy aspects. A recent report tends to support the notion that local officials do not find energy an important profit. It's kind of a chicken and egg thing. There are a lot of misgivings that energy is not an important problem, that it is something that we at the local level cannot do anything about. I think there is a real need to tie energy concerns to issues that already have legitimacy at the local level, like economic

development, urban revitalization, and environmental concerns. Those ties can be brought out. People's perceptions are very important, and the ties that are going to make this a legitimate concern to local officials of all types, people in the neighborhood and people in the city government and counties and states—these ties have not been made and they need to be and are going to be. (pp. 101-103)

MR. DYKEMA: Since I do not really expect DOE to sponsor the sort of political activities that are going to challenge city hall, the thing that occurs to me over and over again is that many of the people I hear talking don't want to involve people in this problem. (p. 104)

CHAIRMAN LEDERER: I am in sympathy with what you are saying, but I don't think that the people in city government who are intimately involved in helping their city to survive are doing that to oppress the people. I hope that you don't go away believing that we are not trying to involve our constituents in the problem. (pp. 104-105)

MR. LEVENSON: In a sense there is no energy problem, in a sense there is, but that is not the issue. The question that must be asked is about the rising cost of energy. It must be very specific because energy is an abstract term to most people. I think the large majority probably will say yes, this is the problem. (p. 106)

MS. LACHER: That is true, but what they didn't say was that it was anything the local government or local citizen could do anything about. This is what was on the report. The question was brought up: "Are there any energy questions on which you are getting heat from your constituents?" (p. 107)

MR. HOBART: The kind of information that I think people really need, to the extent that they are paying attention to energy issues, is first, more information about analytical techniques to help them make decisions. Second, it's been our experience in terms of trying to tell people about what is useful, that a local demonstration of a particular technique that definitely can be transferred to the citizenry of that community is a very useful device. (pp. 107-108)

MR. PENDLETON: In considering energy for economic development, then, we must examine ways that we can keep those dollars in local communities and keep them from draining out. At some point I need to know more about it. If it is being done, then give me the technology; give me the answer. (p. 112)

SECOND DAY

CHAIRMAN LEDERER: First, let me say that there probably should be a change in our recommendation No. 1 so that it reads "energy efficiency must be considered and implemented as a prerequisite to solar energy." (p. 3)

MR. DANELS: What is meant by "energy efficiency must be considered and implemented?" How do you implement energy efficiency? I can see considering it. (p. 3)

MR. ODLAND: We are finding that conservation is a "bad" word.

MR. GUY: I agree with efficiency, because I think it has a broader scope. (p. 4)

MR. DANELS: I think we could go beyond air quality and say federal or environmental quality standards on No. 3. (p. 6)

MR. BURNETTE: I would add to No. 4 "and citizen participation in government" or "citizen participation in social concerns", and "solar energy provides jobs within the urban areas in neighborhood services, technical assistance, manufacturing," and so forth. In other words, marketing and social services, not just technical services will be created. (pp. 6-7)

MR. ODLAND: Would the same thing be true of No. 6? (p. 7)

MR. BURNETTE: Yes. I would like to see No. 7 augmented to read "particularly in distressed cities." (p. 7)

MR. GUY: I would have deleted the words "secondary" and "local" so that it reads, "solar energy creates favorable economic impact on the economy through self-reliance." How about deleting the whole part there about making money available for other types of economic activities? (pp. 7-8)

MR. DANELS: I have been trying to figure out if the facts are in on whether the solar installations are actually going to reduce energy costs or simply provide a reliable, safe form of energy as opposed to an energy form which fluctuates according to the price of oil or gas. (p. 8)

MR. BURNETTE: I would like to augment No. 8 by saying "to control the cost increases of public assistance." (p. 9)

MR. GUY: How about just starting off with energy conservation combined with solar energy? (p. 9)

CHAIRMAN LEDERER: Let's go on to No. 9. Any comments? (p. 10)

MR. DANELS: In No. 9, am I looking for something that isn't there? I would rather it say, "local institutions are valuable devices for making many decisions," because that does not necessarily favor local government or neighborhood institutions, one over the other, when one may be more appropriate than another in a particular instance.

Later on, I would like to insert a recommendation that more attention be paid to community and city-wide needs. I don't think that it has been thought about adequately in terms of what a city does best. (pp. 12-13)

MR. ODLAND: There originally was No. 10, which somehow got left off when it was typed, that reads: "Therefore, the Panel finds (A) that solar energy has the potential for contributing to the revitalization of American cities and (B) solar energy deployed at the local level has the potential for contributing to the solution of America's energy problem." (p. 10)

MR. DANELS: Can we insert a finding that there has been inadequate attention to — (p. 11)

CHAIRMAN LEDERER: Inadequate attention to urban concerns. (p. 11)

MR. BURNETTE: I would also like to add that there is a distinct need to clarify and focus consumer knowledge on the benefits of conservation and solar energy use in cities. (p. 11)

CHAIRMAN LEDERER: We will move on to the recommendations and see if we can tailor those to reflect what we talked about yesterday. Number 1? (p. 13)

MR. DANELS: I would prefer that DOE give out development money for cities to hire their own city people to make some sort of decisions about their own in-house capacities. The way it is written now implies teams going out and lending assistance. (p. 13)

MR. ODLAND: Another way of saying it is that: "This information and assistance must be used to build an evaluation capability within cities and must be targeted toward city locations." (p. 14)

MR. BURNETTE: I would hate for that to be understood as meaning only planning, because implementation is absolutely essential, too. (p. 15)

MR. DANELS: Providing information for the ordinary citizen is great, but the ordinary citizen isn't always the best person to actually do certain things in neigborhood planning. The way it gets done is for some kind of leadership to take the reins somewhere along the line. (pp. 16-17)

MR. BURNETTE: Could we say, "Information must be made available in the form useful in specific communities?" (p. 17)

CHAIRMAN LEDERER: Could I make a suggestion in the other direction, that we eliminate No. 3? We covered it in No. 1. (p. 17)

MR. DANELS: I think that keeping No. 4 in is valuable because it targets a specific group of people—a whole economic development group. (p. 17)

MR. BURNETTE: It is very important to focus information. You are saying that information should be made available and specifying what it would be used for, but I think you need to say that it must be in the right form or it won't be used. (p. 18)

MR. ENGEL: I object to No. 5 in terms of scarcity of resources. Direct door-to-door contact and counseling to millions of urban residents would either be impossible now, or the end result would be very selective. (p. 18)

MR. BURNETTE: I don't think it has to exist for every person in the country. What is needed is to start the process to get examples in place by local innovation. That can be achieved by direct door-to-door selling.

Maybe a generalized statement on No. 5 would be good. (p. 24)

CHAIRMAN LEDERER: Let's move on to No. 6. (p. 25)

MR. SOLON: Local institutions other than local government ought to be referred to here. My second objection has to do with the either/or aspect of local government versus the Federal Government. I think there is room for cooperation. (p. 25)

CHAIRMAN LEDERER: I think that the thrust is to put the responsibility for the attention to those local problems at the local level, and the fact of the matter is that the resources for providing that attention are not available at the local level. (pp. 26-27)

MR. DANELS: I am concerned that the idea should indeed be positive, but it shouldn't be watered down so that we are saying, "Let's all be friends." (p. 27)

CHAIRMAN LEDERER: Okay. Number 7. (p. 29)

MR. DANELS: I just don't know about a Presidential Commission. (p. 29)

MR. BURNETTE: Why don't we just drop 7 and reinforce 8?" (p. 29)

CHAIRMAN LEDERER: So that No. 8 would read: "Analysis potentials for different energy supply, self-reliance strategies in cities should be conducted and publicized." Okay, can we move on to No. 9? (p. 30)

MR. ENGEL: This sounds like, "Let's put up a token energy person in the city government who is going to be looking at energy." That has to be part of a larger recommendation that says there has to be a large-scale program of money to cities and not just a person. (pp. 30-31)

MR. BURNETTE: I think you are perpetrating the federal fallacy that you have to have a huge system before you can do anything. What I see is the failure of most of these programs to recognize that the required first step need not be a large one. (pp. 31-33)

MR. ENGEL: Would it help to pluralize the word "expert" and say, "experts on conservation and solar energy"? (p. 33)

MR. NADLER: A way to make this more immediately practical or operational may be to somehow use the regional offices and explicitly mandate them to initiate some kind of energy outreach programs. (p. 34)

MR. BURNETTE: Capability is the right word, assigned responsibility and advocacy in the right place. (p. 35)

CHAIRMAN LEDERER: Let's run on through No. 10. (p. 35)

MR. BURNETTE: Could No. 10 be added to federal program support? Locally administered seed grants should be provided for solar planning. (p. 35)

CHAIRMAN LEDERER: No. 11. (p. 35)

MR. ENGEL: What do you mean by "publicly funded stores"? A lot of businesses have been trying to make a go of it since 1973. Are you going to put them out of business with public stores? (p. 35)

MR. BURNETTE: No, the concept is more like public television in showing by example. A nonprofit energy store would pile back its profits into consumer education and support, help the local solar industry by giving them a place to display products, give reports to customers about the success of those products, and provide a place for people to see what is available. Until the private market system is ready to work, the government must prime the pump. (p. 36)

MR. DANELS: I agree with the concept that, in the case of energy conservation, solar, and alternate technology, we can't afford to wait for the marketplace. (p. 38)

MR. GUY: Perhaps we should change the word "stores" to "displays." (p. 38)

MR. BURNETTE: But that doesn't get to the point, because a consumer must be able to go to a store and act on the information that is there. There should be a marketing center for every form of energy device. There will be immediate competition, but that is desirable. This is a public stimulation to private enterprise. (pp. 39-41)

MR. GUY: Why don't the utilities have the stores? (p. 43)

MR. ENGEL: Would you object to energy markets being established in urban areas by which dealers and manufacturers could display and market their wares? (p. 43)

CHAIRMAN LEDERER: Let's move on to No. 12, on travel funds. (p. 44)

This should be saying that local government needs the capacity to cross-pollinate ideas. And one of the ways to do that is to allow people to travel between cities. (p. 46)

Most urban communities talking with one another find there is a very basic need. We need to make sure the travel funds are there. Okay can we go on to No. 13? (p. 48)

MR. SOLON: I want to make a plug for the Department of Commerce and an agency therein called the Economic Development Administration (EDA). This is a workshop on economic development. I think its specific reference to EDA is appropriate. EDA is going to have more and more of an effect than ever before on urban character. (p. 48)

MR. DANELS: But they can't use their money in a reasonable way without major travel funds in local governments in tight fiscal situations. (p. 47)

FINAL REPORT
PANEL NO. 1—ECONOMIC DEVELOPMENT

Presented by Panel Chairman Creighton Lederer

Findings

(1) Energy conservation should be considered and implemented as a prerequisite to solar energy.

(2) Solar energy can attract or retain industry by assuring a reliable supply of energy.

(3) Solar energy can attract or retain industry by providing a means whereby industry can meet environmental standards.

(4) Solar energy can serve as the focus for community and municipal citizen action, which not only can affect energy costs and supplies, but can also lead to other types of local self-help projects and citizen participation.

(5) Solar energy can provide jobs within urban areas in neighborhood services, technical assistance, manufacturing, installation, and maintenance of solar equipment.

(6) Solar energy can provide increased opportunities for small and minority businesses in neighborhood services, technical assistance, manufacturing, installation, and maintenance of solar equipment.

(7) Solar energy can produce favorable economic impacts on the local economy, particularly in distressed cities.

(8) Energy conservation, combined with solar energy, can reduce energy bills of municipal government and local residents, and control the energy-cost component of public assistance.

(9) Consumers must be made aware of the benefits of conservation and solar energy in urban areas.

(10) The Federal Government has paid inadequate attention to urban areas in the development and implementation of energy policy.

(11) Local institutions are valuable for making energy decisions because:

(a) they have developed mechanisms for citizen input,

(b) decisions are made by elected officials,

(c) multiple financing opportunities are available,

(d) energy can be coordinated with other local functions,

(e) significant implementation authority such as zoning is available, and

(f) equity issues can be addressed.

(12) Therefore, the panel finds that:

(a) solar energy has the potential for contributing to the revitalization of American cities, and

(b) solar energy deployed at the local level has the potential for contributing to the solution of America's energy problems.

Recommendations

(1) The proposed synfuels program should be reevaluated; it should be compared with an accelerated program for solar energy. The evaluation should consider impacts on municipal governments and people within those government jurisdictions.

(2) Local elected and appointed officials should be more involved in providing input to federal energy policymaking.

(3) Federal revenues should be made available to local governments and other local institutions to solve energy problems at the local level.

(4) Additional information and technical assistance must be provided to cities to enable them to assess the applicability of solar energy. This information and assistance must be used to build an evaluation and implementation capability within cities and must be targeted toward specific locations and user groups such as people involved in the local economic development process. Better information dissemination through effective hotlines, newsletters, digests, and other appropriate mechanisms should be provided. Reliable cost and performance information is especially needed.

(5) Local governments need the capability to disseminate information and provide assistance. This should include programs to deliver direct assistance to households and small businesses in making and implementing energy conservation and solar decisions. Technical and financial assistance should be provided through door-to-door counseling followed by vocationally trained technical assistance. Information should be provided to cities on how the Residential Conservation Service might benefit community energy programs. These local assistance efforts should be supported by the Federal Government.

(6) An office of conservation and solar technology should be established in every major city to act as a focal point in assisting policy and program development and promoting information exchange between the Regional Solar Energy Center (RSEC), SERI, and the state energy office.

(7) Federal program support and locally-administered seed grants should be provided for establishing a local capability for solar planning, consumer education, demonstrations, technical assistance, and the development of local solar and weatherization industries.

(8) Community energy centers should be encouraged; these centers should provide information and display solar equipment. The centers could include space for equipment marketing.

(9) Analyses of the potential for alternative energy supply/conservation strategies in cities should be conducted and publicized.

(10) DOE and other applicable agencies should develop energy systems and energy programs specifically suited to urban areas. Solar energy programs in urban areas should be closely coordinated with other urban programs. A Federal coordinating committee should be formed with representation from DOE, HUD, FmHA, DOT, EDA, DOD, and other appropriate federal agencies to target federal efforts in conservation and solar energy in cities. DOE should have primary responsibility for the research and development of solar systems. Demonstration programs should be coordinated closely with HUD and other applicable agencies. Widespread implementation of solar systems within urban areas should primarily

be the responsibility of HUD with coordination with and technical assistance from DOE.

(11) Federal programs for cities should not be technology specific or even solar specific; a city should be able to integrate energy conservation with various supply technologies to produce a systematic approach.

(12) Government incentives should be directed toward low-income people and renters at least as much as toward middle-income homeowners. Policies must be developed to deal with energy conservation and solar energy in rental units. Any energy program must incorporate long-term and emergency assistance to the poor to deal with energy prices.

(13) The SBA loan program for solar businesses should be strengthened.

(14) More DOE contracts should go to small businesses, with a set-aside to minority businesses.

(15) The minimum wage laws for teenagers should be waived in order to aid urban revitalization and economic development efforts.

(16) Additional research should be conducted on selected issues such as utility roles, district or community energy systems, fiscal impacts, financing mechanisms, local incentives, and community/long-term energy storage.

DISCUSSION—PANEL 1

MR. DANELS: (National Urban League) A very important thread going through a lot of the recommendations and in some of the debates was the need to distinguish between local governments and other local institutions, neighborhood groups which also have appropriate roles in energy planning at the local level. In many of the recommendations, we were constantly amending language so that we were not restricted to local governments. What we were trying to get at is that energy planning is needed at the neighborhood level. We wanted to be sure that DOE recognized the need to provide assistance for local energy planning at both the government and other neighborhood institutional levels.

CHAIRMAN LARSON: (SERI) As I understand it, there is an issue here that subcity groups may tend to threaten existing city governments. How would you respond to that?

MR. LEDERER: (City of Detroit) On the energy issue, I don't see that as a problem at all. There are some Federally funded local groups whose prime purpose is to jam or to interfere with the local government system. This is not the type of thing we are looking for in terms of energy promulgations in the cities. The city government is not the enemy, and there is no need to produce an organization within the government that is counterproductive. Certainly local institutions must be supported to meet their local needs; it is hoped city governments would cooperate with that.

MR. BURNETTE: (Philadelphia Solar Planning Project) I would like to underline one point for DOE that needs to be understood. Creating local market demand in cities requires demonstration projects in those cities on a scale that neighborhood people can relate to. It is fundamental also that DOE doesn't forget that there are special R&D problems in the cities—questions about how you retrofit city buildings have not really been dealt with adequately. The particular issues relating to the row house and how you attach an energy-collecting device to a building—these simply have to be addressed.

MR. SULLIVAN: (DOE) I was also present at Panel No. 1, and one of the things mentioned there was the spirit of cooperation. For instance, if a manufacturer of solar equipment in the city might provide the photovoltaic cells, the city would provide the installtion, and the Department of Energy would provide enough funds to buy all the hardware to assemble this whole thing, the project would seem to guarantee better participation.

MR. O'CONNOR: (SERI) This deals with the overall workshop itself. The bottom line is; shall we do this again? The feeling of our panel was that it could have been a waste of time unless there is clear evidence that the hundred recommendations or so that are going to come out of this group really receive some thought in the DOE programs. The second thing was that paper is hard to respond to.

In our panel, from time to time a DOE person was there. Without his or her being there for the whole panel, he or she couldn't have gotten the flavor of the kind of discussion that took place. We feel that, given another conference, this should occur.

CHAIRMAN LARSON: Bennett Miller has stressed that a report from this panel will go out. It will include only excerpts from the transcript since I don't think we should burden you with the entire transcript.

MS. KARPATKIN: (Consumers Union) I am interested in hearing from Bennett Miller about his response to our recommendation that the Department of Energy respond specifically to the recommendations that were made by each of our panels as a way of operating in the future to improve accountability to the public.

PANEL

NUMBER

TWO

DOES SOLAR ENERGY DETERMINE LIFESTYLE?

Invited Paper by Laura Nader
Woodrow Wilson Institute

It is perhaps obvious that energy forms are linked with particular social and political effects. In a recent study for the National Academy of Sciences, we described two future societies whose energy was provided by either solar or nuclear technologies. An analysis of societal consequences of nuclear and solar energies make vulnerability apparent as an important variable. Vulnerable technologies such as nuclear encourage increased centralization, more military and police organization, and the development of a "priesthood," or at least a special class of experts, who decide what is best in energy planning.

Control is inherent to vulnerability, and the picture for nuclear seems determined by the very technology itself. For solar technologies the picture is more complicated and the technology less autonomous. Solar technologies may have varying characteristics—concentrated or dispersed (centralized or decentralized), democratically controlled or despotically held, in need of engineering capabilities or managed by any householder. Orbiting solar collectors are an example. Control of this type of solar electric power could be placed in the hands of a few people, and the economic and social costs of such a venture would be exorbitant and susceptible to a backlash similar to the public backlash on nuclear energy today.

What may not appear as obvious is the connection between work organization and the development of solar technologies. In this paper I concentrate attention not on those who might benefit from the workings of solar technologies—the consumers—but on those who are presently charged with making them possible. I start with the premise that it may be easier to change people's consumption habits than it is to change people's work patterns—that it is easier to make a transition from one form of energy to another without disturbing household habits, but difficult to change work habits necessary to energy change. It is true, as David Morris has noted in his lively piece on municipal energy independence, that the governing principle of energy planning was that there would be no change in lifestyles—that the same basic institutional arrangements of energy deliverers would not be altered. That is what many workers also like—transition that does not require redefinition of jobs.

In a study that was part of the Distributed Energy Systems in California's Future project, we interviewed a variety of wage workers involved in the implementation of California's solar building code. This code was specifically designed to eliminate the use of electricity for the heating of residential buildings and was to affect all new residential buildings in California after March 1978. The regulations were to modify existing insulation standards and to establish additional energy conservation standards relating to water-heating, climate-control systems, glazing, and vapor barriers. Natural gas and especially solar energy should be used and supplemented by insulation, glazing, and vapor barriers. The code dealt briefly with architecture and engineering, with economics, and with the environment, but the success of such a code is, of course, dependent upon the human component. The lenders, the builders, and the realtors in corresponding order determine the money, the building, and the availability of housing. Building codes could be passed, but these groups determine the extent of their effectiveness.

We interviewed a range of people who represented various interest groups related to housing, building codes, and energy use: bankers, contractors, architects, building inspectors, and realtors. Each one of these types of workers belongs to a particular work subculture with an organization and values peculiar to its work group. The interviews all suggest almost self-contained levels of dealing with the code. It is difficult for people involved in a level to break out of it and to see the picture as a whole. When we analyzed court cases for the objections to codes, we found that the major objections to the code are often elaborated around arguments about higher construction costs, the inflexibility of prescriptions, the lack of materials, the lengthy pay-back periods, and the collapse of certain industries such as manufacturers of electric resistance heating devices. Behind objections stated in court are certain conditions characteristic of the building industry. As a group, architects react critically to codes because they see them as a hindrance to their creativity, particularly if more paperwork is involved. Building inspectors who are overworked and understaffed worry about still more work. Realtors, who are doing well with the status quo, are not interested in new codes. Government bureaucrats are straitjacketed by their organizations and only able to work within their mandates, even when the solutions to their problems lie outside of narrowly defined mandates. Similarly, concerns of utility organizations were behind objections of the utilities to the possibility of dispersed electric generation that could be bought by the public utilities. The public utility is interested in preserving itself as a generator and seller, not as a buyer.

The point of enumerating worker self-interest, industry self-interest, or professional self-interest is not to present new data, although an analysis of the California code would require us to do so. The point is to focus on aspects of transitions to solar energy that inhibit its speedy development when government or industry or professional workers are responsible for this transition. Even if solar energy does mean that cities could be more livable, that the poor might have jobs and the self-respect that comes from feeling empowered, and even if multifamily rental housing is served by use of solar technologies; if the consumers are on the receiving end, and those who produce the goodies feel themselves to be on the losing end, those who perceive themselves as losing are in charge and are not going to lead us into a smooth transition to solar.

It has been said that the energy crisis is a social and political crisis and that the paradigms set in the early part of the 19th century are changing. The change agents then were those who stood to gain: those who had capital to invest in land and industrialization. Similarly, the first-level change agents today must be those who stand to gain: people under economic and social stress, disenfranchised professionals, unemployed college students, or workers who are frustrated and caught on a merry-go-round that they would like to escape from. Solar challenges take a pioneering spirit—a willingness to try something new and a tolerance for diversity—more often than simply a lot of money. Government, industry, and the professional societies desperately need a leadership from those who are affected by their works. New ideas generally come in from the periphery; government has often borrowed new ideas from more flexible communities of people. We need to realize that workers, whether they be in industry, in government, or in professional societies, are often not free to create new structures. It is no wonder that self-reliance is a key value of those working in solar and conservation technologies.

We have come full circle; lifestyle does seem to determine solar innovation, and the organization of work is a crucial component. It makes sense that solar changes in cities are primary targets for people and places that have least to lose. Middle-class wage workers, corporate executives, and government bureaucrats can be useful only if the reward structures and worker guarantees are changed. A central characteristic of the

solar city will be a work force operating in direct antithesis to the welfare concepts of the New Deal. New institutions such as energy cooperatives and old patterns such as volunteerism and public and private grants can support such endeavors, which can be institutionalized by government and industry.

Change strategies that affect employment will work best when the change does not challenge entrenched power or add burdens to already overburdened workers. Uncertainty in the work place in this country makes for conservatism. Solar directions should work to reduce uncertainty. Conflicting goals within a work role, conflicting values and loyalties, and worries over unemployment are only part of what we encountered. The strategy suggested in my remarks is one that begins where there should be the least resistance. Remodeling abandoned portions of cities by using a labor force made up of workers who are peripheral because of unemployment or disaffection would provide for a rejuvenation of poor sections of town and attend to the drive towards improved neighborhoods. It would also provide successful models of development which would allow other segments of the population to become less entrenched and less fearful of trying new possibilities. The presence of the cooperative bank law, which would allow private citizens to develop energy cooperatives and to apply for loan and technical assistance, is one avenue. Building codes are a mechanism of government that begins a process of education. Mandate alone, however, can build a resistance movement or lead to the support of solar satellites merely because it allows for perpetuation of existing relationships.

At the turn of the century, the president of the American Chemical Society predicted that by the 1970s our country would be running on solar energy. Why isn't it? Because of World War II, the military development of nucler energy, the monopolization of energy research through the creation of the AEC? If we counted heads, how many DOE employees are left over from earlier days at the AEC and like places? And is the slowdown of solar implementation related to the fact that, when DOE was created, no separation of military from civilian energy goals was made? The self-interest here is associated with a mentality that prefers the complex solution to the simple, the big toy over the workable gadget, laser fusion over community solar collectors—a mentality that is still rooted in military values of control, centralization, and fear.

Solar technology has all the components for producing electricity and liquid and gaseous fuels. Why then have we made so little headway on city transportation? Why isn't Washington a model city, using methane, gasohol, or electricity (thermal batteries) to run its cars? Why aren't community-based collectors common phenomena? Why haven't federal buildings been retrofitted? Why, when the administration was making a point of support for solar energy?

The delay in implementing solar technologies can be remedied by a politically active constituency that understands that conservation does not necessarily require sacrifice; that increasing GNP does not, ipso facto, mean increasing quality of life; that more may not be better, but may in fact give us indigestion; that we can have a high technology society with lower energy consumption; and that retrofit probably means new jobs.

If I were an anthropologist from New Guinea, observing the energy efforts of the past several years, I would notice a wide gap between what the leadership says and what it does in this country. In particular, I would note that the government has no serious interest in solar energy. Events like this conference would be seen as rituals of reconciliation in the absence of true innovation or change. I would be convinced either that there is no energy crisis, as evidenced by the way leaders handle the problem; or that there is, but that society is having a nervous breakdown or a serious disorder of the central nervous system.

I am struck by the presence of solutions and the absence of will. One conservation researcher at Lawrence Berkeley Labs cut over 40% of the electricity use in a major building without anyone noticing. Yet most of our federal structures have not even begun serious conservation. Reviewers know how to deal only with large corporate contractors and not with individuals who want to develop community solar collectors.

Solar in the cities will happen as it started in Davis, California, and New York City—through dedicated, private citizen initiative. Those who can be flexible will experiment, and government will follow their lead when it is safe and when they are too embarrassed to do otherwise. Successful outcome to the energy challenge requires participation. People are attracted to solar because they believe they can plug in and make it happen.

DISCUSSION

Gary DeLoss, Environmental Policy Center
Laura Nader, Woodrow Wilson Institute
Elizabeth Wood, U.S. Conference of Mayors
Arnold Nadler, Arnold Nadler Associates
Michael Maguire, Tennessee Valley Authority

MR. DeLOSS: I want to point out that while it may be correct that the conventional energy supply systems are very complex, contrasted with some of the solar technologies, the process for guiding investment is just the reverse.

MS. NADER: Thanks for clearing that up. I was referring to the scientist's mentality. Scientists really are drawn to the complex.

MS. WOOD: One of the things that seems important to note here is that some of the technologies that are probably the most useful for a city are very complex. I don't think we can talk about solar technologies as being simple.

MS. NADER: I was talking about a scientist's predilection for the complex over the simple, and I wasn't characterizing solar technologies as simple and nuclear as complex.

MR. NADLER: Solar systems tend to require more intelligence at the end-user's place, which means that they tend to be self-limiting today and we should endeavor to make them simpler at the end-user location.

MR. MAGUIRE: You placed a lot of emphasis on cooperatives and political movement in commercializing solar technologies, but it seems that a mood of conservatism is sweeping the country and it may be better to look toward private enterprise. One should be careful about tying political goals to commercializing conservation.

MS. NADER: America is basically very cooperative oriented, and I don't know why that should be seen as a radical term. The energy crisis doesn't cut right or left. There is no reason why we shouldn't push private enterprise, if they perform.

PANEL EXCERPTS

PANEL NUMBER TWO

SOLAR ENERGY IN THE CITIES: IMPACT ON SPECIFIC GROUPS AND INSTITUTIONS

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Consumers Union

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Sun Harvester Corp.

LENORE LOEB
League of Women Voters

ELIZABETH WOOD
U.S. Conference of Mayors

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EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and at DOE.

FIRST DAY

MS. WOOD: While there are some cities that have taken on a broad consumer kind of program, they are few and far between. I see cities—in particular the older cities, the northeastern cities—as being somewhat limited in terms of passive solar and to some degree in active solar. (pp. 6-7)

MR. PRICE: One of the critical arguments about going to cities is that if you took all the houses in a new suburban development and utilized 100% solar design, the energy spent going back and forth to work would be equal to what was saved by the use of solar construction. So, we save the same amount by making people go into nonsolar homes in a denser environment. That may be the only option in the future. (p. 8)

MS. WOOD: If the building industry is presented with something that is too daring, innovative, difficult, or expensive, there are going to be problems. (p. 11)

MR. PRICE: They told us in Manhattan that there was no way we could save more than 30% of the energy in buildings. But the first year, with minimal effort, we could save 75%. So, if the decentralized resource in a city can carry 70-80% of the load, there may be enough capacity in existing plants to last 500 years. (pp. 13-14)

MR. ANDERSON: It is a very, very expensive process to analyze the potential for buildings to be support structures for renewable energy conversion systems, and to prepare codes that might work. I think an important role for Big Government to play is to allocate money to develop model codes that can be used at local and state discretion. There is no way that my town is going to be able to develop any code on its own or take any initiative to develop anything along these lines. All it can do is look at what somebody else has done and say yes or no to it. (pp. 14-15)

MR. PRICE: The manpower needs to make that transition are important. I think it will be made worse by going to codes. (p. 15)

MS. NADER: More public input is desperately needed to determine budgetary allocations. Procedural recommendations are needed that have to do with cutting red tape and easier access to what the Department of Energy has to offer. As to education, I think that they ought to be putting more money into extension services and agricultural services. DOE project directors should spend some time in the field every year. There ought to be, under R&D, support for noncorporate freelancing people who don't get funding because they are not connected with an institution. This country is also desperately in need of foreign advice. We have the impression that we are far ahead of everybody when, in fact, we are being by-passed by countries that are not so organizationally hampered. (pp. 16-18)

MR. DeLOSS: One of my major interests right now is promoting solar leasing. I think this is practically the only way we can get active solar water heating systems into multifamily dwellings. There are a couple of ways to develop that but the one I'm most interested in right now is taking the residential solar energy tax credit and making it available to leasing firms. (pp. 19-21)

MR. WATKINS: What I can't understand is, where is all of this cost coming from in water heaters? We have been doing a lot of weatherization—insulating of houses—and find that the old fears related to cost were groundless. For a thousand-square-foot house, insulation costs about $280. I don't understand where these costs are coming from—it's not going to the solar panels, and it's not going to the storage tank. (pp. 21-22)

MR. PRICE: The real issue is, we shouldn't be talking about cost. We should be talking about financing. (p. 23)

MS. LOEB: The environment and economic viability of our cities can be enhanced by using solar energy. Expanded use of solar energy in our cities will reduce air pollution as well as provide new employment opportunities. Extensive efforts should be made to utilize the solid waste resources that we have in our cities. ' Money currently used to burn or bury these resources can help provide new energy supplies. In all of our states, we are preparing Residential Conservation Service plans involving the utilities. Depending upon how those plans are drawn up, we may either be encouraging or discouraging solar energy use in the residential sector.

There seems to be a problem with the proposed tax credits for passive solar design; perhaps present IRS regulations need to be addressed here. Passage of the Solar Bank Act is very important. The windfall profits tax should provide a new source of federal funds for solar programs, alleviating the economic impact of rising energy costs for the poor and for public transportation programs. In every metropolitan area there is a need for buildings open to the public, demonstrating solar technologies and providing energy information. For example, I am from the largest metropolitan area in Region VII. To the best of my knowledge, there is no public building where a citizen may go to see a working solar energy installation; nor is there a publicized agency or organization to call for energy information—including solar energy information. Such centers are essential in each metropolitan area. (pp. 28-30)

MR. ANDERSON:

Barriers to the implementation of renewable energy in the cities seem to be excuses for inaction rather than just problems that need to be dealt with. The issue is not whether or not; it's how. The same thing applies to the issue of employment. Here, again, we should not ask, "Does solar provide jobs?" but rather, "How can we implement renewable energy in such a way that jobs will be produced—the right kinds of jobs in the right places?"

Next, I would like to make a plea that we cease apologizing for solar and renewables in terms of life-style changes. There are millions of people in this country who want life-style changes. Also, some people will criticize solar energy because it affects the appearances of buildings. But the vast majority of buildings in this country will benefit from solar systems if they're done properly. In many, many cases, retrofits improve the appearance of a building.

Municipalities often are on the short end of the stick conerning some rights. For example, an investor who puts $100,000 into a wind energy system can write off about $45,000 the first year, basically as a tax shelter. But a municipality cannot. We need to develop financing mechanisms for municipalities to build renewable energy systems. We need to provide technical support to municipalities whether they choose to utilize low-head hydro, district heating systems, waste systems, or whatever.

Much of the technology being developed in renewable energy is not going to lend itself to local management. The issue is not whether the technology is decentralized, but whether the management control is. One way of tackling this is to project various scenarios for different types of neighborhoods and municipal regional living patterns and then identify the kinds of technologies that are required. Integrated

energy systems are going to become an increasingly important part of the solution mix. And finally, I'm terribly concerned about the Residential Conservation Service program in which utilities are required to perform energy audits. It will be beyond the capability of virtually every utility to train auditors. The procedures can be installed, but you've got to have the right people implementing them, and these people have to be trained properly. (pp. 30-34)

MR. SELVAGGIO: We're supposed to be talking about the poor. In many respects they should be a model for us, because they use a lot less energy than the middle class or the wealthy. One of the speakers said that, by the year 2000, we will be using 20% more energy. I asked myself, "Why does this have to be? Are we just on an upward spiral of using more and more energy? Are we really happier because we're using more energy?" So I think a recommendation should be something on life-style change. (p. 35)

MR. PRICE: A fundamental philosophy is to assist the cities in solving their problems with solar technologies and not even talk about what solar's problems are. Until that attitude is adopted 100%, the most fundamental thing won't be done. Enlist the political and economic forces in a city—once those forces are used for support, other things can work out.

First, job opportunities in cities is a fundamental issue. Next, energy supply problems and rising costs are fears that are going to happen. Third, the general city problem of pollution must be addressed. Fourth, inflation seems to be galloping more rapidly in the city. And finally, a really big problem is the rehabilitation and redevelopment of cities.

I think that the way to solve those problems is to immediately increase the replicable solar applications in cities. One representative building causes people to see things to which they can then apply their creative talents. We must help the cities in their planning and implementation stages. We must start talking up front about equity, dealing with the low-income model. And finally, we must support more citizen participation in planning. There are four specific ways:

- direct financial assistance in the next few years;
- lateral communications between cities;
- working manuals for various constituencies within a city; and
- intergovernmental coordination.

SUEDE was just a gem of a program. The fact that SUEDE programs haven't quadrupled for next year is astounding because it combines problems of the unemployed and economic development, and it's crossing a number of federal areas, and somewhere someone has got to start doing that. (pp. 36-41)

MR. THOMAS: DOE and HUD should demonstrate their partnership in a more tangible way. Either a task force or a visible team between DOE and HUD would be an indication that they mean what they say. I see a lot of city money going to building garages and hotels and the like, and that's fine. But there is no reason why some of those grants could not go to either solar or conservation or both.

A lot of cities are giving tax abatements to private development. With a 25-year tax abatement, the system and building have to perform well. There is a program in Rochester, New York, that works very well. Every school building in Rochester has an energy budget; 50% of the cash savings come to the school for their own use. It's amazing what's happening—a daily routine: "Close that door; make sure the thermostat is working; watch out for this." And it's so simple. I recommend that this be advertised throughout the country. (pp. 42-43)

MR. CORREN: Payback is not the ultimate criterion. The ultimate criterion is cost-effectiveness. Utilities will lease solar collectors to consumers—the worst of all possible worlds. I don't like to see tax incentives going directly to private companies with the idea that it will trickle down eventually to the consumers, because trickle-down doesn't work. The government could lease these things to people and actually make money. It would be better if it could be done on a municipal level, if there were some way that we could encourage the Federal Government to help allow the city to develop this program. (pp. 44-48)

MS. WOOD: Every state must have a state energy management plan to be approved by DOE. Most DOE money is channeled to state offices. Very little actually gets down to the cities. Many cities do not have the capability to manage the kind of high-level planning that's required. Cities need the financial support to develop the capacity to conduct local-level energy planning and management. Legislation is proposed that would be of great help in making that kind of expertise available at the municipal level. (pp. 50-51)

CHAIRMAN KARPATKIN: Is our recommendation that it be money or federal employees who get into the local areas? (p. 53)

MS. LOEB: There's another alternative which would encourage local government to become involved in leasing solar equipment. IRS rules could be modified so that municipalities and cities would be eligible to float bond issues and, therefore, rather than a utility, could go into the business of making and renting hot-water heaters. (p. 53)

MR. WATKINS: I would be a little reluctant to have cities across this country having the ultimate say about where the money goes if we are talking about a program that's geared to a majority of poor people who live in a city and need solar energy. Poor people are often not the targets for federal, city, county, or state money. (p. 56)

MR. DeLOSS: I think there is a great potential in leasing for applications of active solar systems for water heating. But someone said in the plenary session that, before implementing solar systems, you should do all possible toward energy efficiency. And you can't lease insulation to the building owner or the tenant. In either case, there's nothing in the marketplace that makes a landlord want to invest in either solar energy or energy conservation in a rental building. The government should intervene where market forces break down in that context—the question is, how? Should we mandate these investments by the building owners over a period of time? Or should we make some kind of 100% grant to the building owner? Or should we combine the two?

It's been six years since the oil embargo, and nobody has made a dent, anywhere in the United States, in rental housing conservation and solar energy. If rental housing subsidies or programs are mandated, some kind of financing mechanism like the Conservation Bank and the Solar Energy Bank could provide loans that stretch the cost over a long period of time. Even if the government says, "I will give you 50% or 75% of the cost," there's no incentive for the landlord to put up the rest of the money. (pp. 62-67)

MR. DeROSA: What's the feasibility—in cities that have some kind of rent control—of requiring the landlords, before they get a rent increase, to address an energy problem and reduce costs that way? (p. 68)

MR. DeLOSS: We should have begun with rental dwellings; especially those for people with lower incomes. We're six years late. (p. 70)

MR. WATKINS: Why can't it be mandatory that the FHA-guaranteed loans have a rider on them? (p. 70)

MR. DeLOSS: That is the Portland plan. In effect, a home must be updated at time of transfer. The trouble is that it doesn't take effect until after five years. And then it only really takes effect as the housing ownership turns over. (p. 71)

MR. PHILPOTT: One of the things that's being pointed out now is that when you conserve energy, the payback gets longer for solar because the house has been made more energy efficient. (p. 74)

MR. PRICE: Btu per square foot of collectors is still the same, though. (p. 74)

MR. DeLOSS: Take the Oregon utility investment plan. It looks like it's free at first, but it turns out to be a zero-interest loan that is repaid when the building is sold. You'd think that might look good to a landlord, but they aren't even using that plan for rental buildings out there. (p. 77)

MS. NADER: The same technique could be used that they used with food inspection in New York City. They just published the results. (p. 77)

MS. VORIES: I think the bottom line of this discussion is: What kind of an incentive is it going to take to make a landlord do something? (p. 78)

MR. PRICE: In Canada, they're giving 100% grants. (p. 78)

MR. McCALL: Perhaps one of the best things that could come out of this panel discussion would be the pulling together of incentives for options on rental housing implementing solar and utilizing a lot of the existing groups in this country that plug right into cities: The National League of Cities, the U.S. Conference of Mayors, etc. If we could plug into these other task forces, we could come out with something that could be very valuable. (p. 79)

MS. WOOD: At the Conference of Mayors, we get "Fine! Where do I get the money?" We find ourselves saying, "Look, this city over here did it. They saved a million and a half dollars in five

years. With the money, you could then finance an office for yourselves because there isn't any federal money available." (pp. 79-80)

MR. DeLOSS: It seems to me the government must intervene in other ways. I can think of two: One is the mandatory or regulatory approach which we have seen now in Portland, Oregon; Davis, California; and in the state of Minnesota. The other possibility would be a 100% program. Theoretically, a rental building in an area that qualifies under certain criteria might be retrofitted under the Weatherization Grant Program, even if a few of the tenants didn't qualify individually. Another example of a 100% grant is the Canadian program. (pp. 83-84)

The way to make that tax credit subsidy more democratic and less regressive, and a way for it to have a bigger impact on solar energy development is to make the residential tax credit for solar energy investment available to a leasing firm—the middleman. We already have water heater leasing; now we need solar water heater leasing. The Solar Energy Domestic Policy Review recommended in Option Two, giving a tax credit for solar leasing, and approved solar leasing firms. (pp. 85-87)

CHAIRMAN KARPATKIN: What mechanism can the Department of Energy proffer to us to assure us that the recommendations we make will have some consideration and follow-up rather than just be put away? Perhaps we can take it upon ourselves to send along our recommendations to the White House. I would be glad to send it to the one contact I have, which is Esther Peterson's office. (p. 88)

MS. FOX: But the individual tenant might feel free to burn up as much energy as he wants. So all the savings from solar will be lost because of irresponsible tenants. In other words, what we should do is get a little bit of metering back into this multiple solar project. (p. 90)

OBSERVER: What are the pros and cons of utility involvement in leasing equipment? (p. 91)

MR. DeLOSS: I feel that we should stop arguing about it, go ahead and have a couple of pilot projects, and see what happens. (p. 91)

CHAIRMAN KARPATKIN: Is there a recommendation, then, that there be publicly owned utilities for solar purposes? (p. 92)

MR. DeLOSS: Why don't we suggest that it would be proper for the government to encourage both municipal and investor utilities to experiment with something like solar leasing, and then monitor the performance very carefully? (pp. 92-93)

MR. ANDERSON: For years I have heard that the government should jump in and protect solar buyers from making bad purchasing decisions. And that scares me. I doubt as to whether the government should be involved in trying to protect people from themselves. I would support a program in which the government supplied seed money to groups such as the Consumers Union and others to help offset the very expensive process of analyzing solar products and supplying that information to people. (p. 95)

MR. DeLOSS: Remember, leasing is 100% consumer protection. (p. 96)

CHAIRMAN KARPATKIN: Leasing is not consumer protection. Let's assume I lease a poor instrument; what happens to the lessor? He is a consumer, too. Those who lease can do their jobs right only if there is a flow of information to them that they can use as a basis for making decisions. (p. 97)

MS. VORIES: One of the recommendations of a consumer protection conference was to look into the feasibility of a federally-backed warranty insurance. (p. 100)

MR. PRICE: What are we talking about in the cities regarding economic development, and how are we dealing with the big unemployment problem? There should be something about localizing employment opportunities. (p. 105)

CHAIRMAN KARPATKIN: One of the reasons consumer protection can be more of a problem in large cities than in smaller areas, whether urban or suburban, is that there is a certain amount of accountability that comes from the community itself. (pp. 104-105)

MR ANDERSON: Back to the warranties and consumer protection. You can also get that by certifying and licensing installers or in some other way making it clear to the consumer that the technicians know what they are doing. We have seen, over the last several years, that the inability of new and small

business in renewable energy to get financing is perhaps the most critical problem right now in making solar energy happen. If local governments had a particular interest in economic development and had federal support of some sort, I think we would see a more effective program. (pp. 106-107)

MR. PRICE: If the Federal bank money earmarked for the low-income groups is used to buy equipment from small business in that community, it has a better reception in the final loan process. (p. 108)

MR. ANDERSON: Are you saying that if Federal monies are used to buy solar equipment, that solar equipment should be made locally? (p. 108)

CHAIRMAN KARPATKIN: We ought to think that through a bit. What would that do to a competitive market if there is only one manufacturer in a small town? Then there is no competition and a Federally-funded monopoly has been created. I think your goal may be more noble than achievable. (p. 109)

MS. LOEB: A study was made in the MASEC region of the businesses involved in solar. Conclusions from that study were that there were far too many businesses, and many of them had gone down the drain. Now, is that valid or not? This study led to the suggestion that we must work more on the demand, and then the businesses will be there to fulfill that demand. (pp. 109-110)

MR. ANDERSON: No. The demand is coming, and the reason those businesses failed was because there was not a demand. When there is a demand, successful companies need financing; they need working capital. The mechanisms should be in place, and there is a long time lag to get them in place. (p. 110)

CHAIRMAN KARPATKIN: Did I pick up another recommendation here that DOE and the government have to move much faster than they are moving, because otherwise something might go down the drain? You are saying that speed is necessary and that a government priority should be to take such steps as are necessary to avoid monopolization. Is the reason behind this, aside from all the traditional virtues of competition, that it is going to help the low-income people in the cities? (pp. 113-114)

MR. PHILPOTT: We should restructure the weatherization program so that it is directed more at multifamily housing rather than single-family, owner-occupied housing, from which the program evolved. (p. 117)

MS. VORIES: I would like to suggest a resolution that the programs, not only in DOE but in the Federal Government in general, need to be restructured to look at a comprehensive way of solving the problems of the cities—particularly energy—rather than just looking only at energy and not worrying about other problems. (p. 117)

MS. LOEB: A very small percentage of the grants seem to go to small businesses. (p. 118)

CHAIRMAN KARPATKIN: Your resolution is that the contracting process . . . (p. 118)

MS. LOEB: . . . be reviewed to eliminate large grants going to corporations with conflict of interest, and have more of a thrust toward supporting small businesses throughout the country. (pp. 118-119)

CHAIRMAN KARPATKIN: We have a whole bundle of recommendations concerning the regional offices: that the grants process be regionalized, that the regional offices be strengthened, that some resources be decentralized, that some decision making be decentralized. Anything more on the Department of Energy? (pp. 127-128)

MR. PRICE: On the issue of set-asides—agencies don't give the money out until they teach those small businesses what they need to know to qualify. We're turning DOE into a bit of an educator rather than an objective judge or politician. You may want to slow some of those things down until you meet that requirement. (p. 128)

CHAIRMAN KARPATKIN: That would have to be viewed against the other need to speed things up. Then somebody has to work out an approach that resolves what may be two conflicting goals. It's not a free marketplace if there are national policies favoring large companies. (pp. 128-129)

MR. ANDERSON: I see a dangerous tendency to do at a regional level what DOE does at a federal level. The fastest way to make solar energy happen is to enlist 229 million Americans to help,

rather than just a small number of large companies or four regional offices with 50 staff members. I recommend that when we talk about regionalizing some of these program elements we're really clear about what that means. It doesn't necessarily mean that we're centralizing again at the regional level. (pp. 129-130)

CHAIRMAN KARPATKIN: You have spoken previously about consumer information. One thing we didn't talk about in connection with that is the public information campaign to promote solar as a desirable means of energy; and creating, through government employment of the media—through advertising techniques—a public acceptance and interest. (p. 131)

MR. PRICE: I disagree totally. I think the best advertising is to put $10,000 into a community group somewhere and put up something. (p. 132)

MS. VORIES: Any marketer is going to tell you that you cannot have only one approach to your information campaign. You've got to have several levels: the national media approach, more targeted information in magazines and in newspapers for specific audiences, and nonprofit groups with their demonstrations and their technical assistance. And if you just do one of those, you aren't effectively using your capabilities to deal with the problem. (pp. 132-133)

CHAIRMAN KARPATKIN: It's a waste if consumer information isn't delivered in a way that people are ready and eager to receive it. What you're suggesting, of course, is very good. And other ways that governments communicate with their people and tend to modify public thinking or public opinion is the same way that manufacturers and advertisers do. I'm asking the experts on the panel—why shouldn't the government create the demand by those techniques that are successful? (pp. 133-134)

MR. WERNER: The problem is also that DOE will not yet take that strong a stand on solar. (p. 134)

CHAIRMAN KARPATKIN: Well, okay. They just want to achieve the President's 20% by not doing anything. (p. 134)

MR. ANDERSON: How would you feel if the government spent the same amount of money for public service advertising? (p. 135)

SECOND DAY

MS. VORIES: The title now reads: "DOE Meaningful Public Input and Participation." I would also like to urge that the second paragraph be put first. The first paragraph would read: "DOE should track the success of the recommendations of this meeting." (p. 3)

MR. PRICE: State the efforts in writing to the participants. (pp. 3-4)

MS. VORIES: Regarding the third open workshop: Is it a foregone conclusion that they'll have it, or should we make that one of our recommendations?

MR. THOMAS: I would like for someone from the panel to be assigned to be the contact with DOE so we don't cross ourselves. (p. 5)

CHAIRMAN KARPATKIN: Shouldn't SERI take that role? Perhaps we might explain recommendation No. 6 with a preliminary sentence that says there is insufficient communication among cities developing solar programs. I think that No. 10 was unnecessarily limited and I would like to broaden it. (pp. 15-18)

MR. DeLOSS: Why don't we include in No. 12 a request for a report; a breakdown of where the money flows are? (p. 22)

MS. WOOD: I have problems with the Federal Government dictating mandatory things to local government. Can we say "government might consider or—"? (p. 24)

MR. PRICE: "Encourage." I don't know. This reaction against local control has a lot of credence, too. There are some things that are just federal and if it isn't done federally, it never well get done. (p. 25)

MR. DeLOSS: If we leave it too open-ended, we obviously won't get any feedback. Somehow we've got to corner them and say, "Unless other measures are effective, the government should undertake the following two," or something like that. Somehow we've got to force them to confront the fact that even though these are two tools that the government is very reluctant to use—either 100% grants or mandatory retrofit requirements—that we don't see any other tools that can accomplish the task. It probably would be totally

impractical to give a credit to the person who is living in rental housing. The tax credit to encourage leasing has to go to the leasing firm. Perhaps it would be most useful for people at this conference to simply say that we support greater subsidies for renewable energy sources, and not argue about whether they should come from windfall profits tax or other general revenues. The information that we should pass on is that we don't think that the present level is high enough to correct all the market distortions like subsidies for competing fuels, average cost pricing of utility services, and the failure of the market prices to include environmental damage. The fact is that tax incentives do not reach the low-income consumer. So it is just one of several approaches. (pp. 27-33)

MR. ANDERSON: I would also like to go on the record as favoring phase-out clauses for subsidies and incentives. Is the panel willing to do that? (p. 40)

MS. LOEB: Wasn't this panel supposed to have addressed the role of the financial institutions? We had nobody from the financial community and so we haven't really addressed this issue. (p. 53)

MS. WOOD: Maybe we could say that DOE should provide educational/information programs for the financial community in order to get them involved. (p. 53)

CHAIRMAN KARPATKIN: There is a question as to whether we should allow the financial community, of all communities, to act solely in their financial self-interest when they ought as well to consider social goals. I want to try out something like this: "In participating in the setting of national energies, the Department of Energy should urge increased funds for renewable energy resources such as the above programs. This priority should be considered ahead of increased military and defense spending." (pp. 56-57)

FINAL REPORT
PANEL NO. 2—IMPACT ON SPECIFIC GROUPS AND INSTITUTIONS

Presented by Chairman Rhoda Karpatkin

This panel makes the following concensus recommendations to the Department of Energy with the aim of increasing the capacity of the nation's cities to make the most effective possible use of passive and active solar energy and other renewable resources in urban areas.

It is understood that when we use the word solar throughout these recommendations, it means an integration of energy conservation and renewable resources.

A. DOE-Meaningful Public Input and Participation

(1) We appreciate the opportunity to have a discussion of solar issues at this workshop. DOE should encourage more and earlier public participation in the priority setting and budgeting process.

(2) DOE should report to the participants its response to these recommendations and the status of its efforts to implement them, and report back to the participants within six months and again at the Third Open Workshop. These workshops and other forms of public participation should be continued.

(3) DOE, SERI, and participants of this conference are urged to submit their recommendations to the White House and Congress for appropriate action.

B. DOE-Assistance to Cities

(1) The focus of solar programs aimed at cities should be to assist cities in solving their city problems using solar as a tool in accomplishing this. The programs should focus on meeting city needs, not on meeting DOE needs. Some of the problems that cities face are: economic and job development, energy supply and cost, health and pollution, higher inflation rates, urban trade-off, equity, citizen participation in planning, transportation, education, and security. These needs should be prioritized by each city, and programs designed to meet them.

(2) Funding should be provided to increase the availability in cities and towns of experienced personnel who can undertake energy planning and implementation (including applying for potential implementation funds).

(3) DOE should provide funds for and/or offer technical assistance to cities to plan and implement solar programs.

(4) Programs dealing with energy conservation and solar should become strongly integrated with each other.

(5) DOE and other government programs should focus on the issue of lowering the burden of energy costs and availability for low and fixed-income people.

(6) There is insufficient communication among cities about solar programs, and DOE should fund mechanisms to provide more lateral communications among city programs—e.g., case histories, newsletters, conferences, and workshops.

(7) More funds should be made available in the form of small grants for city demonstration programs.

(8) DOE funded programs should require effective public participation in the city planning efforts.

(9) RFPs, PONs, and other granting and contracting procedures are unnecessarily cumbersome and bureaucratic and deter applicants. All such problems should be reviewed and revised so that:

- Application paperwork is at a minimum.
- Notification of available funds is widespread and includes organizations focusing on city issues as well as energy issues (e.g., CDC's community groups) and is easily accessible thru DOE regional offices, DOE headquarters and the Regional Solar Energy Centers.

(10) DOE should develop an effective complaint processing and analysis system, analyze the work that the FTC has done, including information to federal agencies and others.

(11) In the absence of BEPS, DOE should develop or disseminate already existing building codes to city and county officials that address different codes and zoning for different types of buildings.

(12) A high percentage of DOE funding of money going for solar in the cities should go to small business community groups and municipalities. Many members of the panel felt that 75% should be set aside for this purpose. Information should be made readily available on how these funds are distributed.

(13) Regional operations of DOE should be strengthened to deal with municipal, nonprofit and small business needs. Some resources and decision-making should be decentralized. Outreach capability should be improved. Coordination with DOE headquarters should be improved.

C. Federal Investment Incentives and Regulations

(1) All solar and energy conservation incentives should be refocused to assist low-income and renters of multifamily housing, as well as middle-income homeowners.

(2) The Federal Government should recognize that present programs of increased oil prices, energy audits, and partial subsidies do not influence landlords to make significant capital investments in energy conservation and solar energy. Therefore, a national program to promote the use of energy conservation and solar energy in rental buildings must be based on new policies such as:

- Mandatory and regulatory measures such as those passed in Portland, Davis, and Minnesota, and/or
- 100% grant programs such as those available in Canada.

(3) HUD should increase mortgages for multifamily housing to allow for energy conservation and solar improvements.

(4) Tax credits should be given to businesses who purchase solar systems and then lease them to other users in order to increase the availability of solar equipment to renters and others who wish to rent solar equipment.

(5) Tax incentives and loans should be increased and expanded; DOE should study and recommend alternative financing methods that will assist municipalities in acquiring capital to undertake solar programs, such as:

- The federal tax structure should allow municipalities to issue revenue bonds for the purpose of financing solar programs.
- We support the development of a Solar Bank. Such a bank should function in keeping with the policy directives included in these resolutions. Many panel members believe that seventy percent of the money made available through the Solar Bank should go to urban areas. It should be stipulated that an appropriate percentage of this money be available to poor people.
- Consideration should be given to phasing out incentives as appropriate. All FHA new and resale houses should be required to undertake appropriate energy conservation and solar measures before approval of the loan.

D. DOE Information and Education Program

(1) Information and education opportunities should be available at the local level, and DOE programs should be structured to support not-for-profit organizations who are already engaged in these activities to continue to service their communities in this way, as well as the EES and agricultural extension services.

(2) Every metropolitan area should have at least one public building where passive and active solar technologies are demonstrated and information is available.

(3) DOE should expand sponsorship of people from foreign countries who have developed successful solar programs to come and share their experiences with federal, state and local groups so that the U.S. can benefit from their pioneering efforts.

(4) DOE should provide seed money to consumer groups to evaluate solar products and widely disseminate their findings.

(5) DOE should establish a database for all contracting/grant opportunities in the energy conservation and solar field and make it easily accessible to small businesses, community groups and municipalities.

(6) DOE should increase its efforts to educate people to think in terms of life-cycle costing and payback.

(7) An extensive advertising-oriented, public media campaign should be undertaken to promote solar and create a consumer for solar development.

(8) DOE project directors should be required to spend time in the field, talking with city, county, and not-for-profit groups about their success and problems in bringing solar to the cities.

(9) Education about solar should become a part of on-going educational activities in schools and community programs.

E. DOE-R&D and Commercialization Efforts

(1) DOE should adopt and communicate a positive approach to solar energy. It should spend less time and money trying to identify and describe the "barriers" to solar energy usage in cities, and more on understanding how to make it happen.

(2) DOE (and others) should adopt a positive approach for and stop being fearful of potential lifestyle changes associated with solar and underline the positive aspects of many of these changes.

(3) DOE should spend less time and money trying to determine if solar energy will provide jobs, and more on devising ways to implement the usage of renewable resources so that they provide the kind of jobs that are needed.

(4) DOE should sponsor research to develop techniques that are appropriate to municipal needs and management.

(5) DOE should investigate the operation of a federal/state warranty insurance pool program for solar systems.

(6) More funds should be made available for small business and not-for-profit organizations to undertake R&D.

(7) DOE should develop a variety of future scenarios that use different renewable energy supply approaches and identify the types of techniques that need to be developed to meet these needs.

(8) Efforts should be made to understand and learn from the lifestyle changes undertaken by the poor and others to meet rising energy costs.

(9) The section of NECPA that forbids utility involvement should be repealed. Municipal and investor-owned utilities should be encouraged to undertake experimental solar financing programs to be monitored by DOE for effectiveness and possible infringement on the roles of others.

F. Other DOE and Federal Programs

(1) The SUEDE program should be retained and funding increased.

(2) Funding for the Appropriate Technology Program should be greatly increased.

(3) DOE should recognize that a conservation/renewable auditor training program is critical to the successful implementation of the RCS and that, generally, utilities are not qualified to do this training. Funds should be made available to the private sector to develop and carry out such a training program.

(4) A complete audit should be undertaken which includes conservation, solar and other renewables under the Residential Conservation Service program and any other auditing program.

(5) DOE should catalyze greater cooperation and joint planning with all federal agencies (especially HUD) supplying aid to cities that could be used for addressing solar energy issues.

(6) A part of the Community Development Block Grant should be mandated for energy conservation and solar.

(7) Federal orders for solar systems should go by priority to small businesses to encourage local employment opportunities in solar.

(8) Light industry such as the manufacture of solar equipment should be encouraged in cities.

G. Additonal Recommendations

(1) Cities should require energy performance from developers—especially those to whom they give tax abatement incentives.

(2) The financial community should consider ways it can implement and support the above goals and recommendations.

(3) In participating in the setting of national priorities in the federal budget, DOE should urge increased funding for renewable energy resources such as the above programs. This priority should be considered ahead of increased military and defense spending.

CHAIRMAN LARSON: (SERI) Do you have a response to any of this? Certainly the photovoltaics program is very active. How does your program relate to this?

MR. MAYCOCK: (Department of Energy) We have not yet discussed photovoltaics. Our plan calls for total distributed deployment starting with residences and working through the community. We see no major barriers if our cost is right. We can get on with it if we can figure out how to make the monthly cost of supporting a photovoltaic system equal to the monthly fuel savings. The key status is that we have the product, the product works, and it can be deployed now. The issue is, can we afford it in our monthly balance sheet? Construction is where we must succeed.

MR. NADLER: (Arnold Nadler Associates) Has Consumers Union run any articles in which they indicated the results of testing solar panels?

MS. KARPATKIN: (Consumers Union) We have run an introductory piece. We have bought units and the panels are up on our roof, but it will be a very long time before we have anything to report.

MR. TATUM: (Department of Energy) First, the same community action grant amendment which I discussed earlier would provide for the creation of a national energy clearinghouse for information between local government and community groups. Secondly, there would be limited funds available to give what we call information dissemination grants to successful community or local government programs. So different community and local government groups around the country would not have to reinvent the wheel each time they moved toward the renewable resources goal.

Just a note on the information network consisting of the entities which all of you know, the solar energy centers, SERI, the National Solar Heating and Cooling Information Centers, the DOE regional offices, and the energy extension service—we are now working with the subject of how this system really works together and the roles each one of these play.

MS. KARPATKIN: With specific reference to DOE, the panel felt that the DOE project director should be required to spend time in the field talking with, not necessarily to, city council groups about their efforts in bringing solar to the cities. We felt that this was a resource which was not being made available. The panel also

felt that the regional operations of DOE should be strengthened to deal with municipal nonprofit and small business needs, and that some resources and decision making should be decentralized, and outreach capabilities should be improved and coordinated with DOE.

MR. ENGEL: (Housing and Urban Development) The only comment I would like to make is with regard to the low-income issues on the solar bank. The bill, as coming out of the House subcommittee on housing, does provide for a special program for low-income groups. In addition, there is a special public housing program for solar, so those issues are being watched.

MR. TATUM: The DOE has a local officials' hotline and the people manning the hotline are local officials themselves, who come into Washington for 30 days at a time. They work in energy at the local level. There are three different numbers. In most places in the United States, you call (800) 424-9040. If you are in Alaska, Hawaii, or Puerto Rico, you call (800) 424-9081. If you are in Washington Metropolitan area, the number is 252-2850.

The morning after the President's Camp David speech, he spoke to the National Association of Counties in Kansas City and indicated to the officials at that meeting that he wanted to have a dialogue between the Federal Government and their respective county governments, which he later expanded to municipal governments as well, on how to achieve the energy goals. Working with Jack Watson, the head of intergovernmental activities at the White House, the DOE talked with a number of national interest groups here in Washington and eventually evolved this hotline format.

The hotline is manned on an 8-hour-a-day basis, and local officials have a chance to come to Washington and learn more about the federal energy programs, and we will learn more about what they are doing. So we think it is a nice hybrid federal/local program.

MS. KARPATKIN: There is a vastly different perception on the part of government people and the public participants on the success of outreach programs. It's very valuable when we come here today and say to you, as we said, "There are various weaknesses about which we are making recommendations, and there is a need for more as we described here. You must look at that and not try so much to defend yourself as to see whether there might be further steps you can take to make the work that you are doing more productive so that when the people are here again they can appreciate it and tell you: 'Now you are right on,' and 'That is very good.' "

SOLAR ACCESS AND URBAN FORM*

Invited Paper Given By
Ralph Knowles
University of Southern California

Urgent calls to use solar energy in our buildings, towns, and cities have made solar access a critical issue. A number of cities and states have passed legislation to protect existing solar installations and to ensure continued solar access to future development. The Federal Government has supported a number of studies to determine the most feasible, effective and enforceable way to establish "solar rights." Amid the controversy over permits, easements, height limitations and solar zoning, the urban form implications of solar access have been naively or inadequately addressed. The notion that solar access is antiurban and antiproperty rights has gained currency without a full exploration of its implications for the design and growth of cities. To say that solar access will destroy cities because it won't allow a tall building to be erected amid low ones is hardly an argument for urban quality.

It is a simple fact that tall buildings cast long shadows. A 50-story tower in Los Angeles will cast a shadow 1000 feet long between 1 and 2 p.m. in December. By 3 p.m., that building's shadow will be 1800 feet long, with an area equivalent to two city blocks.

There is an ethical issue as well as an issue of urban quality here. While I may choose to stand in shadow, I resist a developer's mandating it. And if I occupy a building in the wake of that tower's shadow, I will resist that violation of my right to the sun's light and heat.

There are a number of recent examples of energy-conscious building designs that accomplish their efficiency goals at the expense of their neighbors. An office tower that publicizes its use of the sun to save energy but deprives its neighbors of the same opportunity is clearly on questionable ethical grounds. Valuing solar access, however, does not eliminate the tall building from the urban future, nor does it argue for suburban densities.

Using a concept of solar zoning called the solar envelope, which describes the volumetric limits to development that will not shadow neighbors, we have achieved floor area ratios as high as 7.5. This far exceeds suburban densities and would be consistent with the densities of most urban areas in the United States, with the exception of such high-rise centers as Manhattan.

Solar zoning does, however, have a scaling impact on urban growth that calls for new construction to relate to the old. Density can increase over time, according to public values, but violent disruption of city scale is avoided. Where high-rise development already exists, solar zoning can be used to protect rooftop and upper-floor solar access.

Guaranteed solar access carries with it an implied moral obligation to use the sun and to formally relate to it. The designer is encouraged to differentiate building and urban

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*The AIA Journal has agreed to allow SERI to publish the material in this paper. See Knowles, R. "Solar Access and Urban Form," AIA Journal, February 1980. See also, for further development of these issues, Sun Rhythm and Form, MIT Press (forthcoming).

form in graphic response to the sun's movement. One side of a building will not look like another and one side of a street will not look like another. Development will tend to be lower on the south side of a street than on the north, where southern exposure is thus preserved. Streets take on a directional character where orientation and cues to natural time and phenomena are clear.

The public value for the sun will influence the character of development. Buildings will tend to hold the street line. Large-plan buildings will encourage designers to cut into them, creating courts and terraces that bring sunlight and heat to the interiors. Concern with public and private spaces and the interface of open and closed spaces at urban and building scales again become important design issues and urban resources. Solar access thus provides new dimensions to urban form.

Solar access is not the only zoning concept to have direct form implications, but it is unique in having implications of time as well as form. A framework for urban design, solar access introduces natural time as an element of urban form and thus a new element to our perceptions of quality in the urban environment.

These kinds of qualitative concerns, more than those relating to quantities of energy consumption, originally led me into the exploration of solar access and its implications for urban form and policy. The design values expressed through the important writings of such people as James Marston Fitch, A. E. Parr and Kevin Lynch provided impetus and direction to my inquiries and a sense of the formal potential. Much of this writing was published 20 to 30 years ago, and its significance continues to grow.

In "American Buildings" Fitch clearly expressed our over-reliance on energy-intensive rather than architectural means of adaptation to natural variation. He complained that we were to willing to settle for an artificially processed environment when the basic qualities of life might be better provided by more sensitive architectural design.

Fitch's apprehensions were related mostly to buildings, but Parr, senior scientist of the American Museum of Natural History, related the quality of our built environment to the bases of our perceptions. His point was that the human species evolved with adequate mental and physical adjustment to a natural environment. But during the 19th and 20th centuries "we have achieved the ability to alter our surroundings on an order of magnitude that leaves far behind the scale of individual mental and physical performance . . . ." His conclusion was that environmental change should be scaled or "adjusted to the real needs of those who must endure them."

Parr's anxiety about urban qualities was addressed in Lynch's "The Image of the City," which developed the concept of urban legibility based on perceived properties of form. Lynch was concerned with the individual's ability to follow pathways by recognizing the shapes and structures of a city. He posited a notion of relating orientation to free movement and a sense of well-being.

In "Energy and Form," I attempted to synthesize the concepts of these three writers. I hypothesized that an artificial system made in balanced energy response to nature would exhibit diversity useful to a sense of orientation and expand choice for improved life quality.

The notion of balanced energy response used Fitch's ideas about over-reliance on mechanical systems and developed strategies for architectural adaptation to natural variation. Location and form became design strategies for responding to and using the heat and light of the sun.

The idea of formal diversity is consistent with the ways plant and animal forms differentiate themselves as graphic adaptations to natural variation and recurrence. Parr had already suggested the scalar relationship between natural diversity and human perceptions. The final link was provided by Lynch's notion of urban legibility, thus completing a circuit that ultimately linked the concept of adaptive solar architecture to urban diversity for enhanced life quality.

An urban framework that could guarantee access to the sun was clearly missing. Yet without a universal covenant that ensured a right to the sun now and in the future, the promise of these ideas could not be fulfilled. I presented the initial development of such a framework in "Energy and Form." This concept, called a "solar envelope," has since been further developed through research and, most recently, has been tested in the architectural studio in collaboration with Professor Richard D. Berry of the University of Southern California.

The generation of the solar envelope is conceptually simple. It is a container to regulate development, but its limits are a function of time as well as space. Its boundaries are a formal expression of the sun's relative motion. Development within these boundaries will shadow the surroundings during specified periods of the day. The envelope is, therefore, defined by the passage of time as well as by the more traditional constraints of property.

The time involved is a duration of solar access, or a period of direct, line-of-sight approach to solar heat and light.

The period of solar access may be conceived as some segment of an arc drawn to represent the sun's path. If access is required year-round, two arcs may be used to represent paths of the sun during summer and winter. If the resulting angles of the solar azimuth and altitude are transferred to the edges and corners of a land parcel, the consequence is a set of geometric limits that derive their vertical dimensions from the sun's slanting rays. If the entire volume implied by the vertical limits is drawn as an explicit form, the result is a container with surfaces representing the dimensional boundaries of development.

Depending on duration of solar access, land parcel location and configuration, and surrounding conditions, the size and shape of the envelope will vary. When the envelope is used in the context of urban development, where density is an important consideration, the specification of edge conditions becomes critical to realizing its full development potential.

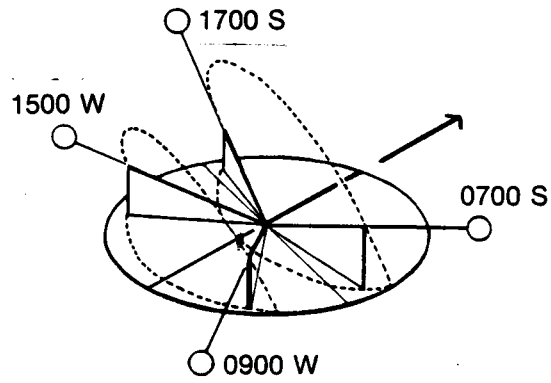

Figure 1. Solar Access Arcs

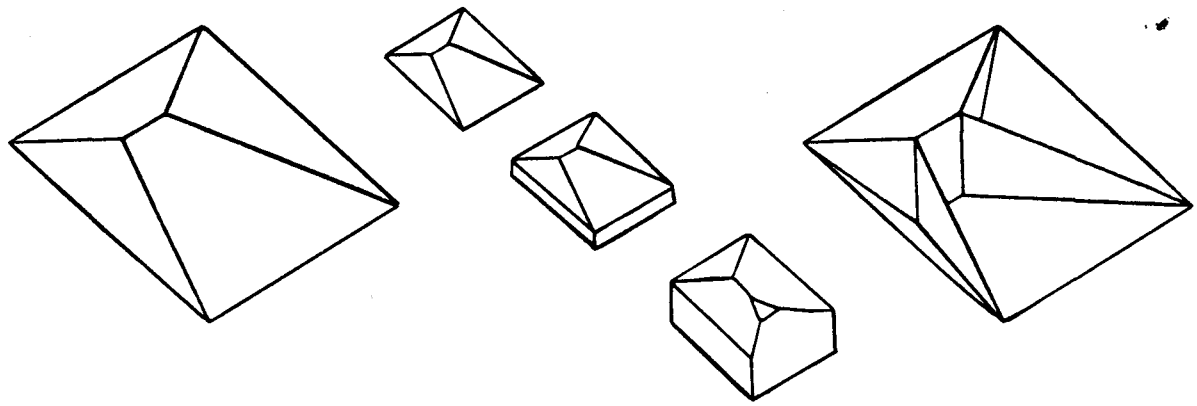

Figure 2. Some Examples of Solar Envelopes

PANEL EXCERPTS

PANEL NUMBER THREE

SOLAR ENERGY IN THE CITIES: URBAN FORM AND PLANNING

PANEL MEMBERS

GLORIA SHEPARD McGREGOR,
Chairman
City of Davis

RALPH KNOWLES, Speaker
USC School of Architecture

PETER POLLOCK, Coordinator
Solar Energy Research Institute

DICK MUNSON
Center for Renewable Resources

CLARA MILLER
Southern Tier Planning & Development

ROBERT TWISS
University of California, Berkeley

MICHAEL LICCIARDELLO
Licciardello & Associates

MARION HEMPHILL
City of Portland

MARTIN JAFFE
American Planning Association

BETTY TERRY
Georgia Solar Coalition

LEANNE SOWANDE-BRENT
The Urban Ark

STEVE HUDSON
International City Management Association

OTHER IDENTIFIED PARTICIPANTS WHOSE REMARKS ALSO APPEAR:

JACK GLEASON
Consultant

EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants, and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and at DOE.

FIRST DAY

MR. LICCIARDELLO: The real estate people who really need to be a part of the implementation of solar energy in the community have an obvious set of barriers. They are not all interested in slowing down sales in the interest of conserving energy, and one should understand that. No one is considering the solar home or a solar commercial installation in the same category of risk as the nonsolar installation. (p. 5)

OBSERVER: One change to typically held concepts is the question of allowing far broader use of mixed land uses; seeing residential single-family and multifamily housing in perhaps newer arrangements than most communities are likely to allow now. (p. 6)

MS. TERRY: I saw the issues, rather than specific architectural forms and that sort of thing, as more the physical environment of a city or sociological environment of a city, as affected by energy requirements and energy production. (p. 7)

MR. JAFFE: How should urban growth change to come up with biomass plantations as part of open space or greenbelt planning? Also, how does urban form change wind patterns, and how does it affect the installation or use of wind energy conversion systems? And how feasible is a solar utility approach as a local government option? (p. 8)

MR. POLLOCK: One of the issues that should be addressed is whether technology has a place in the cities and what special problems they have to worry about with different technologies. (p. 8)

MR. HUDSON: We see the role of the local governments in developing a comprehensive national solar and conservation policy as incorporating both the elected officials and the city managers, because they are the ones who must implement, monitor, and direct the programs and policies which are set forth by the city council. (p. 9)

MS. SOWANDE-BRENT: Evanston has almost no space for new construction; even Chicago is not going to build many new buildings. What about all the other large metropolitan areas with so many people and with such great need and such great pain? Most of the information available is on how to build a new, thermal-efficient structure and make it attractive. We are interested in looking at pooling the skills of the architects, the mechanical engineers, the planners—anyone who is willing to work with us to tackle how to do something about the buildings that now are there.

I think if we look at the national picture of the need for solar, we will be overwhelmed. Each of us can go to our communities and identify people who have the skills to assess these kinds of problems, come up with local solutions, and then utilize the resources for implementation. (pp. 10-11)

MR. TWISS We took the position that in the future, cities are going to look a lot like they today—even in 2020. The street systems are in, the basic energy patterns are established, and yes, there is going to be new construction, but we need to look at our existing cities.

We found that we didn't have too much trouble meeting the DPR solar goal at all. In most cases, densities were low enough to go quite a bit beyond the goals we had been given, so we raised the goal to see how much solar energy we could actually generate. It turns out that some or most parts of cities can generate much more solar energy for heating and electrical demands than they will need.

The patterns of cities as we know them today needn't be changed drastically unless we want to do so for other purposes. There are only a couple of land-use types that don't have sufficient area for collectors to meet rather substantial demands. Not all buildings will be capable of self-sufficiency. You do a little better at the block level and even a little bit better at the neighborhood level or with a city-wide system, and this leads to district heating systems and other mechanisms for sharing energy within or across land-use types. These kinds of sharing mechanisms perhaps imply that we want things such as mixed use, where there can be short distances between surplus and deficit areas. How far is it feasible to go in these kinds of systems which require sharing, and how far can we go in reclassification in zoning to encourage mixed use?

I would like to discuss where the burden lies. Are we really a nation where we have a right to shade our neighbors or are we going to be a nation where we all have a basic right to receive the sun's energy on our property?

MS. MILLER: What I would like to see in the future is a much more integrated approach to solar or renewable energy resource planning that takes into account the resources, where they exist, how they relate to the existing infrastructure, how energy qualities relate to each other within the city structure, and how those opportunities can be turned into community energy systems and other sorts of energy-saving arrangements that invest in the future.

MR. MUNSON: How can we get a financial base into the urban areas to enable people of all income levels to utilize solar energy? (p. 16)

MR. HEMPHILL: We currently have a nationwide situation where cities are still taking a disaggregated look at solar systems. They send out a plumbing inspector, an electrical inspector, and a structural inspector, and still are not sure that the system will work when it is finished. How can cities get good technical experience to remove the bother of multiple inspections and ensure that the system works properly and is safe for the user and his neighbors?

Smoothness of operation and ease of application are important in solar access, so why not just go next door and negotiate an easement with our neighbors? No fancy rods at the property line, no planning and zoning mechanisms; just a simple, straightforward contract agreement. We believe that is probably the most expeditious way.

We have a good wind resource, but there again, we don't have the proper tools for our inspectors to ensure that it is going to be safe. At the plan check stage, we could require that the engineer or the architect put his seal on a solar energy system and certify that he has given it equal assessment. We are taking this one step further to say that the building owner must certify that he has been given a choice between a solar system or a conventional system by his architect and engineer.

Consumers often won't recognize an energy conservation opportunity or a solar opportunity unless a tax credit is associated with it, because that is the official stamp of recognition that it is approved. I think that DOE could do a great service by really pressing the Hill on this and getting recognition for passive solar. I noticed a number of individual lawsuits and a number of planning and zoning people passing restrictions on solar because of the glare that they produce. That isn't the case with ordinary window glass, and I think that is unfair. (pp. 16-23)

MS. MILLER: How much of an urban system must we examine in order to get something that is meaningful from a planning perspective? A residence? A neighborhood? A city? A region? Which size geographic area is most appropriate for what kinds of planning?

MR. TWISS: Trying to solve the downtown problem doesn't mean putting all the collectors downtown. We can nest different levels of planning. (p. 29-30)

MR. KNOWLES: Each city, in fact, has different sets of problems. (p. 30)

CHAIRMAN McGREGOR: What kinds of existing urban form do you see as counterproductive to the use of either solar or alternative energy sources? (p. 31)

MR. TWISS: Sharing is necessary in solving some of those problems. (p. 31)

MS. TERRY: If I had to pick one urban form that is counterproductive, I would say too many highways. (p. 32)

MR. KNOWLES: An access to the sun is intense adjacent to the freeway because there is more open space. There must be many ways to use that to enhance solar access to properties adjacent to the freeways. There is more development potential adjacent to the freeway, depending on orientation, because shadows can be cast across the freeway and not hurt anyone. I suppose one of the points about the freeway is that it has some socially redeeming values if it becomes an energy source rather than an energy drain. (pp. 32-33)

MR. JAFFE: I strongly believe that the urban form results of solar access and solar energy use are going to be largely climatically determined. I think the pattern of development in Jacksonville, Florida, should be different from that in Portland, Maine, in terms of total energy use. In hot, arid climates where the major energy use is for air conditioning, more sprawl could be tolerated in order to take advantage of cooling wind patterns, for example; whereas in the northern climates, where the predominate energy use is for space heating, very tightly-clustered development and reduced sprawl may be appropriate. (pp. 33-34)

CHAIRMAN McGREGOR: I can't think of any situation within the whole energy picture where sprawl would do any good. (p. 34)

MR. KNOWLES: If you want to understand something about the form implications of climate then look at indigenous buildings. Their form had to grow from function before we had one generation's worth of intensive energy capability.

Another issue of life quality needs intense discussion. A nightmare recurs to some people who are concerned with energy issues now, and that is: what would happen if the whole energy problem went away? The answer, of course, is that we would still be confronted with issues of life quality in our cities. (pp. 34-35)

MR. TWISS: I would like to make a summary comment. There is little relationship between solar energy and urban form. Solar energy is not an excuse for large lot zoning, because we can generate the heating and cooling and all the solar energy we need for fairly dense residential areas. Cities can or should meet human needs, and we can fuse solar energy into that. (pp. 35-36)

CHAIRMAN McGREGOR: I am rapidly coming to the conclusion that we should throw out all of our concepts about separation of uses that we have had in traditional zoning and figure out a way to fit it all together so it will work well, but will also meet all our needs of having stores or factories near where we live. Then we can go into cogeneration. (p. 36)

MR. KNOWLES: In the grid orientation—in this case the old Spanish grid—there is incredible pragmatic implication. By contrast in what has historically come down to us as the Jeffersonian grid, the conditions are not so good. (p. 38)

MR. TWISS: I would like to see an exploration of the envelope idea from a retrofit point of view. (p. 41)

CHAIRMAN McGREGOR: California has passed a law which says that everyone's solar access is protected as of now whether it is new or old. (p. 41) The philosophical question is: Should this group recommend that everyone should have a right to solar access? (p. 43)

MR. HEMPHILL: I was surprised that California responded to a traditional local-land-use question and said, "You shall not block your neighbor's light." (p. 43)

MS. MILLER: The states are the ones that give specific zoning powers to the local governments. (p. 44)

MR. JAFFE: Even California doesn't say anything about the right to sunlight. All it says is that we must not block more than 9% to 10% of our neighbor's solar collector if he has one. It is a government decision that can readily be handled by local authorities; i.e., zoning. It is up to the local government to zone for solar access. They can allocate it however they wish. (p. 44)

MR. TWISS: In a community with 80 units per acre density and a certain building type, I assume that you are adapting the envelope concept to that density. Maybe you are protecting rooftop access and not side walls in a situation like that, or varying the percentages. (pp. 46-47)

MR. KNOWLES: We are talking about a totally different sort of attitude. We are talking about a different mentality. All of that can't be handled at a local level, but some of it can be. (p. 47)

MR. TWISS: I think that the property law issue is a serious concern at the national level, but that the implementation, planning, and development obviously should take place at the lowest possible level. (p. 48)

CHAIRMAN McGREGOR: There are some stubborn people in this world who, for no other reason than being stubborn, would say, "I am not going to give you an easement over my property." (p. 49)

MR. HEMPHILL: I am not so certain that neighborhood envelopes are going to be any more workable than purchased easements. (p. 50) I think that to go back now through some zoning mechanism into the built environment and take someone's right without a reasonable compensation, is an improper way. (pp. 50-53)

MS. SOWANDE-BRENT: I suggest that somewhere within the resources that are available we begin with looking at the solar use patterns and energy use patterns for that block or that neighborhood. If, after this assessment, a commercial organization can be shown that it can receive 30% or 40% of its needs from alternate technology, all kinds of incentives and encouragements should be brought to bear. These can be accomplished on a federal, state, or local level.

The fact that people can't have affordable solar systems is not because resources and financing aren't available. Solar energy is being subverted and ignored. I think that the answers are there. We have theorized and theorized; as Mr. Schumacher said, an ounce of practice is worth more than a ton of theory. If we do 10 homes this year and 20 next year, that is a beginning and is much better than more conferences and more discussions. In 10 or 15 years we may get somewhere. We need a timetable to have this done, through every municipality, in no more than three to five years with no exceptions. The form should adapt to the need of the community as often as possible rather than the other way around. (pp. 54-57)

MS. MILLER: On the planning staff in Corning we did a program that was citizen based. We produced some background information, but the planners were 40 or 50 volunteers from the community at large. They did an excellent job. And you are absolutely right that when citizens do the planning from the beginning, they get involved themselves. They have an enormous amount of expertise that is completely wasted in almost every traditional planning program I've ever been involved with. The planners usually do everything and then hold it up and say, "Do you like it? Sign here." (p. 60)

MS. SOWANDE-BRENT: I think that's an important point. The process that should be established is the one that is easily transferable to whatever the crisis in the next 10, 15, or 20 years. Right now, some of us are really concerned about energy. The idea is to teach people how to solve their own problems and participate with people; not necessarily to impose solutions on anyone, since we're all in this together.

I think the resources we need for that to happen would be very well spent, and maybe we could do without a few of the familiar costly emergency solutions that usually don't work anyhow. (pp. 60-62)

MR. JAFFE: I would like to raise the issue of a solar utility that would provide solar technologies to people without the need for them to come up with front-end cost or maintenance costs. (p. 63)

MS. SOWANDE-BRENT: There should be a local solar utility to which people are encouraged to belong and participate, but that shouldn't be the end-all and be-all. Solutions to what sorts of efforts are feasible and applicable must be resolved in the community by people who know the building stock, the availability of material, and what people in those areas want and will live with. (p. 46)

MR. KNOWLES: While I agree in principle with what you're saying, I want to know what the most reasonable size increment the supply is going to be in that case? Will there be one unit on everybody's house? Will there be one unit for six houses? Will there be one unit per block? How is it going to be done? If that's a question of local discussion, I'd say, "Hear, hear." That's going to take some considerable technical know-how. (pp. 64-65)

MS. SOWANDE-BRENT: There are people who have the technical know-how. We need to make them available to communities. (p. 65)

CHAIRMAN McGREGOR: It's a local issue, depending on economics and urban forms in that locality, (p. 65)

MS. SOWANDE-BRENT: If a municipality is really behind this issue and wants to make the resources available, it can be done. (p. 66)

MR. KNOWLES: Municipalities could try some plans for one unit per house, some where a number of houses feed off one unit, and at least one where a whole block feeds off a unit. They could see what it takes and how it functions, and pour enough money into it to make it work. You get real tests. It has to happen in many different places. (pp. 67-68)

MS. SOWANDE-BRENT: City managers must be shown that another city manager somewhere else along the line took a chance that turned out successfully. If we can't document that someone else has done that, it's much harder to sell them. (p. 68)

MR. HUDSON: There is no comprehensive stock of exact information on what technologies have been developed at the local level, and that really hurts, because one of the most effective ways of disseminating that information is through peer match.

There's a new program called the President's Clearing House on Community Energy Efficiency. The idea is to set up a toll-free number and a mailing number for local government officials to call. That kind of a peer-matched program, an access program for local government officials, is one way to let locals know horizontally what's being done. (pp. 68-69)

MR. JAFFE: I think that the existence of technological solar alternatives separates the density issue from the solar energy use issue.

Extremely high densities could utilize a power tower 30 miles away. Similarly, vacant land with reasonable access or reasonably low-density sites could use community-based systems or on-site technologies.

MR. TWISS: This chart showed a need for thorough investment in insulation before going on to solar supply. (p. 74)

MR. KNOWLES: There was a time when people drew shades at night and a time when people put a storm sash in for the winter and took it out in the spring. There was a time when, as we moved from one room to another, we turned the lights off. That time was when I was a child growing up in Ohio, and it was so much a part of my life that it was a kind of ritual. I'm not sure that that aspect of living is ritualized any more. (p. 76)

CHAIRMAN McGREGOR: Are you saying, then, that we have a big education component in anything we do? (p. 76)

MR. TWISS: When we're talking about form, there's no use trying to call for the very different patterns that might be required for active solar until we've exhausted other possibilities. But passive does have form implications. We use it before active, and passive should set the standards for the amount of sunlight needed. (p. 77)

MR. KNOWLES: Some parts of the city may remain essentially unchanged and other parts of the city may not only change, but be encouraged to change. (p. 78)

MR. TWISS: Are you suggesting a need for demolition and reconstruction of certain segments that are not compatible with solar? (p. 78)

MR. KNOWLES: The south orientation is usually best, though this point is arguable, depending on local conditions. The south orientation of a lot that is running long in an east/west direction has a lot more passive capacity than a lot that is running long in a north/south direction. (p. 78)

MR. TWISS: Another way of stating this is that an energy planning effort should identify the worst problems—dense places or lot orientations that are more difficult to handle. The investment might best be handled in a kind of shared system,

rather than trying to crowd panels on wrong-facing roofs. A district heating scheme also might be needed that could involve sharing with a commercial area next door. (p. 82)

MR. JAFFE: Aren't there technical issues involved with the shared system that limit the extent to which heat can be transmitted without sustaining extensive losses? (p. 87)

MR. GLEASON: Heat can be transmitted 100 kilometers with 10% loss. These things have been addressed in Europe by looking at community systems for solar. (p. 87)

OBSERVER: In situations with very high loads and high population density, a shared system is probably more economical. (p. 89)

MR. TWISS: The other thing we haven't mentioned is storage. It's a little easier to find a major storage area for a shared system. Similarly, in the Northeast, a shared system with long-term storage should be seriously considered. With shared systems, a lot of these little physical problems can be solved. Right now, there is no mechanism for doing that. The chances of finding an additional collector area are good in mixed-use areas.

Strip commercial seems to be a surplus. Things like warehouses are surplus. And, believe it or not, many industrial and quasi-industrial and office uses are surplus. Even in the densest part of most cities, a tremendous amount of excess land is used for parking lots. So, for retrofit, district heating is feasible with multiple uses providing a balance between surplus and deficit. This is done by creating a new kind of energy planning community. Starting from scratch would be easy since mixed uses could be implemented in initial design. There would be no problems because the houses would have minimal demands and would employ the latest technologies. Therefore, energy consumption would be almost nil.

OBSERVER: This country shows a lot of inherent social and political problems when we try to get a space-heating district, especially with respect to retrofitting an existing district. I think there are two mechanisms here: military housing or low-income housing that's government-owned. Viability must be demonstrated somewhere with the hope that somebody will say, "Gee, that's good, let's transpose the economics." It's interesting that the Department of Energy has taken the position that they are basically opposed because of the political problems with respect to space heating. (p. 96)

MR. TWISS: Baltimore is an example of a city that has a district heating system.

MR. KNOWLES: I think there's a spectre of centralization that worries people who are interested in solar potential. So when we talk about shared systems or higher degrees of centralized solar, the logical question is not a technical one of hardware; it's a serious question of management and the politics of that, and a serious question of the level of centralization of solar we are willing to attain. Is the answer for solar simply to generate the stuff somewhere out in the desert and pop it into the grid and go on with business as usual? Those areas where we go from one land use to another land use are the troublesome places. One of the ways they're troublesome is that the quality of life there is very often poor. And one of the reasons it's poor is because someone is casting a shadow over us that is a quarter of a million square feet in land area. That guy is using up more than his share of the world. And I think it's a serious issue—an issue of life quality. I'm not just interested in gaining access to the sun in order to convert it to watts. I'm interested in access to the sun for my life quality and for the life quality of my neighbors. (pp. 98-100)

CHAIRMAN McGREGOR: I thought we were putting in shared systems and district systems. They mean shared self-reliance that doesn't involve such big systems that we are back to "Big Brother" again. (p. 101)

MR. KNOWLES: I think that land uses should be mixed together for a lot of reasons. One is that mixing produces high-contact diversity. And there's a transportation payoff, an energy exchange, a transaction payoff, a community balance payoff, and an economic payoff. We're talking about something that has energy self-sufficiency, but in a sense, it has community self-sufficiency in some degree. (pp. 101-102)

MS. MILLER: To what extent will single-family, residential energy self-sufficiency contribute to sprawl in the future? (p. 102)

MR. KNOWLES: I've heard that issue raised, but primarily by people who were in the business of selling conventionally manufactured energy. They like to use it as a club by saying, "Gee, if you really had energy self-sufficiency, you wouldn't have any control over urban sprawl." Maybe the price of gasoline will solve the problem, but the fact is that cities have not stopped growing at all. And the question is, what are the rules of growth? (pp. 102-107)

MR. TWISS: I think that maybe this group should make a comment that transportation really is another key to energy self-sufficiency, and transportation is related to urban density and urban growth. (p. 109)

MR. KNOWLES: I wish I had a better concept of how much of the community we could reasonably talk about as a diversified increment of growth to deal with. (p. 110)

CHAIRMAN McGREGOR: We're talking about approximately 200-300 houses. (p. 111)

MR. KNOWLES: Is that, in conventional terms, about 8-10 city blocks? (p. 111)

MR. TWISS: The commute is not the major factor, as I understand it.

We have as many abandoned units in the city of New York as San Francisco has houses; a quarter of a million abandoned units that no one will spend money on to bring them up to code. A rebuilding program, utilizing solar energy, could solve our urban form problems, and make every place more liveable. This would be part of the improvement of urban America instead of something foreign to it. (p. 112-113)

CHAIRMAN McGREGOR: We all agreed that mixed use is a good thing to advocate. (p. 114)

OBSERVER: I don't think that the people at the Department of Commerce know how to begin to consider the energy conservation/energy use question when they play their economic development role. And I'd like to see some more interaction between DOE and Commerce. (p. 116)

MS. MILLER: EDA has really innovative programs that I think are some of the top ones. (p. 116)

MR. HEMPHILL: EDA is good in terms of energy, in terms of developing new industries in energy technology, as well as looking at giving assistance for business relocation in order to move away from strip development into nodal concepts of retail cores. (p. 116)

CHAIRMAN McGREGOR: We said earlier, I think, that the Federal Government could

set priorities and expenditures that relate to any kind of a project that will provide more energy efficiency, starting with a lot more money, perhaps, in the block program for retrofit. (p. 117)

MS. SOWANDE-BRENT: Specify and direct it, in very strong terms, to be used for energy-related education, outreach, or implementation. (p. 117)

MS. TERRY: Increased funding for small-grant technology programs would also reach neighborhood-level groups that do not ordinarily have access to funding or planning for community-scale projects. (p. 117)

MS. SOWANDE-BRENT: We need to say that they should set aside "x" numbers of dollars, but they should not dictate the programs. The programs should come from the bottom up, and tax dollars should be available. In my opinion, all of us have a better chance of analyzing, assessing, and perhaps changing or affecting what's happening on a local level than on a national one. (p. 119-125)

CHAIRMAN McGREGOR: The Federal Government has been responsible for fragmenting programs at the local level. We could say that they should pay more attention to encouraging team work rather than to funding discrete efforts. (p. 125)

MS. SOWANDE-BRENT: I think there's a method of accountability that must be built into a community-level program and/or state-level program, but how many federal programs have gone boondoggle, and where is the accountability there? (p. 126)

CHAIRMAN McGREGOR: Our state energy commission is extraordinarily terrible in dealing with local governments. (p. 130)

MS. TERRY: I think that state energy offices could play a very important role in information dissemination, and I think it's more practical on the state level than the federal level because so much of the information necessarily changes from state to state. (p. 131)

MR. JAFFE: I think that energy mandating should be left open and local government given options, rather than being forced. (p. 136)

CHAIRMAN McGREGOR: I disagree with you. If we don't have something like California which says every new subdivision has to be planned to provide solar access, locals will go on doing the same old thing they have always done. And building codes regarding conservation also can be mandatory at the state level. (p. 137)

MR. TWISS: There is a relationship between land-use changes and growth and energy demand. Everybody knows that, but the energy forecasting business pretends that those prohibitions are completely unknown; that there is no known relationship between a new subdivision and the amount of energy available for it. Urban form has a direct link to energy planning, and we would like to build a stronger bridge between the projections and needs for energy. The other alternative is investments in urban rebuilding; investments in urban areas in terms of weatherizing, insulation, and fenestration. (pp. 137)

SECOND DAY

MR. TWISS: Under "urban form" on page 2, I think we should cross out "generally little relationship between solar energy and urban form was found." I don't agree that there is no relationship. There are simplistic levels of looking at an urban pattern, and some advantages to different patterns, although I am afraid as we investigate these more fully they don't hold up. Here is the urban pattern that is in finger form, which has an interior greenbelt and an exterior greenbelt. A believer in neighborhood scale would want a finger city because the system can be built as small as possible. (pp. 2-4)

CHAIRMAN McGREGOR: Economics is the bottom line in a lot of cities today. I don't think we should put alternative energy resources over economic service in our system of priorities. (p. 5)

MR. TWISS: A possible conflict exists between an efficient city and a pattern that would make community solar systems easy. (p. 6)

CHAIRMAN McGREGOR: I just don't want inner spaces of any considerable area within the city that are not devoted to providing urban uses. What if, instead of just a big, high-density blob in the middle, there were a lot of nodes throughout? (pp. 6-7)

MR. KNOWLES: A post-World War II model has three major segments; a large undiversified area of housing, one of commerce, and one of industry. In order for this model to work, and develop transactions among these, there must be mobility. The model in Los Angeles breaks this down into nodes. Each one of them has components of housing, commerce, and industry. (p. 7)

MR. TWISS: It is also good to have some open space, some biomass, or short-term storage. It is nice to have a mixture.

I suggest that we treat this as an issue that we don't really know the answers to—what these kinds of urban pattern relationships might be. (pp. 8-9)

CHAIRMAN McGREGOR: But place more emphasis on recommendation of mixed-use areas. (p. 9)

MR. TWISS: Generally, the relationships between solar energy and urban form are not well understood. (p. 10)

CHAIRMAN McGREGOR: Getting us back to the earlier statement that I want to put into urban form, I also wrote: "Inventory of renewable resources should be done at the regional level. Such inventory with accompanying economic implications should be a part of determination of appropriate urban patterns." (p. 12)

MR. TWISS: That same inventory will lead to the appropriate investments in various solar and renewable energy systems. (p. 12)

MS. MILLER: That is really important because it starts from the resources rather than the building or the technology. (p. 13)

MR. KNOWLES: While orientation becomes important in cities relying on solar energy, they don't have to look fundamentally different from the way they do today, and could in fact achieve higher average densities than today's cities tend to exhibit. (p. 14)

MR. TWISS: Solar really equals land. Space is needed for collectors and for sunlight and access. What follows from that is the involvement of urban planners and urban developers in the energy planning. The kind of inventory and economic analysis we are talking about is a completely new thing. (p. 12)

CHAIRMAN McGREGOR: A preliminary statement could be made before we said anything else, to get rid of the hardware mentality. Provision of solar hardware should be at the end of the continuum of conservation. (pp. 16-17)

MR. JAFFE: Isn't it the consensus that we should stress small-scale, decentralized technologies? (p. 17)

MR. KNOWLES: I would feel more comfortable if we could insert the idea of energy sharing. (pp. 18-19)

MS. MILLER: Weatherization, passive solar applications, and active solar systems are all technology transfers; they are not really planning in the strict sense of resource planning. (p. 20)

MS. TERRY: The planning for that has not taken place, and we are recommending that the comprehensive approach include those three steps for maximum benefit. (p. 22)

MS. MILLER: I don't think that is a comprehensive approach. If you are going to form a real plan for solar energy, you talk about the sun, and resources, and many other things besides weatherization, passive solar application, and the active solar system. The point that we originally wanted to make was that this was hierarchical. (pp. 22-23)

MS. TERRY: Community assessment and planning is the key process. (p. 23)

CHAIRMAN McGREGOR: Do we have any more issues? (p. 24)

MR. HEMPHILL: How active and immediate is the report going to be, and who will be the implementors? Should we speak to specific legislation? (pp. 24-25)

MS. MILLER: We should be more specific. We should say who the actor is and what the actor is going to do and what he or she or it should accomplish. (p. 25)

CHAIRMAN McGREGOR: What we are trying to do is set policy, I think, as against programs. Let's start by trying to sort it out by levels. Would it be effective to say "maximum funding should be provided for regional assessments as looking toward a goal

of regional autonomy and energy reduction?" (pp. 25-26)

MR. HEMPHILL: Local governments are where we should be doing energy planning. (p. 27)

MR. KNOWLES: Regional self-sufficiency is terrifically important. Robbing Peter to pay Paul, however, is not the way to go. There are areas of the country that really can't be energy self-sufficient, but that is not a reason for not going in that direction. (pp. 27-28)

MS. MILLER: We have done a regional assessment. One thing I worry about is that our citizen groups came up against a problem of rural-urban split. It emphasizes regional differences and battles and the "island" mentality. (pp. 28-29)

MR. TWISS: Until we do these analyses, we don't know the degree to which various communities are going to be self-sustaining. To put it another way; how much money will it take in investments in various parts of the country to make them more self-sufficient? Also, will the money be forthcoming from the Federal Treasury? If it had to come from property taxes in order to do this bootstrap operation, there would be great differences in the ability of communities to protect themselves from high energy prices. If we come out for self-sufficiency, we must make it clear that there still are going to be inequities. La Jolla, for example, is going to be easier to weatherize then Duluth. (p. 30)

CHAIRMAN McGREGOR: Let's talk about "transportation funding priorities should be linked to energy efficient urban patterns." (p. 31)

OBSERVER: The only problem with that recommendation is that earlier we said that we really don't know what the relationship is. (p. 31)

MS. MILLER: I'd like to make it stronger because if you asked the Department of Transportation, they would say that they work closely with local government in determining transportation expenditures. They think they do, but what does that mean? What they do is steamroll the local governments. (pp. 32-33)

CHAIRMAN McGREGOR: Do we want to say something like, "special funding priorities should go to energy-distressed areas?" (p. 34)

MR. HUDSON: How about just urban areas instead of energy-distressed? (p. 35)

CHAIRMAN McGREGOR: Some urban areas like San Diego have a much lower need than Detroit or New York. (p. 35)

MS. TERRY: Maybe we can say "especially energy-deficiency areas." (p. 35)

MR. HEMPHILL: What happens, unfortunately, is that cities who acted first without waiting for outside assistance get cut off. (p. 35)

CHAIRMAN McGREGOR: Portland, for example, has done all of its work on a huge scale. The only problem now is that they can't do anything with what they know. (p. 36)

MR. HEMPHILL: There should be a two-pronged attack here. Leaders who have demonstrated what they need to do should receive further technical assistance to refine it and to put it in place while, at the same time, we bring along those energy-deficient areas to come up to speed. (p. 36)

Clearwater, Florida, certainly is not distressed, but it has a good energy program. (p. 38)

MR. TWISS: I have two recommendations: the planning, regulation, and implementation of solar access should be done primarily by local governments, but property law aspects of solar access deserve the attention of all levels of government. (pp. 39-40)

CHAIRMAN McGREGOR: I assume that we all agreed with that statement. (p. 41)

MR. JAFFE: I don't. Solar access doesn't have anything to do with property laws. On the basis of all these legal studies, there is no need for any fundamental change in the property law. Solar access can be done under existing laws. Therefore, fundamental revisions in legal processes or redefining legal definitions of peoples' interests in realty is irrelevant in protecting solar access. (pp. 41-42)

MR. TWISS: I guess I disagree with the lawyers. (p. 43)

MR. JAFFE: The Department of Energy should be involved in litigation as a "friend of the court" in cases involving challenges to local energy conservation programs or solar regulations. (p. 43)

MR. TWISS: It's not just the courts. The Congress of the United States may some day be writing some laws about solar access. (p. 43)

MR. KNOWLES: I would like to think that it wouldn't be necessary. It can be completely handled through local zoning. (p. 44)

MR. HEMPHILL: I wonder whether it would be politic to include a statement that federal assistance to states should include a caveat that previous state funding for energy efforts be maintained. When federal money comes in, the State legislature or the Governor may see an opportunity to reduce its budget, thereby nullifying the increase in activity that would have come from federal assistance. There are some federal programs that do contain that caveat. (p. 46)

MR. JAFFE: Shouldn't we put down that federal grants for comprehensive planning should have a mandatory energy planning component? (p. 47)

CHAIRMAN McGREGOR: Do you want to also put in, "more funding emphasis on technical assistance should be available at regional DOE offices?" (p. 47)

MS. MILLER: If we are going to have more for the states, then wouldn't it be redundant to also have it regionally? (p. 47)

MR. JAFFE: State environmental impact information definitely should have energy conservation or alternative energy components as part of the analysis. (p. 48)

MS. TERRY: Everyone here has gone back again and again to the importance of community-scaled projects and the subject of what makes strong neighborhoods and cities. The appropriate technology/small-grant program is the first effort on the part of DOE to get down to this level of funding. (p. 49)

PANEL

NUMBER

THREE

FINAL REPORT
PANEL No. 3—URBAN FORM AND PLANNING

Presented by Chairman Gloria McGregor

This panel was charged with addressing issues concerning solar energy as it relates to city form and planning. A variety of topics were discussed, including implications for urban form, appropriate scale of solar systems, integration of solar systems with the existing urban environment, solar access, and appropriate roles of Federal, state, and local government.

Many issues were raised in a preliminary discussion. These include:

- the importance of weatherization in energy planning;
- the use of incentives versus mandating solar use;
- the potential for solar utilities on a local level;
- information needs and administration of local inspection of solar systems;
- institutional barriers for those involved in the development process;
- the impact of solar systems on urban design and form, especially as it relates to mixed use development, growth dynamics, aesthetics, density, and life quality;
- financial mechanisms;
- the difficulties in defining passive solar systems for tax credits;
- the role of wind energy conversion systems and biomass systems in urban areas;
- variations in solar access protection techniques;
- the potential for shared solar energy systems;
- the role of state and local government;
- the special problems of inner cities; and
- the role of existing federal programs.

Several of these issues were then discussed more fully and led to the following observations.

Observations

Urban Form. Generally, the relationships between renewable energy systems and urban form are not well defined. While orientation of buildings and streets becomes important in cities relying on solar energy, solar-powered cities do not have to look different and could, in fact, achieve higher densities than today's cities tend to exhibit. Community energy planning should be a part of the determination of appropriate urban patterns.

Mixed use development patterns and the use of shared energy systems offer many advantages in urban areas. Mixed use development has direct benefit in achieving energy conservation in transportation. The use of shared solar systems in mixed use areas can take

advantage of surplus solar potential in certain land uses to power land uses that cannot achieve energy needs on-site. Shared systems can mitigate problems associated with shading by vegetation, application in high density areas, and retrofit. Management and transaction costs for shared systems are higher than for individual systems, and appropriate institutions must be found or created. Increasing storage capacity could also mitigate problems of solar applications in high density areas by lowering area requirements for solar collection.

Solar Access. There should be a fair share approach to the use of sunlight. Zoning techniques, such as the use of solar envelopes, are a promising approach to access protection. Conventional approaches, such as privately negotiated easements, involve agreements and potentially high transaction costs with neighboring property owners to limit development to protect one property owner's access. Zoning techniques place limits on everyone's development to protect everyone's solar access. While the easement approach may provide easier administration, zoning techniques can provide maximum access for maximum choice. This is important when dealing with a rapidly changing technology, transaction costs of property owners, and for maximum assurance of life quality. Protection of solar access should be a mandated local responsibility as a part of the comprehensive land use and community energy planning process.

Community Energy Planning. Planning strategies should first address weatherization potential, then passive solar applications, and then active solar applications. Retrofit applications will dominate in urban areas, although there is substantial redevelopment and infill potential. The scale of planning is important. Significant differences in strategies result, depending on whether a single building, neighborhood, city, or region is examined. All scales require individualized attention through a comprehensive physical, social, and economic community planning effort.

Recommendations

A series of recommendations based on the previous discussion of issues were then made, for action at the federal, state, and local levels:

(1) Federal

- Maximum funding should be provided for local and regional assessments of renewable energy sources with the goal of regional or local energy self-sufficiency. Pending legislation, such as the Energy Management Partnership Act, should be examined with this in mind.
- Several other federal agencies, which have policies and programs that impact local land use and community energy planning, should prioritize funding to support local energy self-sufficiency. These agencies include the Departments of Transportation, Commerce, Housing and Urban Development, Health, Education and Welfare, and Agriculture.
- Special funding for weatherization and solar applications should be given to poverty areas that are energy distressed.
- Continued support of innovative community energy planning programs is critical.

- The National Energy Act should be amended to allow utility investments in weatherization.
- Protection of solar access and quality of life may require new interpretations of property law. Federal guidance is needed.
- Federal assistance for comprehensive planning should have an energy self-sufficiency component. Prioritization of federal funding should be towards mixed use development, energy efficient buildings, and self-sufficient communities.

(2) **State**

- States should take an active role in providing technical assistance to local governments and should facilitate solar development through enabling legislation, tax credits, and building code and subdivision regulation revisions.
- State and regional inventories of renewable resources are important. Pass-through programs utilizing federal monies can be significant in this regard. Federal funding should not be an excuse to reduce state support of local energy planning and implementation efforts.
- State environmental impact reports or similar environmental reporting mechanisms should have an energy component, addressing the potential for weatherization and solar energy use.
- States should adopt mandatory energy efficient building codes with enabling legislation for modification at the local level.

(3) **Local**

- Energy planning and implementation programs with emphasis on local self-sufficiency, should be developed at the local level. Pre-packaged guidelines, if available at the state or federal level, should be broad outlines with minimal restrictions on local solutions. Federal policies, programs, and funding have tended to induce fragmentation in community planning, whereas a comprehensive approach is needed. Local government can provide this approach.
- Local programs should work toward mandatory protection of solar access for existing and new development through zoning techniques such as the solar envelope. Emphasis should be placed on weatherization of existing buildings and comprehensive approaches to energy self-sufficiency.

MS. SCHACHTER: (State of California) There are two ways to increase local self-reliance that might have a negative effect on unemployment. First, you can tax income in the local economy and reduce energy expenditure so that you are locally energy self-reliant. Second, you can encourage local resources being used for very expensive energy systems. I would hope that somewhere in that definition, you make clear that energy self-sufficiency may be a means of obtaining a low-cost supply of energy that can increase employment.

MS. McGREGOR: (City of Davis) It is important to say that our end-goal is lowered energy cost, and that discussions about energy self-sufficiency happen best at the local level. The confrontation should occur there.

MR. TATUM: (Department of Energy) This supports a piece of legislation which would modify our Energy Management Partnership act, which would provide $400 million a year for local governments. Did you discuss the funding levels?

MS. McGREGOR: We felt that we would be fishing around in the dark if we tried to say anything about funding levels without some previous information.

MR. TATUM: You used the term "energy self-sufficiency" several times. What is your definition of that?

MS. McGREGOR: We realize this is a perfect goal that will probably never be achieved, but there is a very good chance that we could substantially reduce community dependency on conventional energy sources as we know them today, mostly by conservation, by some changes in urban form, and by looking at the utilization of renewable energy resources that are available at the local level, such as solar, biomass, and wind.

MR. DeSERIO: (Department of Energy) My reaction is, on the whole, positive we can't get from here to the year 2000 and solarize only 20% of our building stock. We never will have a 100% solarized building stock, but might have 25% of it solarized and 25% conservationized. That means that 80% of the building stock must be improved at the 25% level, and 80% solarization of the building stock by the year 2000 is an incredible goal.

We also have the problem of time. It may take a minimum of five years to build one prototype building. Our preliminary, back-of-

the-envelope type of calculations indicate that we need to move a couple of billions of dollars just to achieve half that goal by the year 2000 under most optimistic assumptions of spinoff effect.

My second point is the need to look at multiple building projects—block-scale projects both in the commercial sector and in the community neighborhood sectors.

MS. McGREGOR: I don't think we have to spend five years experimenting on passive or active solar systems. We know what they are now. The technology is here. Passive systems, in particular, very rarely cost any more than ordinary construction techniques. What I would say is immediately achievable within three to five years is a 50% reduction of our current energy use by conservation alone. Twenty percent solar is somewhat meaningless. Rather, we ought to talk about the reduction in use of oil as a fuel resource at this point in time.*

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*In subsequent discussion, Ms. McGregor asked that the record show that the Department should begin immediately to implement a wide range of conservation and solar technologies. Since she perceives the problem as serious, Ms. McGregor believes the Department cannot provide funds only for research, and that a five year delay in initiating many of the solar technologies would be intolerable.

Mr. DeSerio concurred while voicing concern about built-in barriers to accomplishing this—barriers which the Department is attempting to alleviate through the DOE Solar Cities and Towns Program.

The Solar Cities Program is aimed at three target groups: building owners, design professionals, and institutional decision makers. The Program is structured to begin immediately in agreement with Ms. McGregor that the active and passive solar technologies are presently ready for commercialization. Details of the Solar Cities Program are contained in the DOE responses to the panel recommendations, which are contained in Volume II.

PANEL

NUMBER

FOUR

ENERGY AND EMPLOYMENT IMPACT OF THE SOLAR TRANSITION*

Invited Paper by Leonard S. Rodberg
Public Resource Center

Abstract

The savings in nonrenewable fuels and the net job creation from an energy future stressing energy conservation and renewable energy are estimated. Some financial measures that can help bring about such a future are suggested.

Introduction

There is now widespread agreement that the nation must move toward the conservation of energy and the use of solar energy in its various forms—such as solar heating and electricity, wind, and biomass. By envisioning a future in which extensive investment has been made in the widespread introduction of conservation and solar energy measures, and by using economic projections to estimate the employment resulting from such spending, we have estimated the impact of solar energy implementation on nonrenewable fuels and employment.

Conventional projections of energy consumption predict that aggregate U.S. energy demand will double by the turn of the century. Over three-fifths of all energy use currently takes place in the industrial and commercial sectors, yet the major consumers of energy employ relatively few workers. The projected rise in energy consumption will, if it takes place, be accompanied by a continuing shift in employment from goods-producing to service-producing sectors of our economy. According to "business as usual" projections, new energy-related jobs will be few and will require worker migrations and social dislocations.

Toward Conservation and Renewable Energy

We envision an alternative scenario with a strong emphasis on energy conservation and solar energy. For residential and commercial use, we assume the introduction of rigorous insulation measures, improved equipment efficiencies, the use of passive solar designs, and the installation of active solar water and space heating. For industrial uses, we assume more energy-efficient industrial practices, cogeneration of electricity as a by-product of heat and steam production, and the use of solar collectors and solar-powered heat engines. For transportation we assume increased automotive efficiency and use of mass transportation. For portable fuels we postulate the production of methane and alcohol from biomass wastes, and for electricity production we assume the use of photovoltaic cells, wind-powered generators, and solar-powered engine-generator systems.

For each of these measures we postulate a set of national goals to be achieved by the year 2000, and we assume that investment in each measure is sufficient to achieve these goals. For residential and commercial uses the goals are 50% savings through conserva-

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tion and 50% introduction of active solar systems on existing buildings; for industrial use, 40% savings through conservation, 100% use of available cogeneration sites, and 25% use of solar energy for process heat; for portable fuels, conversion of 50% of waste products; and for solar electricity, 25% of 1977 electricity production.

Using estimates of the cost-per-unit of energy for each measure, we can find the annual investment required to achieve these goals. The employment generated by this investment is determined from economic projections and input-output tables developed by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor.

The introduction of these conservation and solar measures leads to very significant savings of nonrenewable fuels, reducing their consumption in 1990 by 44.9 quads compared with "business as usual" projections. This is 11 quads below their consumption in 1977. Less electricity from nonrenewable sources is required than is used today. Total energy consumption in 1990, including energy from solar-drive devices, is 76 quads—just about equal to total energy consumption in 1977. One-half of the saving is achieved through energy conservation and one-half through the use of solar energy.

Employment Benefits

For the year 1990, these projections lead to an annual investment (in 1978 dollars) in energy conservation and solar energy of $65.6 billion, or 13% of the BLS projection of gross private domestic investment that year. This investment creates 2,170,000 jobs producing and installing conservation and solar measures and the components and raw materials they contain. One-quarter of the investment and jobs are in energy conservation, three-quarters are in solar energy.

The reduced consumption of nonrenewable fuels allows related spending to be reduced by $118.8 billion in 1990. This leads to 1,137,000 fewer jobs in the fuel-producing and electric generating industries, in the industries that supply them, and in the industries that build their plants. The loss of employment in the conventional energy industry, compared with current employment levels, is only 65,000.

If the dollar savings from reduced energy consumption are spent on other goods and services, an additional 1,870,000 jobs will be created. A net of 2,903,000 jobs will be created in this scenario, compared with the "business as usual" projections. These jobs will tend to be widely dispersed across the country, and especially may contribute to solving the chronic employment problem facing our urban areas. The emphasis on conservation and solar energy also will cause shifts in housing and land-use patterns, inducing more compact communities and low-rise buildings.

Financing the Solar Transition

The fuel savings and employment benefits in this scenario can be achieved only with substantial investment in energy conservation and solar energy. This will require mandatory federal standards and new financing mechanisms that make these purchases attractive when compared with the continued purchase of nonrenewable fuels. Conservation and solar measures tend to be purchased by the users of energy rather than current energy producers. Since the user's investment is compared with the average cost of energy—while the producer deals with the replacement or marginal cost of new facilities, which has increased rapidly—the user's decision tends to be weighted against the purchase.

To overcome this disadvantage, some alternative financing arrangement, such as federally subsidized, low-interest loans, would be desirable. However, in this time of fiscal conservatism, Congress seems most unlikely to make large amounts of low-interest money available.

An alternative that would cost the Federal Treasury nothing is to change the way loans are repaid. Instead of using fixed monthly payments, persons installing energy conservation and solar energy measures should be offered "Energy Saver" loans, for which the payments start low and increase at a regular rate in later years. While the loan payments will rise, the savings also will rise with the price of nonrenewable fuels. As prices and wages rise with continuing inflation, the loan payments will remain a nearly constant portion of income.

Combined with the recently passed federal tax credit for conservation and renewable energy measures and the tax deduction for interest payments, these loans would enable the consumer to realize immediate savings from such investments. In fact, for some reasonable assumptions on interest rates and rates of payment growth there would be immediate savings on measures having simple payback periods as long as 25 years.*

With these financial mechanisms in place, with the strong support of national leaders, and with adequate information resources, we should be able to move successfully into the solar transition.

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*The concept of "Energy Saver" loans is discussed more fully in Leonard S. Rodberg, Breaking the Financial Barrier to the Solar Transition (forthcoming).

MACROECONOMIC EFFECTS OF SOLAR ENERGY

Invited Paper by Edward A. Hudson
Dale Jorgenson Associates

The supply of energy from solar sources will require inputs from the economy—labor, capital, and materials inputs will be required during both construction and operating phases of the solar capacity. This supply of solar energy may reduce the demand for conventional fuels and so reduce the claims on capital, labor, and materials inputs that the supply of these energy forms would have required. The balance of economic input requirements to solar energy, relative to those of the conventional energy displaced, determines the net economic demands imposed by solar energy. In calculating these net demands, the input requirements should cover all costs of the system delivering energy services: for solar this includes capital, labor, and operating and maintenance costs both for the solar supply and for any conventional fuel backup system; for conventional sources the inputs cover capital, labor, operating and maintenance, and fuel costs (valued at their full economic prices). In fact, these net demands form a matrix. In one dimension they cover net demands for capital, labor, and each type of material input; in the second dimension they span the lifetime of these supply capabilities. The net input requirement of solar energy can be indicated by the cost differential for each type of input. Further, in the present aggregative analysis, the net input of solar is indicated by the overall cost differential between solar energy and the conventional fuels displaced.

The net change in demand for economic inputs caused by the introduction of solar energy will have an impact on the economy. Real output and income, economic growth, productivity, inflation, employment, and the international economy may all be affected. The direction and magnitudes of specific impacts are determined by a complex set of processes. The nature of these impacts can be determined only when other conditions are specified. However, some effects can be expected under almost any conditions in which solar energy supply is introduced—the implied reduction in the use of conventional fuels will have beneficial effects in terms of reduced oil imports and in terms of reduced environmental, health, and safety costs arising from the energy system.

Three sets of conditions are critical to the nature of the economic impacts of solar energy:

- whether solar energy is more or less expensive than conventional energy during the construction phase;
- whether solar energy is more or less expensive than conventional energy during the operating phase; and
- whether or not there is excess supply capacity in the economy during the time being considered.

Generally, solar energy is more expensive during the construction phase (compared to the incremental cost of conventional fuels). The economic impacts then depend on the extent of excess supply capacity existing in the economy. If the economy is at full capacity, the additional inputs required by solar—corresponding to the higher cost—must be diverted from other uses. Removing these inputs means that less output can be produced; consumption and/or investment quantities are reduced. Consequently, real output, income, and productivity are lower than otherwise; employment remains unchanged (although the structure of employment may be altered in accordance with the changed

pattern of energy system purchases); and inflation increases (due to the injection of new spending into an already fully employed economy). If, however, excess capacity is present, then the net addition to demand caused by solar energy will have different effects. This new demand can be satisfied by increasing the inputs used in the economy and by increasing output levels—output does not have to be diverted from elsewhere. Real output and incomes are increased, employment rises, and since there is no excess demand pressure, there is no increase in the rate of inflation.

During the operating phase, solar may or may not be more expensive than the conventional energy that it displaces. If solar is more expensive, then its use involves a net increase in economic resources drawn into the energy system for the same level of energy output. If excess supply capacity is present in the economy, then the use of these inputs in the energy system does not require the sacrifice of other output; rather, the additional demand increases the levels of real output, incomes, and employment. If there is no excess capacity, then the additional inputs must be diverted from other uses, and nonenergy output falls while energy output remains the same—so total real output, income, and productivity decline. Further, employment remains unchanged at full employment levels while the excess demand acts to increase the rate of inflation. The opposite case is that in which solar is less expensive than conventional energy sources; i.e., requires less inputs for the same energy output. If there already is excess supply capacity in the economy because demand is insufficient to fully use all productive capacity, then this net reduction in demand leads to a further decline in the level of economic activity—real output, income, and employment all are reduced. If, in contrast, there is no excess capacity, the economy being already fully stretched in terms of production, then the inputs released from the energy system permit other output to rise. The result is that employment remains the same, but that real output, incomes, and productivity increase.

There also are dynamic effects on the economy. These arise first from the dynamic nature of the cause: solar energy affects the economy during its construction phase and during each year of its operation. Further, many solar projects will be ongoing but started at different times. Second, the economic impacts themselves have important dynamic feedbacks: any output changes affecting investment affect the growth of capital stock and the potential rate of growth of real output and incomes. Any inflation increases are reflected, at least in part, in labor and other cost upswings, which in turn cause further inflationary pressure.

It is possible to assess the quantitative nature of the macroeconomic impacts of solar energy. From a medium- and long-run perspective, the appropriate analytical assumption is one of full capacity use in the economy. With this assumption, a model system covering the course and structure of energy and economic growth—the Dale W. Jorgenson Associations-Brookhaven National Laboratory LITM-TESOM linked model—was used to estimate the economic effects of a "maximum practical market penetration" solar energy case. This case involved 13 quads of solar (comprising 17 types of supply in the areas of solar electric, direct solar, and biomass gas). Best current estimates of solar costs were used. Costs were distinguished between those in the construction phase and those in the operating phase. Since solar was, on balance, more expensive than conventional energy, the net economic impact was adverse—real output, incomes, and productivity increased less rapidly than in the low solar reference case. These effects are significant and permanent. For example, real GNP in the year 2000 is reduced by from

1.6% to 2.6%, depending on the method of financing solar; a decline in year 2000, corresponding in the 1.6% case to $43 billion in 1972 dollars in real GNP or about $375 per household or $3 per million Btu of solar supply—both in 1972 dollars. The employment impact, however, was different: there was only a very minor change in the level of employment, but a significant change in the structure of employment.

In sum, a solar energy program will have effects on many aspects of the economy. In particular, a large program such as the supply of 10% of total energy input by 2000 is likely to have a significant impact on the course and structure of the U.S. economy. These effects cover all macroeconomic aspects, from output and incomes to employment to inflation. The existence of these impacts necessitates a careful review of all effects as part of the decision making on an appropriate solar energy strategy.

PANEL EXCERPTS

PANEL NUMBER FOUR

SOLAR ENERGY AND EMPLOYMENT: MACROECONOMIC IMPLICATIONS

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Tennessee Valley Authority

LEN RODBERG, Speaker
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OTHER IDENTIFIED PARTICIPANTS WHOSE REMARKS ALSO APPEAR:

NORMAN MILLERON
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Department of Energy

EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and at DOE.

FIRST DAY

MR. MEADOWS: I direct Dartmouth's Resource Policy Center, a group of 45 people interested in various aspects of designing the regional transition from dependence on oil to increased use of renewable resources. Our focus to date has been on wood energy and small-scale hydropower. (p. 2)

MR. MAGUIRE: I am the head of Planning and Policy Analysis for the Renewable Resource Branch of the Tennessee Valley Authority. (p. 2)

MR. GROSSMAN: This year at Environmentalists for Full Employment, we are putting together a national panel of various constituencies to look at the kind of analyses that have been done on the relationship between energy and jobs and to make recommendations to DOE and other interested parties on both research and policy issues. (pp. 2-3)

MR. HUDSON: As an economist, I have been examining the macroeconomic effects of various kinds of energy and have been focusing in particular on investment and productivity as they relate to estimating the economic effects. (p. 3)

MR. CORRIGAN: I'm with the Citizen Labor Energy Coalition, a coalition of labor unions, citizen action organizations, and public interest groups. Beginning next month or so, we hope to be undertaking public education programs in regard to solar energy and its job creation potential in Ohio as a pilot program for a future, nationwide program.

MR. HERENDEEN: At the University of Illinois' Energy Research Group, we have been analyzing various aspects of energy use, using old input-output data. (pp. 3-4)

MR. HUDSON: If we accept that solar energy is not an end in itself, we should think deeper about what sort of objectives solar

might contribute to, such as national security, economic performance, and the obtaining of continuing access to resources rather than dependency upon depletable resources. It's important that we try and relate any program back to those fundamental reasons. The danger of advocating solar is that it can get out of proportion. The cost of solar energy must be evaluated relative to the benefits that are going to result.

I'm sure there is some optimum level of solar use. If use of solar energy is pushed past that optimum, the result is steadily increasing economic cost. That may be good for employment, but if solar uses resources in that area they won't be available for making other things. There's nothing intrinsically good about solar in terms of job creation. Any spending creates jobs.

Of the additional 10 million jobs that are going to be created between now and 1990, 3 million are going to be in solar energy. Maybe 3 million jobs are going to come out of unemployment, but I would say that that is not going to be the case. The type of labor input required for solar is not available in the magnitude of 3 million people among the unemployed.

Another way to look at this is to consider creating jobs because you think those jobs are not otherwise likely to be created between now and 1990. I would argue with that point. Apart from the Depression, employment has been growing along with the labor force. (pp. 5-9)

CHAIRMAN CICCHETTI: How about imports versus exports? Does that make a difference? (p. 10)

MR. HUDSON: The import question is one of the benefits of solar. If more solar energy is used, less petroleum needs to be imported. This means a security benefit because OPEC nations will have less leverage over the United States. It also means an economic benefit—every $22 spent on importing a barrel of oil does not require $22 worth of exports to pay for it. (p. 10)

MR. RODBERG: Carter promised us a national health program and then hired 39 economists and one doctor. The result was cost control and no health program. I think we have the same problem. I certainly think that there is an intrinsic good in solar—it lets us leave some oil in the ground for future generations. I know that economics, as it's usually practiced, has no way of measuring the value of that oil because it's not yet a market good, but it certainly is of principal value to us. (p. 11)

MR. HUDSON: I'll come back to that, but that is not correct. (p. 11)

MR. RODBERG: I think that Ed Hudson focused on a crucial problem that I sense in the conversations I've had, which is the question of cost. One of the assumptions was that solar was more expensive than conventional energy. I don't know what that statement means. I don't know whether it's true or not, because it depends on discount rates, interest rate lifetimes, and so on.

Military spending counts in the GNP and counts positively. Now, it seems quite anomalous to me that if we, instead of spending money on additional MX missiles, spend money to leave oil in the ground, that somehow looks like an economic loss. There has to be something wrong with economics if it leads to that kind of nonsensical conclusion, and perhaps we have to explore how to talk about solar cost—both in economic terms and in some kind of broader terms. (pp. 11-12)

MR. GROSSMAN: The GNP will also probably be higher if we go along with the energy systems that are the most destructive to the environment and to health. People who talk about costs should be explicit about what kinds of assumptions they are making about costs, because we could have 10 different definitions of what cost is, depending on what system is pushed. (p. 13)

MR. HUDSON: We have been speaking in the context of dollar costs, and the assumption was made explicitly: most solar technologies are higher today than the unit cost of providing that energy need by conventional energy sources. Projections were made in 1990. There are two ways of looking at costs, and I think it is important to distinguish them. The cost to the economy is independent of how it is paid for. It's still X hours of labor and Y dollars of capital.

A lot of discussion has been focused on the microeconomic financial aspects. I agree that is important in terms of promoting the penetration of solar energy; but as far as the broad economic impact is concerned, the manner of financing does not matter in terms of how much labor and how much capital are being absorbed. (pp. 13-14)

MR. RODBERG: You seem to assume the same level of employment with and without solar, because you say a very minor change in employment. What does it mean then, that the gross national product is lower? What is this $375 per household drop in average income? Does it mean, for instance, that they don't have to spend as much on energy? (p. 14)

MR. HUDSON: My statement means that there is that much less production available for people to use. You also asked how there can be lower production with the same level of employment. The answer to your question is that productivity is lower.

I hope you don't think I was saying that solar is more expensive and is bad. I was trying to lay out a framework to set up certain conditions. In some conditions solar has positive economic impacts, and in other conditions, solar has negative impacts. (pp. 15-16)

MR. MEADOWS: Many aspects of small-scale solar devices are satisfying to the consumer which are not expressed adequately through market prices. For that reason one sees many anomalies in consumer behavior—for example, in the use of wood, even where oil or electricity is cheaper. That simply would not be predicted by economists. Talk to a few of the hundreds of thousands of people in northern New England who now heat their houses with wood. Ask why they burn wood even though it takes more time than would be required to earn the money required for oil. They will mention factors like pride in being self-sufficient, security from the whims of large oil companies, or a desire to conserve depletable resources.

Economists would tell us that the GNP of New England has been reduced by the shift to wood in the region because much of the wood fuel does not move through traditional markets. But consumers generally report that their quality of life has improved.

Perhaps for central solar facilities, like power towers, the external social benefits are sufficiently small that traditional economic comparisons do provide a useful basis for choice. But with small-scale devices, traditional economic indices are far from being useful tools for choice. Although they are irrelevant, we might term such indices harmless if it were not for the distressing tendency of society to restrict its attention to those aspects of a decision about which it has numerical data. I agree with Herman Daly who said that economic criteria are useful ways to pick the route to a well-defined goal, but they are dangerous when used to select the goal. The choice between solar and conventional energy sources implies consequences for society that lie mainly outside the realm of economic analysis and theory. (pp. 17-19)

MR. HUDSON: It is well recognized that GNP omits many benefits. No one is disputing that. What we're dealing with is a situation with many components. (p. 19)

MR. HERENDEEN: There are three levels of discussion here: First, the characteristic fight between physicists and economists; second, the question of definitions of welfare; and third, a question of whether the models proposed by these two gentlemen (Hudson and Rodberg) do what they claim. So we can work on three levels, and I believe the last two are the fruitful ones. If we are going to talk about welfare, then let's choose a definition that we can use. (p. 20)

MR. MILLER: This morning there were two positive cases and two negative cases. Are you able to put some probability on which of these courses is most likely to occur over the next 20 years? (pp. 20-21)

MR. HUDSON: There are two directions for policy. One is the forecasting of economic conditions. The other is to try to reduce the cost of solar energy since cost is critical in determining its economic impact. But to come back to the question of full capacity versus partial capacity, it is possible to make projections. (pp. 20-21)

MR. MILLERON: I would like to completely change the basis of what we mean by solar, and I would like to consider what makes the U.S. economy work.

The energy budget of the United States is actually around 23 thousand quads; not 75 quads. If we look at ourselves as indirect products of photosynthesis, we have solar energy very deeply rooted in our pasts and in our futures. If you want to know what's going to happen in the future, people are going to be doing exactly what they've been doing in the past—harvesting from a unit area of land or water—and that's really the basis of the whole thing. The photosynthetic step is indispensable. Take the product of sugar: if you tried to produce sucrose synthetically, the cost would be prohibitive. The manufacture of any substance could not be continued indefinitely without solar input.

The reason "why so much solar" is because you have no other choice. It's just like your heart beating. You may not like it, but that's going to be it. So if we put these dollar costs on a different basis, and if we talk about the solar flux per unit area, we come up with very different ideas.

What is the time scale? What's the lifetime factored into the costs? It comes down to the productivity of the soil—it has to be in perpetuity. I don't think that one has a sound basis for arriving at a cost on a finite, relatively short soil life.

You may ask, as I did, "What is the basis of the decision to separate agriculture from energy?" There is no basis for it.

The biomass question comes down to a simple thing. How is the unit area to be used? It's been posed as a dichotomy: either food or energy. But that's false because, as we all know, the same unit area can be used both for food and other purposes. It's a mistake to leave out the agriculture and forestry areas in terms of investment and jobs, because they're very large. (pp. 22-26)

CHAIRMAN CICCHETTI: A very important point is the distinction between welfare and GNP. Economists spend their time measuring GNP, but their policy pronouncements are based upon national welfare—and there's a big gap in any notion that welfare is a measure of GNP. If a proposed standard for solar energy seems to increase GNP and increase employment, then it's a false standard. The standard is: what is the level of solar energy going to be? If there is a level, there is a presumption: if people are doing it, it must be rational.

I'd rather get to the question at hand, which is: with a narrow definition of solar, can we show or conclude anything about whether or not there is a net increase in employment over using something else—let's say, petroleum? (pp. 26-28)

MR. GROSSMAN: I think the title of our panel is too narrow. The issue is public policy, not the macroeconomic impact of solar on employment. I'd like to spend a couple of minutes talking about the recent history of why there is a sudden interest in employment and energy and perhaps put that in a political context.

Starting with the California Nuclear Initiative in 1976, nuclear power proponents vigorously made the claim that nuclear power provided the only path to growth and jobs. They appealed especially to labor unions and minorities, and threatened that nuclear opponents would cause mass unemployment along with freezing and starving in the dark. The synfuels people have used the same line, as have the liquefied natural gas folks, the gut-the-Clean-Air-Act folks, etc.

Federal agencies with responsibility in energy and employment areas accepted the nuclear industry's claims without questioning, without independent analysis. The first National Energy Plan was created with no input from the Department of Labor, and virtually no thought was given to its actual employment consequences.

Safe energy proponents were put on the defensive. And so we began to examine the two key questions: (1) can a com-

bination of increased energy efficiency and renewable energy systems—with fossil fuels as a bridge—fuel our economy? and (2) what are the comparative employment impacts of a nuclear scenario and a conservation/renewable scenario?

We've had a difficult time getting DOL and DOE to take these matters seriously. We're still struggling to get energy policy makers to accept employment as an important criterion of energy policy. And we are hoping to use this time of energy transition to change the way in which policy makers look at employment, plan for employment, and integrate employment with other policy areas, such as energy.

The better we know our different energy choices and the employment aspects of these choices, the better will be our policy decisions. The role of economists, of the researchers at DOL and DOE, is to show the range of future impacts to the best of their abilities, making all their assumptions and criteria very clear.

Ultimately, though, which way we go is a question for the public and its elected officials to decide. If this panel can lay out different criteria and the different kinds of policy vehicles that can help meet these criteria, and provide reliable tools for informed discussion, I think we will be making a big contribution.

CHAIRMAN CICCHETTI: We can get over this debate that deals in a hundred million people employed and $2 trillion economies and look instead at nuts and bolts kinds of things, and then do our own aggregation and see what we come out with—rather than force an econometric model to produce an answer that is not measuring the things that we think ought to be measured in the first place.

We all know that the existing measures of GNP exclude the benefits of solar and underestimate the cost of fossil fuel. Therefore, using the GNP as a basis for evaluating solar has built-in biases that are so strong, even against solar, that even we are questioning it. If solar energy passes the test that is stacked against it, it must be really good. I'd rather go the other direction and look at things piecemeal. (pp. 32-33)

MR. HERENDEEN: I think we have a responsibility to try to answer the question that's been commented on by Grossman. We need something like an economic indicator to tell us we haven't gone too far. My favorite example is the returnable bottle. Going over to returnables would produce jobs, but the jobs that are lost are paying $6 or $8 an hour, while the jobs that are produced are paying $3.

If there is no other criterion, the society could be shifted over to some other new technology which is more labor intensive. (pp. 33-34)

MR. MEADOWS: Our country has used other decision criteria in the past. For example, the documents that provided the charter for the American revolution and the creation of our nation evidence concern with moral principles, equity, and the condition of the human spirit. These and many other dimensions that have always been important in the evolution of our society are completely cast aside as soon as the analysts begin to focus on economic indices to determine the "optimal" program for solar energy.

I suggest that studies of long-term, energy-GNP interactions and relative labor intensities are mainly useful for fueling the bureaucratic debate in Washington. These studies may affect people's GS ratings, their titles, and their administrative power; but they produce little lasting effect on the actual use of concrete solar alternatives by individual home owners and industrial managers. Over 50 communities in the United States are currently engaged in aggressive, comprehensive programs to implement solar and conservation technologies. They did not wait for estimates of the optimal path. They are too preoccupied with organizing programs that will insulate the next house and working to build a political coalition necessary to weather the problems associated with the initial phase of any program to accelerate the use of alternative energy sources.

There are research projects that would be helpful to these local communities in their efforts to pursue the solar option, but we will not identify appropriate research priorities through national level, macroeconomic assessments. We will find them only through a detailed study of the social groups and institutions that have competing stakes in the direction of national energy policy. We will find them only by determining ways in which to facilitate the technical, resource, economic, and political assessments that each local group will carry out within the context of its own community.

There should be more studies of ways that the social benefits of solar energy can be made to enhance the profits of those responsible for implementing solar. In our study of a Vermont wood-fired power plant we found that nearly 300 jobs would be created by a 50-MW facility—chiefly among categories of Vermont workers that are currently unemployed. We found that the state would realize an additional $1.3 million in tax revenue from the plant. The power company considering the choice between building a wood plant inside the state and purchasing a small share of a nuclear plant outside presently pays no attention to—and is

prohibited by law from considering—the external social benefits from the wood plant.

We should assess the ways in which an accelerated solar program would strain specific resources, such as trained manpower or money for home financing. We should work to assess the differences in the psychic quality of jobs provided by the alternative and the conventional energy sources. We should reconceptualize the role and the objectives of the state public utility commissions so that they are free to develop regulations and price guidelines that do take external social benefits explicitly into account. As the source and use of energy shifts in this society, there will be tremendous changes in our institutions. It would be useful to study what those changes are likely to be and to implement programs now that would reduce their most disruptive effects. (pp. 35-41)

CHAIRMAN CICCHETTI: Most of the hard energy path arguments use the job blackmail issue to promote the hard path. I think that one of the things that we can do usefully is to respond to both micro- and macroeconomic criticisms or questions that are being raised about solar. Can we quantify it in this panel? I think not. Can we respond to those two threats and shed some light on how people around this town and this building think? I hope so. I want to be able to respond to those two issues by building up a case that will say that: (1) the question is not the right question, and (2) even if it were the right question, the answer is different from the answer we've heard. (pp. 42-43)

MR. GROSSMAN: The least that we could do is to encourage the ability to analyze the propaganda that's coming out from all sides so that the choices are laid out more clearly than they have been.

CHAIRMAN CICCHETTI: Suppose we could have two solar programs, one of which would be to hire people to build solar units. The other approach would be for each of us to go out and chop wood or to build our own solar collectors and to add insulation to our houses. Let's suppose that none of these things is going to show up in any measurable expenditure on solar and jobs. The other money is not spent on solar, but $50 billion is in the economy that normally would have gone out of the economy. As I remember my Keynesian economics, the multiplier must be assigned to it, and the effect on jobs will be incredible. (pp. 45-46)

MR. GROSSMAN: Isn't it pretty straightforward to figure out the employment effects? The problem is that the models are not arranged in the proper way to do that. (pp. 46-47)

MR. MEADOWS: My impression is that it's not at all straightforward. (p. 47)

MR. HUDSON: Any money spent will create an indirect employment effect. On the basis of this, perhaps the key point is the direct employment impact of solar spending.

CHAIRMAN CICCHETTI: I see how you could reduce welfare, but how do you reduce GNP? (p. 49)

MR. HUDSON: Assume that a barrel of imports is worth $20. Instead, those $20 worth of resources are put into a synfuels plan, but, in fact, it cost $40 to produce that barrel of oil, so another $20 must be obtained from somewhere else to get that same barrel of oil. The overall economic efficiency would be reduced. (pp. 49-50)

CHAIRMAN CICCHETTI: I agree efficiency would be reduced, but I'm talking about GNP. I can see how you could work through this stuff, but I can't see how it's an unambiguous answer that you're going to have GNP go down when you reduce your imports. (pp. 50-51)

MR. HUDSON: The same amount of energy is produced, but $20 has been taken away from consumption, so the quantity of final goods and services has gone down by $20. (p. 52)

MR. MAGUIRE: That's assuming that the oil produced is valued at $20. (p. 52)

CHAIRMAN CICCHETTI: Is that what the answer depends upon—if the oil is sold within the U.S. economy at $20, then GNP goes down, but if it's sold within the U.S. economy at $40, then it doesn't go down? (p. 52)

MR. HERENDEEN: Whenever GNP is compared from one time to another, the assumption is that the real prices of goods are the same. (p. 52)

MR. HUDSON: It's not a matter of what it is sold at; it's a matter of what it costs to produce it. I'm saying there are cases where substitution can drag GNP down.

MR. HERENDEEN: If we agree that the proponents of the hard path are wrong when they say that we need the hard path for jobs, then I think there also should be a way to make the other argument with at least as much validity. (pp. 53-54)

MR. RODBERG: The argument made by the solar advocates bypasses the argument made by the opponents which is that the economy will stop because there won't be enough power plants. But no matter what model we use, we always assume that enough energy is being supplied from some source to "fuel the economy." So in a certain sense we assume away the opposition's scare argument. Then we answer a different question, which isn't the one they were raising. The question we answer is: which has more jobs? (p. 54)

MR. HERENDEEN: I'm worried that we may decide it's too hard a task to say anything at all. (p. 56)

CHAIRMAN CICCHETTI: The direct employment effects of the soft path probably exceed the direct employment effects of the hard path. If the indirect effects are considered, the kinds of things we are talking about are probably even more so. We're also talking about a soft path that's just beginning, so usually all the easy things can be done first. Down the hard path, everything from now on probably is going to be a bit more costly and expensive. (p. 56)

MR. HUDSON: Don't we already have data? It's not a matter of speculation; it's a matter of fact, at least to the first approximation of what those jobs are. (p. 57)

CHAIRMAN CICCHETTI: What is the information? (p. 57)

MR. MASON: Basically, on direct technology employment, the decentralized solar technologies might be significantly more intensive than are conventional technologies. Centralized solar technologies don't appear to be a lot different per delivered energy output. (p. 57)

CHAIRMAN CICCHETTI: What kind of percentages? (p. 57)

MR. MASON: Passive implementation is difficult to figure. You can't even cost it, let alone get the labor component.

One of the reasons those direct solar energy labor data show that is because solar equipment is more expensive. Right now more labor and more capital are required. (p. 58)

MR. MAGUIRE: But if you look at the cheap technologies, that may not be the case. (p. 58)

MR. GROSSMAN: It seems to me that Bennett Miller was trying to set up solar jobs as a strawman earthling and telling us to knock them down. He even used the word panacea for unemployment, and he said, "I want you all to prove it to me so I can go and defend it to OMB." The kind of data produced by the kind of people who are gathered here would help make us rational in viewing specified criteria dealing with the kind of claims that are being made. (pp. 58-59)

MR. RODBERG: I don't like the approach that compares one source with another source, because it's very hard to know on what basis the comparison is being made. First of all, direct jobs are a matter of definition. One of the reasons there are more direct jobs in solar is that more of the activity is defined as direct. Usually, making a turbine for a nuclear plant is not defined as direct. That's why I prefer to use the method which compares different situations. I found a net job difference, and I've been trying ever since to understand why there seem to be two reasons for the large net job bonus to solar. One reason is that many jobs involved in the hard path are overseas jobs because of the imported oil.

The other is that a lot of the money spent on nonrenewable energy by consumers in the next 20 years will be spent on plants that were built 20 years ago and will not be involved in the job picture of the next 20 years. Fifty years hence we will have made the solar transition and will be down to very few jobs in solar. The job bonus occurs only during the transition process. (pp. 59-61)

MR. HERENDEEN: What about the other possibility, that they are lower paying jobs? (p. 61)

MR. RODBERG: The method I used assumed that they were standard construction wage jobs. (p. 61)

CHAIRMAN CICCHETTI: You can have a zero paying job if you do it yourself, and that's the extreme case. If imports are reduced at the same time, the stimulus of the reduced imports on the domestic economy is going to result in an increased GNP and an increased demand for employment.

If solar and nuclear are compared, this may not be the case. If solar and oil are compared, that indirect effect may loom very large. (pp. 61-62)

MR. HUDSON: There are two types of indirect. All the people who make turbines must be paid. This is a legitimate sequence. I think that your reference to the Keynesian multiplier/effect as indirect is not appropriate in this case. (p. #62)

CHAIRMAN CICCHETTI: There's a difference, though. There are two Keynesian effects, and I agree that one Keynesian effect should be left out. That's the balance budget multiplier, where government spending and taxes and GNP all go up by the same amount. But if there is a path that results in a reduction in imports, then it is appropriate to measure that effect on jobs. The indirect effect is when I decide to use my nights and my weekends to cut the tree myself, haul it back to my house, and shove it in my stove. I have reduced my imported oil, but at the same time I have increased my consumption of things that are produced within this economy. (pp. 63-64)

MR. MEADOWS: We have been talking implicitly as though a job were some kind of fixed unit. Yet it is clear that the nature of a job and of employment will shift drastically over the course of society's transition away from oil dependence. Labor in a solar economy will be as different from today as employment today is different from the period when grass, wood, and hydropower were this country's principal power sources. The change need not be retrogressive, but to understand it will require far more sophisticated inquiries than those that simply tally up the number of workers under different scenarios. (pp 65-67)

CHAIRMAN CICCHETTI: Several of us have agreed that we should be making recommendations. The first recommendation I wrote down is that the Chamber of Commerce idea of solar impact on jobs is very weak.

There is a notion of gross national welfare versus gross national product. We could recommend to DOE that they quantify the benefits of solar energy and the soft path and quantify the external cost of the hard path if we are trying to shed light on the debate of one versus the other.

Regarding solar employment, we have the direct question, the indirect question, and the import/balance of payment questions. Again, better measures might be a recommendation for DOE. (pp. 68-69)

MR. HERENDEEN: If we agree to consider a few indicators, we can come close to the answer. First, we should have some indicator of physical consumption, and I like GNP. Second, we should specify jobs to be defined as they're defined today until the year 1990. I'm not interested in the year 2025.

We have two basic results that come from people who use very detailed but static types of calculations and from people who do much more dynamic calculations, but a greater level of aggregation. They haven't buried the hatchet yet, and I think they should be encouraged to do so.

MR. HUDSON: I would want to tell DOE that there are methodologies available. Within the work sponsored by SERI, they have been brought together to give a consistent picture. (p. 74)

MR. MASON: In our exercise, we found some serious flaws in the concepts and methods. We could specify that (1) there are areas that seem to be crucial to solar energy; (2) for whatever reasons, we're not capable of using existing models to assess these areas; and (3) there are modifications that need to be made to give the desired answers. (p. 75)

CHAIRMAN CICCHETTI: What you (Rodberg) are really looking at is a cost-effective investment in solar over time. Therefore, you are showing that for any given levels of GNP, there will be an improvement in employment. (p. 77)

MR. HERENDEEN: And the question is whether that is self-consistent because you assume GNP is constant. (p. 77)

CHAIRMAN CICCHETTI: Let's keep going down this list of recommendations. (p. 78)

MR. HUDSON: I support what seems to be the consensus that employment is one of many important indicators of solar energy that should be taken into account in policy decisions. (p. 78)

MR. RODBERG: The argument is not between the models, but between assumptions that are made in the two models.

My assumption about solar technology is that it used to be considerably less expensive than it is today, and I think the cost figures that Ed's study used were higher. (p. 79)

MR. HUDSON: We put in the constant dollar cost of a million Btu. (p. 80)

MR. RODBERG: That's an arbitrary assumption of what the life is and what the discount rate is. It's absolutely and totally arbitrary. The cost of the solar unit that I install on my roof, per Btu, is absolutely arbitrary because it depends on how I stretch out the investment that I make that year. (p. 81)

MR. HUDSON: My third recommendation is more of a data collection and data management issue to obtain information and present it in a way that will permit comparison of different technologies and assessment of the magnitude of the employment impacts.

CHAIRMAN CICCHETTI: There's an incredible debate on the cost of coal versus nuclear energy. If a decision of that nature has to be made, one doesn't try to come to a conclusion but rather to make a choice on the basis of the available information. (pp. 91-92)

MR. HUDSON: In that case, it probably doesn't matter. How important is it to get this information? And that leads me to question what role the Government should have in this area. (p. 92)

MR. RODBERG: I would say that it is a very important role. It is important for this Department to assess the economic and employment impacts of its proposals. There also should be data and surveys on production and installation methods, the labor involved, and the training needed in any given locale. What will be the employment impact of synfuels? (pp. 92-94)

CHAIRMAN CICCHETTI: Suppose we unambiguously knew the answer to that question. What would we do with it? (p. 94)

MR. RODBERG: In a sense, we were blackmailed into the synfuels policy with an employment argument. Clearly, employment is an important factor if you're saying that in the real world people don't take employment into account in making their policy decisions. I'm saying that they don't and they should. (pp. 94-95)

MR. MASON: There seem to be two general categories. One is identification of issues and the method of providing some information to shed light on these issues. The second one is the definition of key issues and the method of acquiring information that should be included in the decision-making process. (p. 95)

MR. GROSSMAN: And the third category is the process of decision making. It's not DOE's role to decide what the policy is going to be, but to make the choices and the impacts clear. The public, through elected representatives, should select the policy.

Those who are working for safe energy and for some possibility of using the transition to solar for a more equitable economy want to show that there will be no negative impact upon employment when we move to a more energy-efficient, renewably fueled economy. (pp. 95-96)

CHAIRMAN CICCHETTI: Would you agree with this: The job answer is in favor of solar energy as contrasted to the large central generating approach? (p. 97)

MR. MEADOWS: I agree with the statement. (p. 97)

MR. GROSSMAN: I agree with the statement, but I think it would be sufficient to say that employment definitely should be an important criterion for energy policy. (p. 97)

MR. MASON: The key issue is whether or not we can supply energy with solar technology. Can we get energy in a reasonable fashion that way? (p. 97)

MR. GROSSMAN: I think the policy has to be decided the other way: we should select our energy and employment policies in tandem. (p. 98)

CHAIRMAN CICCHETTI: But who makes decisions on that level? No one in this country makes decisions on that level. (p. 99)

MR. MEADOWS: Each of us individually does. (p. 99)

MR. GROSSMAN: That's right, and then it aggregates. That's different. (p. 99)

CHAIRMAN CICCHETTI: Speaking of employment and energy, we will have unemployment as a way of combating our incredible use of imported foreign oil.

MR. MEADOWS: Bennet Miller's job would be greatly facilitated by a better understanding of how employment is perceived by the different constituencies favoring and opposing solar energy. Solar decision makers are very dispersed, and all of them respond to a solar proposal from the perspective of their own families, firms, communities, and natural environments. Understanding is very poor of public perceptions as they influence attitudes about solar and conservation. Good, empirically-based data—something that is clearly possible to obtain—would help us identify certain kinds of solar options that seem more expensive but are favored by most of the stakeholders involved in the solar debate. We also would recognize other solar options that appear economically attractive but are opposed by a large number of the important political constituencies.

It is important to realize that the issue we are currently debating—long-term national aggregate employment—is of almost no concern to any of the groups promoting or fighting solar energy. It is often cited, but only by those groups who feel that the statistic supports their predetermined stance on solar energy. It probably is useful to estimate long-term employment implications at the national level, but that is only about 1% of the real question. (pp. 101-103)

MR. RODBERG: Encourage people to do it locally, because that's where people are going to make solar decisions. (p. 103)

MR. GROSSMAN: If these efforts could just quell the Chamber of Commerce blackmail tactic. . . . (p. 103)

MR. MEADOWS: Mr. Grossman should realize that the groups that oppose solar energy will not change their minds even if it is shown authoritatively that solar will provide three or five times the employment of conventional sources. Opponents of dispersed systems will simply find some other number that supports their case. (p. 103)

MR. GROSSMAN: Fine, but that would be a help. A lot of people are spending time dealing with that argument, and they could be doing something else. (p. 103)

CHAIRMAN CICCHETTI: My impression is that the only interesting things happening in terms of energy conservation are happening at the point

of decision, either in factories or individual households. The decisions that are made in Washington are almost totally irrelevant when it comes to the real world of energy conservation or production. (pp. 103-104)

MR. HERENDEEN: I disagree. The automobile standards are an exception, as are building energy performance standards, appliance standards, and so on. (p. 104)

CHAIRMAN CICCHETTI: A flow of real energy conservation and implementation is coming from the grass roots and from the local and state levels. (p. 104)

MR. HUDSON: I can think of several instances where, although the Federal Government doesn't make the decisions, they influence the parameters that the decision makers take into account in making those decisions: the text treatment, investment tax credit, appliance standards, the price of oil and its deregulation, and the price of natural gas and its deregulation. There must be many ways in which decisions are directly affected by federal action. (p. 106)

CHAIRMAN CICCHETTI: I agree, and I believe that the climate the Federal Government has created leads us, in recent years, more in the soft direction than in the hard direction. (p. 106)

MR. RODBERG: Bert raised what probably is the important point: Can we get enough out of solar energy to fuel the economy? The most important employment study is an energy output study showing in practical terms that technology can provide the electricity and the liquid fuels that we need. (p. 107)

CHAIRMAN CICCHETTI: On one level of analysis, employment is a proxy for the economy, and on another level is the point you just made: Is solar energy cost effective and how will it affect employment? (p. 107)

MR. MAGUIRE: The question isn't whether it's going to work, but how much it's going to cost. Uncertain costs are a problem because of the assumption that the future for the two models is known. Examination of the analysis, under uncertainty, will yield a combination of the two things, for diversity's sake. (p. 108)

(Note: Panel 4 did not meet the second day.)

FINAL REPORT
PANEL NO. 4—MACROECONOMIC IMPLICATIONS

Presented by Chairman Charles Cicchetti

Conclusions/Recommendations

(1) The panel agreed that the various analyses conducted thus far refute what was labeled the "Chamber of Commerce/National Association of Manufacturer's" claim that exponential growth of conventional energy production and consumption is necessary to sustain economic growth and employment. Pursuit of a cost-effective solar and conservation path will, at a minimum, not exert negative macroeconomic or employment impacts.

(2) With respect to the national job creation potential of conservation and solar energy, the panel felt that proponents of the soft path have been unduly expected to prove that there will be positive employment impacts from pursuing such a course. The key issue in evaluating the relative merits of solar energy is whether or not it can supply energy cost-effectively. There are many impacts and potential benefits and costs of solar vs. conventional energy supply paths; relative employment is one impact that should be recognized, but should not preempt all other considerations.

(3) Employment impacts of various energy proposals have not been considered in federal energy policy making. These impacts are potentially important and should be incorporated into energy decisions. DOE, DOL, and other federal agencies should conduct necessary analyses of energy/employment interactions and strive to include these findings into the policy making process.

(4) The issue of macroeconomic/employment impacts of conservation and solar energy is not, from an analytical perspective, resolved. Two key variables in assessing these issues are (1) the costs of conservation and solar energy and the energy they displace, and (2) the ability of conservation and solar energy to reduce oil imports.

(5) Existing theory, models, and data bases are insufficient to provide definitive answers on the total number of jobs that may be created or lost by pursuing a conservation and solar energy path. However, the panel was able to come to the following conclusions:

- To the extent that oil imports are reduced, cost-effective conservation and solar energy technologies will have positive macroeconomic impacts, including employment impacts. It is possible that a relatively more expensive soft path can be pursued without exerting negative macroeconomic impacts if the positive effects of reducing oil imports exceed the negative costs to the economy of purchasing more expensive energy supplies. The magnitude and extent of this trade-off, however, is not known.
- The proper focus for considering the employment impacts of conservation and solar energy is the local and regional levels, rather than the national level. This is because employment impacts of alternative energy courses are likely to be localized, and many key decisions that affect implementation of conservation and solar energy will occur at local levels. To assist local decision makers, DOE should develop self-help audit tools that can be used to measure job implications of a local energy plan.

- GNP is a very inaccurate measure of economic well-being. While GNP should be considered in policy making, many other factors that are not reflected in GNP should be included. Examples of these considerations are externalities, social (rather than market) costs of alternatives, and health and environmental impacts.

CHAIRMAN MILLER: (DOE) It is not clear to me why a synfuels program is different from a solar/conservation program in terms of reducing imported oil.

MR. CICCHETTI: (Public Service Commission of Wisconsin) Using fuels that are more expensive will create drains on our economy with negative effects. We are much worse off with the higher cost approach, if that is what the synfuels program is. But you are right. Spending that reduces our imports will improve our position in terms of macroeconomic policy unless the money is spent foolishly. I believe, that the synfuels program would not be money well spent.

CHAIRMAN MILLER: Are you saying that it was clear to this panel that the solar/conservation option would save more oil than the synfuels program?

MR. CICCHETTI: The caveat is that the synfuels program was found to be less cost-effective than the solar/conservation approach, which I personally and strongly believe is the case.

CHAIRMAN MILLER: It seems to me that we must get at the issue that provides something more than assertions. The synfuels community makes precisely the same assertion.

MR. CICCHETTI: If we spend $40 in the economy in order to save $20 a barrel, we may or may not be better off.

MR. GROSSMAN: (Environmentalists for Full Employment) To say that solar jobs and solar conservation would be the panacea for all unemployment and then demand that the solar and conservation enthusiasts or analysts come through with data in support of that, is unrealistic and unfair. We want to express that employment was one criteria on which we judged solar, and we felt that all the aspects are very positive.

MR. CICCHETTI: Even though employment is a silly standard to pick in the first place, solar energy would excel in both the direct and indirect aspects.

MR. ANDERSON: (Total Environmental Action) I would like to see this type of conference focused on discussing how to maximize the employment potential of solar and how to get on with the job of doing it.

MR. DANELS: (National Urban League) We look to expertise from this panel that will give us some guidance and knowledge about the directions that solar energy may lead us in terms of employment.

MR. CICCHETTI: We agreed in our panel that if the present opposition to solar were taken away, some other opposition probably would come to replace it. Why must that be? The only thing I can think of is a latent fear that it really won't work. The issue that must be communicated to people is that it will work, and the best way to do that is to encourage people who are doing it to tell others about it.

PANEL

NUMBER

FIVE

THE JOB CREATION POTENTIAL OF SOLAR ENERGY*

Invited Paper by Meg Schachter
Private Consultant

The number and quality of jobs are basic issues for the national and local economy. Other important issues, such as quality of growth, stability of income, and the provision of public services ultimately depend on tax flow, which stems from income earned in employment resulting from job availability. The importance of creating and maintaining jobs dictates that we take seriously the employment effects of public decisions, particularly those as fundamental as energy policy. At the same time, energy choices can serve as a policy instrument for communities that want more control over job creation in their area. Therefore, it is not surprising that some of the debate over energy alternatives has focused on the job creation potential of solar energy versus conventional energy sources.

Over the past year, a significant amount of analytical work has been done in this area. Most of it, however, has looked only at the quantitative aspects of job creation: that is, the total number of jobs required by solar energy development compared with the number of jobs required by nuclear, coal, oil, gas, or other energy alternatives. Very little of the analyses has looked at what I call the qualitative aspects—that is, the types of jobs created, their skill and wage levels, their geographic distribution, and the stability of these jobs over time. Although the quantitative work is very important, it cannot address several important policy issues if taken alone—particularly those issues relevant to local policymakers. As one example: solar conversions and installations may create more total jobs than conventional alternatives, but the skill level mix required for solar energy development may not be available in the local labor force. Promoting solar energy on the basis of the total number of jobs created might lead to an unexpected influx of workers and their families from outside the local area, which would put great pressure on local residents. I will return to a discussion of the qualitative aspects in greater detail later. But first, I'd like to summarize briefly what we do know about the number of jobs solar energy can create relative to conventional energy alternatives.

Energy development in general can have several effects on employment that combine to represent the total (or "net") employment effect. The first of these is the direct effect, or the labor requirements for resource recovery, component manufacturing, construction, and general operation and maintenance associated with the energy system. For a solar heating system, direct employment includes jobs required for collector/component manufacturing, installation, O&M, and back-up power. For a power plant, it includes the jobs required for plant construction, resource recovery and transportation, turbine or generator manufacturing, electric transmission, and distribution.

In addition to the direct effects, energy development can have secondary effects on employment. These include the indirect jobs created in manufacturing materials for the system (such as glass for solar collectors or concrete for power plants). Additional jobs are created as these workers spend their earnings on more goods and services. The combination of direct job creation and these secondary effects yields what most regional economists refer to as the total multiplier effect of a particular dollar investment—in this case, an energy investment.

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*This paper was originally presented at the International Solar Energy Society Meetings in Atlanta, Georgia, May 1979.

In counting up the number of jobs associated with a new energy development, it is also necessary to subtract the jobs lost or displaced in other energy-related industries. I refer to this as the displacement effect. For example, if solar energy is promoted to replace nuclear power, the employment effects of the switch to solar should be reduced by the direct and secondary employment effects associated with nuclear.

Finally, it is essential to look at the cost of the energy source to be promoted relative to the next best alternative. The effect of higher energy costs is often overlooked in employment analyses. When the use of an energy source that costs more than its alternative is encouraged through public policies, there will be a loss of jobs somewhere in the economy. Put quite simply, if the nation is forced to pay more for energy, then there will be less to spend on other goods and services. This applies to both conventional and solar technologies. Higher energy expenditures will be substituted for expenditures on other goods and services. This will result in layoffs in those sectors that are affected. This is usually referred to as the substitution effect. Conversely, the use of an energy source that is less expensive promotes real economic growth—and with it, employment—as these cost savings are respent on additional goods and services. This is usually called the respending effect.

The combination of these effects represents the overall effect on employment in terms of the number of jobs created. Most of the quantitative analysis to date has looked only at the direct employment effects—for example, the job requirements for fuel extraction, component manufacturing, construction, etc. These studies indicate that for the same amount of usable energy:

- solar hot water, heating, and cooling technologies in residential applications can create from 2 to 8 times as many direct jobs as conventional power plants. In the case of liquefied natural gas, where most of the direct labor is created in foreign countries, these technologies can create 50 times as many direct jobs; and
- for more centralized solar systems such as solar electric, photovoltaics, large wind systems, ocean technology, and industrial applications, the number of direct jobs created is not significantly different from those required by conventional alternatives. In some cases, as in the case of passive solar systems, the number of direct jobs is even lower per unit of energy output than for conventional energy alternatives. This is because most passive solar features are added on to conventional construction techniques and require relatively little construction labor.

However, as mentioned earlier, direct jobs represent only part of the total picture. In fact, the results of some recent studies indicate that direct job creation can be a misleading indicator of both the magnitude and direction of total job creation. This is particularly true in the case of solar applications that save consumers money, such as passive solar and domestic solar heaters as alternatives to electric resistance heat. What most people forget is that these savings will be respent in the economy and create new jobs. In fact, a recent analysis by Len Rodberg for the Joint Economic Committee indicates that, for cost-effective solar conservation applications, this respending effect can far outweigh other employment effects.

The opposite is true for solar technologies that cost more than conventional alternatives. A preliminary study by Brookhaven National Laboratory indicates that, when solar technologies cost more than conventional alternatives and are encouraged through

subsidies or mandatory requirements, there can be a net loss in jobs. This is true even if the direct and secondary effects of solar energy are greater than those of conventional energy.

It is therefore imperative that we look beyond the direct employment effects. In particular, it is important to ask whether or not the energy alternative encouraged through policy measures will cost the nation, a particular region, or a community more—and how this additional cost or additional savings will affect business activity and jobs. The major exception to this consideration would be a small, undiversified local economy where most materials are imported and most income is spent outside of the region. In this case, direct job effects alone would probably be a good indicator of the total employment effects. But this is the exception rather than the rule. It certainly does not apply to the nation as a whole.

As I mentioned earlier, in addition to the number of jobs created, the skill levels needed, wages, stability, and distribution over time and across regions should be of interest to policymakers. This type of information is essential in determining:

- whether or not the job requirements for a particular energy system or energy strategy can be met by the local labor supply.
- whether job training programs are needed to provide labor for a particular energy development, how many should be set up, and what groups can be most effectively trained for the jobs.
- whether workers in conventional energy systems can find suitable jobs in new, emerging technologies. This is particularly important when the use of newer energy technologies reduces the demand for conventional energy and puts these employees out of work.
- whether energy-related jobs can be targeted to particular workers, such as the unemployed. This requires information on the labor requirements for semiskilled or unskilled workers.
- this information is also necessary for evaluating future needs for local housing and public services—particularly in the case where a significant portion of labor must come from outside the region.

Unfortunately, we know very little about these qualitative aspects of job creation.* Preliminary work in this area does indicate, however, that small-scale solar installations require a different mix of skill levels than conventional power. According to a study by the Office of Technology Assessment, solar installations on individual buildings typically require one supervisor for each 10 workmen, while the ratio for conventional plant construction is more like 1:3. This implies that a transition from conventional power to solar energy may displace a lot of workers in the higher skill categories. On the other hand, this same report recognizes that, for the more centralized solar applications, the skill mix is similar to conventional systems.

Targeting solar jobs to the unemployed has become a major objective of several job training programs, including CETA programs, on the state and federal level. However, a

*A current joint project of the Solar Energy Research Institute and the Oak Ridge Associated Universities is identifying the qualitative aspects of solar energy employment and comparing them to conventional energy technologies on an equal energy output basis.

report by the Solar Energy Research Institute (SERI) indicates that many of the jobs created in the solar collector industry will not be readily targetable to the semiskilled and unskilled worker. According to this study, only 18% of the jobs required for solar water and space heating systems are for semiskilled or unskilled labor. Ninety percent of these low-skilled jobs are in the collector manufacturing stage, not in installation. Technicians and skilled craftsmen, however, account for 38% of the projected solar industry employment.

We do not yet know what labor market experiences these CETA-trained solar workers have had. A current SERI project is following from 300 to 400 graduates of California CETA solar programs to identify the types of jobs they are filling. Preliminary indications are that they are becoming estimators, sales people, installers, and general construction workers. Some students are continuing their solar training through union programs or colleges.

In conclusion, the work in energy as it relates to jobs is really just beginning. I hope that this presentation has provided a good overview of what we know—and what we do not know—about the job creation potential of solar energy. I hope it has also raised some new issues that you will bring back to your respective officers and organizations, and that it will be helpful to your work in the area of energy and jobs.

DISCUSSION

Michael Maguire, Tennessee Valley Authority
Meg Schachter, Private Consultant
Ann Mettzer, SEIA Training Department

Mr. MAGUIRE: There isn't a mechanical linkage between what Mr. Hudson was talking about and effects on unemployment. There is a great deal of argument about what models are applicable to that area, just as there is a great deal of argument as to what you are talking about—the actual job skills involved with solar.

MS. SCHACHTER: Absolutely, and those are issues that the panels will be dealing with.

MS. METTZER: What kind of information are you asking for in terms of the quality of training itself?

MS. SCHACHTER: I have a nod from Barbara Burns, who is involved in that study for SERI, that yes, that is an issue and there is an evaluation of that as well.

PANEL EXCERPTS

PANEL NUMBER FIVE

SOLAR ENERGY AND EMPLOYMENT
LOCAL ECONOMIC EFFECTS

PANEL MEMBERS

JOHN LYONS (Chairman)
International Association of
Bridge, Structural and Ornamental
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MEG SCHACHTER, Speaker
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EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants, and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and at DOE.

FIRST DAY

CHAIRMAN LYONS: The economic impact on the locality of solar energy consists of two factors. One is the central solar system, which probably will be similar to our heavy industrial construction; the other is the noncentralized system, which will have its effect in each individual city where solar energy is consumed. A second demarcation line is represented by the different subclassifications of energy that are under the broad title of solar energy. (pp. 4-5)

MR. BLAIR: We need to think about solar power in two different ways. The first is centralized solar power plant systems that can be treated like other centralized power systems in terms of employment impact. In the construction period, there would be a large number of workers with many craft skills. The operation phase would employ a different type of worker, but a lot fewer of them.

The decentralized power systems, defined as everything that could be in local communities, have quite different types of employment impacts. There may be some related construction, but most of it is operations. It is going to change the nature of the system and the economic relationship. The economic relationships that we are familiar with will change, as people in the local area generate and use their own power. To people in research positions, many of our past models may not be good indicators of what the future holds. It is hard to see exactly what will happen as we change to a decentralized system. (pp. 6-8)

CHAIRMAN LYONS: My prediction is that retrofitting will develop almost separately from the initial installation part of solar usage in the decentralized system. (p. 8)

MR. BUTT: I don't think so. The problem of installing a retrofit system in an existing structure is basically the same as installing a system on a new structure. (p. 9)

CHAIRMAN LYONS: Would the distributing and marketing system be parallel? (p. 9)

MR. BUTT: Very similar. (p. 9)

MR. FITZPATRICK: New construction tends to be done by more traditional contractors. (p. 9)

MR. BUTT: The people who have been doing retrofits usually have not been licensed contractors. (pp. 9-10)

MR. FITZPATRICK: The issue in California is whether or not there should be a separate contracting licensing procedure established for the solar energy industry. There is legislation pending to set up a special solar energy licensing requirement. (p. 10)

MS. HUNT: In Consumer Action Now, we have a major interest in getting women involved in solar energy in terms of employment and decision making processes. (p. 11)

MR. BITTLE: There is not likely to be much of a skill requirement difference between retrofit and installation in new structures even with a different set of contractors.

The construction phase would be a period of 20 to 25 years. This includes about 7% for direct solar energy and 20% to meet Carter's goal, so that the construction phase at that rate of progress will go on for a very long time. What is the employment situation that will thereafter be the continuing contribution solar energy makes to employment? Is this an Apollo program that will make 3 million jobs for so many years and then come to an abrupt halt? (pp. 12-13)

MR. SANTINI: For space conditioning, the data that has been published so far indicates that there is a fairly high operation and maintenance requirement after the equipment is installed. A solar power tower, which is more of a conventional technology, would be similar to a power plant with lower operation and maintenance required later. Biomass, I think, sort of lies somewhere in between. (p. 14)

MR. BUTT: There is no reason why high maintenance costs should be associated with space conditioning. Solar space conditioning systems are designed for an indefinite life. One can use any number to represent maintenance cost to take care of "unplanned" failure. (p. 15)

MR. BLAIR: Commercial installations have required very little maintenance. The ones with high maintenance costs very often have been demonstration projects. Because there were special things put into those projects, they required special maintenance. (pp. 16-17)

MR. KATZENBERG: In the wind industry we use a 1% factor for O&M. (p. 17)

MR. COHEN: The conventional systems, whether air conditioning, oil burners, or whatever, average a 15-year life. (p. 18)

MR. BUTT: The Long Island Lighting Company established reserves of $25.00 per year to cover full warranty on solar water heaters, which is 1% or less of the installed cost. (pp. 18-19)

MR. COHEN: I think the skill required for maintenance is quite different from installation skill. In installation, one hooks parts together without caring what is inside; but in maintenance, pumps must be torn down, and this introduces a different kind of skill. (p. 19)

MR. BUTT: There is a need for troubleshooting skills in maintenance. (p. 19)

MS. SCHACHTER: The distribution of these jobs must be considered over the lifetime of the system. We probably can say that the decentralized solar technologies are less apt to have the boom/bust phenomenon associated with a conventional power plant. Solar technologies seem to provide a little more flexibility in timing the jobs—even the construction jobs—to the local labor supply. Also, job training programs can be paced according to the implementation. (p. 19-21)

MR. KATZENBERG: There will be a boom period for a considerable time. We are almost a fad whose time hasn't come yet, but when it comes, we are going to have to expand very rapidly to meet the demand. Then there will be some leveling off because of all the houses that now exist, compared with new construction. (p. 21)

MR. SANTINI: Construction for solar is in the place where people reside, while the alternative energy facility, the coal gasification or coal electric facility, is likely to be in a remote rural area. Even though it is possible to have a boom/bust effect in solar technologies, the chance of approaching a figure like what is likely to occur in conventional technologies is very remote. The average facility sizes for coal and nuclear energy are increasing, and they are becoming more remotely located. (p. 22)

MR. BUTT: There may be a problem if employment requirements are originally twice the norm to which they will later settle down. (pp. 22-23)

MR. BITTLE: I don't think that it sounds to the individual employee like he is being offered as much of a guarantee as if you were asking him to move from one region of the country to another to do that work. He can see that there may not continue to be orders for water heaters. (p. 24)

CHAIRMAN LYONS: There is a difference in the worker who is primarily the home builder—the small commercial builder—versus the heavy industrial contractor. Will retrofit exceed new installations in the early years or vice-versa? (pp. 25-27)

MS. SCHACHTER: I think the new is going to grow and the retrofit is going to top off. (p. 27)

MR. BUTT: But a long time from now. (p. 27)

MR. FITZPATRICK: This is an area where local government policy will determine whether retrofit or new installation gets the lion's share. I think the nature of the skill makeup of individual workers is very different. I imagine the systems will be quite different in the way they are scheduled—the way they fit into existing construction patterns. (p. 28)

MR. BUTT: The majority of both new and retrofit operations are hot water at the present time. Very few space heating systems are being installed today either in retrofit or new construction. (p. 30)

The difference between water heating and space heating is primarily one of size. (p. 32)

MS. BURNS: With retrofit, one sells the individual homeowner. With new home construction, one sells a few contractors and builders, and the traditional industry suppliers. (p. 31)

MR. COHEN: The way to get solar energy to people in the lower economic bracket is to build up the solar industry so that the price of equipment comes down to within the range of more and more people.

I think there is plenty of room for price reduction. In most companies, collectors are either handmade or semiautomated,

and a tremendous amount of improvement could be made by mass production. (p. 35)

CHAIRMAN LYONS: What is the size of the industry now, in dollar volume? (p. 37)

MR. BUTT: $250 million.

CHAIRMAN LYONS: Suppose that the government would place an order that would guarantee that production, and thereby subsidize it so it would be within the reach of low-income as well as medium- and upper-income purchasers?

MR. BUTT: There are two problems associated with that approach. The changes required to reduce costs are partly larger volume production and partly the important evolutionary development of the equipment. A massive government purchase of solar heating equipment would have a potentially adverse effect by freezing the technology at its present state. The other problem is that even at reduced costs—and my guess is that in real terms, government purchase might reduce the cost by 50%—the product is still, without some kind of special incentive, out of the economic reach of the low-income person.

The difference in price between areas of the country where there is little solar experience and areas where there is a reasonable amount of solar experience is dramatic. (pp. 37-38)

CHAIRMAN LYONS: There is nothing that keeps the price high like uncertainty on the part of a contractor. (pp. 38-39)

MR. FITZPATRICK: In the move away from direct employment impacts, the degree of certainty and measurability is lost, and it is much harder to demonstrate that the employment effect is positive. (p. 44)

MS. SCHACHTER: Without moving past the direct, I don't think you ask all the relevant questions (p. 44)

MR. SANTINI: It is more possible to be a jack-of-all-trades in these solar businesses. With increased labor requirements for solar technologies, there may be problems and conflicts to be worked out among unions. Those things should be worked out to everyone's gain, because of the extra number of jobs that are actually available. Unions that can get involved in training will enhance the size of the union and the number of members.

One life-style issue for people that are involved with providing solar energy is that they don't have to move around from place to place because of the possibility of building multiple small units sequentially. The opportunity is there for gradual growth and elimination of this boom/bust type of effect that exists with larger facilities. (pp. 47-48)

MR. COHEN: In solar heating and industrial process heat, the requirements of people involved in the building, the equipment, and installation are very similar to those of current manufacturing processes.

MR. FITZPATRICK: California is projecting installation employment of 6,000 and manufacturing employment of 2,200 in 1982. That assumes a goal of 20% of all the new housing stock will have solar space heating and water heating devices, both residential and commercial, and, in addition, that there will be an annual residential water retrofit of about 50,000 units a year, in a state that has a total labor force of 11 million and a construction employment of about 461,000.

There is a substantial existing capability to install units such as this without the need for massive employment training. (pp. 50-51)

MR. BITTLE: If you already have a journeyman in one of these crafts, how long does it take a training program to teach him competence? (p. 55)

MR. BUTT: Not very long. (p. 55)

MS. BURNS: The plumbers' union estimates that it takes six weeks for a journeyman to upgrade into solar installation. The easiest transfer is from refrigeration specialists. (p. 55)

CHAIRMAN LYONS: Would that be a desirable direction for the country, the industry, and the consumer to go if we urged that solar installation be a licensed trade? (p. 57)

MR. BUTT: Absolutely. Whether it is done as an add-on or as a special trade is in a sense immaterial, but to get the add-on license he should first learn something about solar and demonstrate proficiency. (p. 57)

MR. TAYLOR: Solar test questions were put together by an ad hoc committee of the HVAC contractor associations, and these are presently

used by the California state licensing board as well as the Arizona state licensing board. Certification is a step higher than licensing, because it requires a real qualification and a certification of the individual with demonstrated skill as well as knowledge. Licensing only requires the knowledge skill. (pp. 58-59)

MR. BLAIR: A distinction must be made between the subcontractor or the contractor, and the craftsman. The subcontractor must understand all the special features that are HVAC-related in solar, and if the subcontractor knows that, he or she can use any good skilled craftsman. (p. 60)

MR. BUTT: I don't see a need for a totally new craft. I do think that there is a need to do whatever training is necessary to teach people the special things about the solar installation.

The manpower needed to install a solar water heater that has to have a conventional one as a backup may be two or three times as much as what conventional systems require alone. At some point in time, the total number of craftsmen employed must be a factor of two or three as many as are now employed in installing the conventional equipment. (p. 61)

MS. BURNS: Does solar installation provide us a chance to let some of the city groups that are not traditionally included in the energy labor force enter into the work force for solar energy? (p. 62)

MR. BUTT: It does. In the community where I live, most of the residential construction is not unionized, but the craftsmen that install solar systems were trained by the unions and decided to go into business for themselves. The easiest place for them to go into business is in the residential area. (pp. 62-63)

CHAIRMAN LYONS: The trade insists that we train mechanics that can do all the work operations. If one man is trained to do one part of a broad range of skills, how can one ever be assured that that man will be at the right place at the right time? (p. 68)

MR. BITTLE: There are questions of whether competent people with a little more training would do a good job of installation, whether they have overtrained for the job, and what skill levels are really important. (p. 69)

MS. SCHACHTER: The issue that fascinates me is whether or not non-union trade people could get involved in solar activity. Are we broadening

the discussion a little to talk about the people who are unemployed or underemployed—women and minorities? (p. 72)

MS. BURNS: We are finding that most of those CETA-trained people are being trained very broadly. A wide diversity of people is coming through. Many are getting solar jobs and are turning out to be reasonably good. (pp. 73-74)

MS. BURNS: People in some of the CETA programs see a real problem in having training fall within the jurisdiction of traditional unions, because of very restricted boundaries. There is conflict between the plumbing unions and the sheetmetal unions about what kind of solar training is best. Consider the way of the mobile home workers, who have a totally separate industry of their own.

MR. BUTT: The person who is welding together a collector has a welder's skill, which is different from the skill level needed by a welder working on a nuclear power plant construction job.

The minimum economic size of a collector plant will be smaller than the optimum size for a refrigerator factory. Transportation costs are relatively quite high, and this will always be true. I think there is a more dispersed solar industry down the road than in the appliance or automobile business. (pp. 78-79)

CHAIRMAN LYONS: Should the contractor be a licensed one? (p. 82)

MR. COHEN: Current heating, ventilating, and air conditioning businesses in most states must be licensed. I certainly think it should be the same with solar. (p. 82)

MR. KATZENBERG: Employment requirements of the wind machines are no different in terms of manufacturing. That means they will be labor intensive and somewhat unskilled, but I think there is a tremendous potential for employment in the installation and erection of towers. Tower installation is a very complex field that requires experience and equipment, and it can't be done by neophytes very well. I think that most communities will require licenses and background for the people who do that. Installation is primarily a problem of tower erection and in most instances followed by a crane installation of the generator itself. Tower erection is not centrally located.

I think we are going to find in wind energy that as these plants get developed, the manufacturing will be done in those areas where the labor is relatively cheap. I think there may be many

plants in places like the South—even though that is not where the wind is—simply because production cost is going to be a key. I think we are talking about Frigidaire-type plants again. I think wind plants are going to be sold for two-and-a-half dollars a pound, like automobiles and steaks. (pp. 82-100)

MS. HUNT: The Fred Dubin study pointed out that probably 80% of Long Island's energy could come from wind machines. New York City streets channel wind in certain ways that are unpredictable and can be changed by construction. This leads to an idea of wind rights. Someone eventually may have to go through a whole court battle in order to get wind machines accepted into the utilities. There are great barriers, but great potentials.

I think the job potential would be great in New York City for installing, maintenance, and so forth. (pp. 103-104)

MR. KATZENBERG: We are finding that the public utilities are really very cooperative. (p. 104)

CHAIRMAN LYONS: The towers are usually conventional, structural steel towers, made in many small fabricating plants. One doesn't find over 200 men working in a structural fabricating plant. They are usually located in an area that services about a 200-mile radius, so the whole country is actually adequately located now for the fabricators of these towers. The design will be fairly standard, but there will be custom requirements based upon the different siting required.

MR. KATZENBERG: Because the steel already is produced in sufficient quantity, the raw material is relatively inexpensive. It could conceivably be a regional business. Manufacturers are slowly realizing that the dynamics between the rotor, the generator, and the tower can be quite serious. Ninety-five percent of the towers sold with wind machines today are produced in one factory. Wind towers will be located where land is less expensive. There is talk about setbacks from wind machines in terms of zoning, and this will require land. Wind utilization is a rural kind of situation. In terms of labor, I don't know why wind machines couldn't be produced in cities where the labor is relatively available. Leasing of wind machines where the user pays only for that which is produced could add considerable tax advantage to the solar hardware situation. (pp. 107-112)

MS. SCHACHTER: Would a public utility commission be responsible for the maintenance if the wind machine broke down? (p. 113)

MR. KATZENBERG: Right. (p. 113)

MS. BURNS: How will the demand for solar component manufacturing and installation affect existing small businesses? How will it affect their market and their growth? And how will it affect the ability of small businesses or of large companies to develop decentralized branches in various communities? (p. 114)

MS. SCHACHTER: Can local economies adjust the ultimate solar option for their own resources, labor supply, size of manufacturing? If that flexibility is available for solar energy and not for conventional energy technologies, I think we can make a statement about that. (p. 115)

MS. BURNS: Is there any technical reason why solar technologies would have to be developed in a centralized facility? (p. 116)

MR. BLAIR: We are still talking about a limited number of manufacturing facilities in most cases. Everything we have looked at in the grid—certainly flat-plate collectors and photovoltaics—falls into the centralized manufacturing category. (p. 116)

MR. BITTLE: As we move into computerized manufacturing, people are saying that many of the advantages for gaining economies of scale will be lost. With that kind of operation, one can make smaller runs without having to maintain all these inventories. Therefore, it is more possible to have smaller factories. The smaller technological manufacturers may be in a better position to take immediate advantage of these new technologies. (pp. 117-118)

MS. SCHACHTER: The reason we were talking about more decentralized manufacturing was so that communities could have more direct local employment if they need it. (p. 119)

MR. BITTLE: There will be upheaval in all employment. (p. 119)

CHAIRMAN LYONS: If that takes place with respect to solar energy, it will be taking place with respect to everything. (p. 119)

MR. BITTLE: It makes possible a decentralization of solar or wind manufacturing, and it refutes the point that there must be a 5,000-man plant that supplies the whole country. (p. 119)

MS. SCHACHTER: For a minute I would like to get back to the old approach. Does it mean that most solar technologies need a plant that is so large that it usually is not in a local community? That is not clear to me. And what about shipping costs? (pp. 119-120)

MR. COHEN: We probably wouldn't want to have a plant on the East Coast serving the West Coast. (p. 120)

MR. BITTLE: The more that is shipped, the lower the rate becomes in many cases—so it is another economy of scale. (p. 120)

MS. BURNS: The benefits of economy of scale probably would be somewhat less than a very highly technical skill which is in lower demand. (p. 121)

MR. BITTLE: Economy of scale has more to do with equipment than with labor. Many of the things related to economies of scale need to be rethought. That is what we are talking about—all of the institutional rigidities or social rigidities. (pp. 121-123)

CHAIRMAN LYONS: The central labor employment factors can be upset by a change in technology and/or a greater development of incentives given by localities for manufacturing in those localities. (p. 124)

MR. SANTINI: Communities apparently can cause a greater or lesser degree of local employment in the technology by the policy that they adopt. What is the relative role of localities, versus states, versus the Federal Government in this policy process? Is it really best left up to the locality to try to examine their own self-interest in the process? (p. 125)

MR. KATZENBERG: If we talk about tariffs in cities, communities, and states, then we will end up with one of those complex structures surrounding America that we are trying to break down on a worldwide basis where tariffs could be reduced because there is no interaction between countries and we built inefficiencies into the system. My heart tells me one thing in this regard, and my head and financial background tell me that some of these products are just going to have to be produced in quantity to be cost-effective; so, better in quantity than not at all. (pp. 126-127)

MR. BITTLE: I think that local communities will try to set up tariff barriers, almost like countries do, between states and areas. (p. 127)

MR. FITZPATRICK: I see two basic questions. One of them is, "What can these types of energy technologies do for employment in the local area?" I think what has come out here is pretty clear that the answer is: "Not much." The next question is, "What can local and state communities do to guarantee the quality of training that is needed to ensure that the technology will be accepted?" (p. 127)

MR. COHEN: Roughly a third to half of the cost is in the installation, and that is done locally. (p. 128)

MR. BITTLE: Solar installation is not really going to create many new jobs. It will be a lot of work, and it may make quite a number of employees more secure. (p. 128)

MS. SCHACHTER: We are talking only about direct jobs in this discussion. Other employment effects should be taken into consideration—the effects on manufacturing materials, the effects on spending the savings that are reaped every year once the system pays for itself in local goods and services. (p. 128)

MR. FITZPATRICK: The issue is quality control, not what it will do for local economies. (p. 129)

MR. COHEN: Right now we have a broader problem, and that is to get more energy from solar sources. If we can create jobs at the same time, that's a bonus. (p. 129)

MR. BITTLE: There is an assumption that we have passed the critical mass point and solar is really about to take off. I wonder if we aren't being asked to focus on something that is not the issue. (p. 129)

MR. SANTINI: Are we sure enough that solar is cost-competitive to say that employment is a factor that is really important? (p. 130)

MS. SCHACHTER: My interpretation of the task of this meeting was to understand the differential employment effects, given that the solar costs may be the same, or given that we are at the horizon where we are making conscious policy choices. (p. 131)

MR. BITTLE: It seems to me that this is more a matter of finding the change. Where is the employment going to be? What jobs? As an example, we represent some people in the can industry. It doesn't do any good for those people to talk about the recycling

business and bottle-return legislation. Their uncertainty is: "Where is the employment?" and "Am I, as a worker, going to be one of the lucky people who continues to be employed?" and "Am I going to have as good a job when this is accomplished as I have now?"

Summing up my reaction to our meeting, it seems to me that solar's input is not going to be a tremendous, sudden boost to the local economy, but its effect will be basically positive and relatively steady as it moves on. My feeling is that the skills, and probably a lot of people to fill the jobs, are already in the community doing jobs that aren't that dissimilar. (pp. 131-133)

MR. KATZENBERG: I think we are all basing this on incredibly incomplete information. As I see it, we are not talking about limiting jobs in any other industry as a result of this, with the possible exception of the building of nuclear plants, which will be for reasons completely other than whether or not solar makes it.

The capital is going externally and never being seen again. The question is, can we have policies to keep it in the system? I don't think that it is fair to ask us to make intelligent, rational decisions about jobs and energy based on the little work that has been done. I compliment all of you on what you are doing, but we are still scratching the surface, and I am sure you know it far better than I. Tell us what is most difficult to find in your areas of research. Where are the weaknesses in the system that don't provide you with the information you need? (pp. 134-136)

MS. HUNT: In New York City I talked to four solar manufacturers. Each has had an increase in sales, and each cannot find enough trained people. They are willing to train the hard-core unemployed. (pp. 137-138)

CHAIRMAN LYONS: The skills are available, but skilled people won't work for the wage. Others have to be upgraded. (pp. 138-139)

MR. COHEN: Process heat is not too dissimilar from space heating. A different type of collector or concentrator must be used, but it is essentially plumbing. The systems are going to be much larger per installation. There will be similar types of job opportunities needing about the same basic skills, but a better job of planning must be done before entering the field.

MR. BLAIR: There are four biomass areas that appear to have something going for them right now. One is wood burning. None of the wood burning projects is having major employment impact. There will be some impact in terms of cutting the wood, but the key is that the employment will be close by.

A 50-megawatt woodburning plant might have 300 or 350 people to supply it with wood chips. (pp. 142-144)

MR. LEVINSON: You are talking about rural areas where even what appears to be a small amount would have a significant impact. (p. 144)

MR. BLAIR: A second area is fuel gas generation, using animal manures to generate methane. It can't be very labor intensive because it is done on dairy farms and it can't be a very costly activity. Gasohol production is exploding all around the country. (pp. 144-146)

MR. LEVINSON: There wouldn't be much of an employment impact if production of alcohol were a family farm operation. If gasohol were produced in large refinery operations, then there would be additional employment, but one has to look at the offsets with the loss in gasoline refinery jobs. (p. 146)

MR. BLAIR: Alcohol, as a fuel, is very marginally cost-effective now. It can't have a very big labor impact. The only other current activity in biomass is in municipal waste, but again it tends to involve people who are already employed with these facilities. It is a low-employment impact. (pp. 147-148)

MS. BURNS: In terms of conclusions, solar is not as labor intensive as some earlier projections have led us to believe, but it is regionally located and therefore reinforces the need to include indirect and induced labor in our analysis. Second, the boom/bust phenomenon is avoided with solar, because the people and the jobs are more stable. Third, city and regional policies can affect the location of employment by zoning policies, mandating conservation or solar applications, and by purchasing and procurement strategies.

Fourth, as to retrofit versus initial installation, they do use similar skills, organization, and infrastructure. Fifth, the skills needed for many of the manufacturing and installation jobs in solar technologies are likely to be available in the local employment market. Sixth, some of the solar energy technologies may contribute to regional employment in manufacturing and installation, but may or may not have a direct impact on cities or small units of government.

The only two recommendations that I hear clearly are: (1) DOE should investigate licensing of solar workers; and (2) a better definition of roles and responsibilities among the city, county, regional, and Federal Goverment levels is needed. (pp. 149-152)

SECOND DAY

CHAIRMAN LYONS: We will commence this morning by reading the preliminary draft sentence by sentence to see that we clearly understand what is said and whether we agree with it. (p. 3)

MS. BURNS: The introduction basically tries to give a background of what we were trying to do. Then six or seven issues were separated out which seemed to differ from one other. I will read through the introduction.

"The primary questions addressed by this panel were (1) whether the development of solar energy technologies would create significantly different employment opportunities at the local level than do conventional energy technologies, (2) whether the actions of local (city) or regional governments could influence these employment opportunities, and (3) whether the numbers and types of workers needed in solar energy development are likely to be available in local areas." (pp. 3-4)

MR. SANTINI: It might be useful to say that we had answered the questions in a general way. Number one, I think, was yes; to number two, the answer was yes, and number three is yes. (p. 5)

MS. SCHACHTER: I would go one step further. In number three, the reason the numbers and types of workers needed in solar energy developments are likely to be available in local areas is that a local economy will have those manufacturing skills. (p. 5)

MR. BITTLE: It may be appropriate even in the introduction to say that the rest of the report shows that we answered all of these questions. (p. 6)

MS. BURNS (reading): "It was the feeling of the panel that solar energy technologies will be further developed and implemented, and that the availability of skilled workers may influence the regional development patterns." (p. 6)

MR. BITTLE: The sentences here seem to imply that the availability of skilled workers may be one of the things that either helps solar energy to move ahead or impedes it. The availability of workers will not be a significant barrier, and barriers that exist will not be in that area. (p. 7)

MS. BURNS: How about, "Local policies and employment characteristics will influence the regional development patterns"? (p. 7)

MR. BLAIR: The energy technologies you are talking about here, solar and conservation, will cause diversified employment impacts in many local communities. (p. 9)

MS. BURNS (reading): "An important point was agreed to by the panel—the presently available information on labor requirements for manufacturing, installation, and operation and maintenance is inadequate for informed energy policy decisions." (p. 9)

MS. SCHACHTER: The secondary employment effects, although very important, do not seem to be well understood. (p. 11)

MS. BURNS (reading): "There are two other areas that are not well understood. One is the more detailed information on the characteristics of employment . . . and the other one is the secondary labor . . . " (pp. 11-12)

MS. SCHACHTER: I would like to replace that sentence with: "An important point was agreed to by the panel, that there is a significant gap in the presently available information on: labor requirements for manufacturing and installation and maintenance, secondary employment effects on a local economy such as indirect employment effects and respending of disposable income, the qualitative issues identified by the panel such as wage skill levels and the duration and timing of jobs over the life of this system." (pp. 13-14)

MR. LYONS: In view of the time, let's move on with the panel's conclusions and recommendations. (pp. 14-15)

MS. BURNS (reading): "(1) in general, solar energy technologies do not appear to be as labor intensive in terms of direct employment as projected in some earlier analyses. However, they are more likely than conventional energy jobs to be regionally distributed. This reinforces the need to include indirect and induced employment effects in the analysis, since the regional distribution of jobs increases the importance of secondary effects such as respending on the local communities. DOE should seek to include indirect and induced employment in its analyses of solar energy technologies and should provide funding and technical assistance to local governments involved in assessing the employment impacts of alternative energy strategies." (p. 15)

MR. SANTINI: The local governments will not generally own the conventional energy resource and they will ignore it. It will be something that is always a drain in terms of a loss of indirect and induced benefits from local respending of the energy company's dollars. (p. 16)

MR. LYONS: The D.C. analysis showed that there was no employment offered other than minimal. (p. 17)

MS. SCHACHTER: The issue is not so much on ownership, but on who was employed. (p. 17)

MR. FITZPATRICK: If the decision is whether to build a nuclear plant or a solar energy institution or system in a particular area, solar energy is the better choice in that narrow context. But in the context of the state, it may be more rational to do otherwise. (pp. 17-18)

MR. BITTLE: What are we asking DOE to do there? (p. 19)

MS. BURNS: I suggest that we do two things. One is to expand it to regional and local governments which take care of part of the city problem, and to also develop better models and data bases for supporting these analyses. (p. 19)

MR. BLAIR: I would like to see a sentence in there that says, "the employment analysis must be focused on specific local communities and regions." (p. 20)

MR. FITZPATRICK: I'd like to suggest adding a sentence: "The qualitative aspects of this employment are of special importance, including the skills required for solar technology, the wages paid to workers, the method of training them, and the manner in which solar skills fit into the area's existing trade structures." (p. 20)

MS. HUNT: I just want to emphasize the inclusion of previously excluded sectors of society in these programs. (p. 21)

MR. FITZPATRICK: I was going to add, "which means that employment as an issue in determination of whether to use solar or some other energy technology is not as significant as other issues." (p. 21)

MS. SCHACHTER: What about the secondary effects? (p. 21)

MR. BITTLE: With a 20% commitment to solar energy, we haven't even looked at the labor issue yet. So, I don't think that it is in the forefront of determinant factors that we should consider in deciding the pace of our commitment to solar energy. Far more important is the overriding need to find solutions to the wealth reduction resulting from our current energy-dependent situation as it influences our national security, our standard of living, and ultimately our ability to employ all who are able and willing to work. (p. 22)

MS. HUNT: Maybe that first sentence should say that the direct and indirect job potential of solar is uncertain. I am very skeptical about what we know.

MR. BITTLE: In our economy, we don't have enough jobs to employ all of the people who want to work. An employer in this kind of a situation will always say that he has difficulty getting employees with skills that he requires, because it is to his advantage to have a pool of trained workers available. That helps him to keep his employment costs down. Our problem is that we have more workers than American industry is creating jobs for. When the going rate for a particular job is $9.00 per hour, the employer who wants to pay only $7.50 is going to say that he can't find enough adequately trained workers. That does not mean that we need a great training program for the poor or untrained. If they are trained in these specialties before the specialties create much work, we will not be that much better off. It is a complex issue. (pp. 23-25)

MS. SCHACHTER: My opinion is that the key is getting those energy costs down. If people look only at the direct employment effects, they are going to be misled, both for the local and the national economy. (p. 26)

MR. KATZENBERG: Here is a new recommendation for the group's approval: "that the Department of Labor provide facts relevant to the impacts of a commitment to reach a 20% energy supply from solar on the labor sector of the economy. This should include a comparison between these technologies and comparable industries of a like nature. Primary and secondary impacts should be analyzed. This information could then be factual support for DOE investigative efforts in this vital area."

I am trying to make the point that there is some good information in the system, and it is relevant. For wind machines it might be tractors. For other technologies there are relevant comparisons, and we should realize that and use it intelligently. (pp. 28-29)

MR. BITTLE: The Department of Defense has had a lot of studies done in terms of a nuclear holocaust and what kinds of people they would need to bring various industries back to operational levels. Should DOE have something like the Agricultural Extension Program where a regional person helped contractors? (pp. 29-30)

MS. SCHACHTER: It is being done.

MR. SANTINI: Many of the questions on employment impacts are general.

An employment analysis is something extra. The technology programs would give us money and say: "Develop a good base on employment and make it available to any division of DOE." There is not an organization in DOE with that kind of labor statistics mandate. (pp. 30-31)

MR. BLAIR: There is the Manpower Assessment Branch in DOE, but their funds have been cut back this year, and they are very small.

MR. SANTINI: We have developed a little more knowledge on a specific project every time.*

MR. BLAIR: We still do not have adequate data on the emerging solar technologies.

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*Postscript, June 1980: We now have funding specifically to remedy this problem and are adding technologies to our data base. However, the adequate data problem remains for solar energy. We hope that it will eventually be solved by SERI.

FINAL REPORT
PANEL NO. 5—SOLAR ENERGY EMPLOYMENT AND THE LOCAL ECONOMY

Presented by Chairman John Lyons and Barbara Burns

Introduction

The primary questions addressed by this panel were (1) whether the development of solar energy technologies would create significantly different employment opportunities at the local level than do conventional energy technologies, (2) whether the policies and actions of local (city) or regional governments could influence these employment opportunities, and (3) whether the number or types of workers needed in solar energy developments are likely to be available in local areas. It was the feeling of the panel that solar energy technologies will be further developed and implemented, and that as compared to conventional energy technologies, solar energy development can support more diversified regional economic and employment patterns. An important point was agreed to by the panel—there is a significant gap in presently available information on:

(a) The labor requirements of solar energy systems for resource recovery and processing, manufacturing, installation, construction, operation and maintenance.

(b) The secondary employment effects of solar on the local economy, such as indirect employment in manufacturing materials and the respending effects.

(c) The qualitative aspects of job creation, such as the wage and skill levels, distribution of jobs over time and over the life of the energy system.

These issues need to be addressed in greater detail for conventional energy technologies as well. Thus, many of the panel's conclusions and recommendations should be reviewed as better employment data and analysis becomes available.

Recommendations

(1) In general, solar energy technologies do not appear to be as labor extensive in terms of direct employment as projected in some earlier analyses. However, they are more likely than conventional energy jobs to be less concentrated. This reinforces the need to include indirect and induced employment effects in the analysis, since the regional distribution of jobs increases the importance of secondary effects, such as respending, on the local communities. In addition, the qualitative aspects of this employment are of special importance, including the skills required for solar technologies, the wages paid to workers, the method of training them, the manner in which solar skills fit into an area's existing trade structure, and the ability of solar to bring the economically disadvantaged into the employment mainstream. DOE should seek to include indirect and induced employment in its analyses of solar energy technologies, and should provide funding and technical assistance to local governments involved in assessing these employment impacts of alternative energy strategies.

(2) In most cases, the development and implementation of solar energy technologies does not produce the "boom-town" effects associated with the construction of conventional power plants. Conventional facilities result in a geographic concentration of a large number of workers for a short

number of years. Even in the case of centralized solar facilities, this concentration is much less (because of the relatively smaller size of centralized solar facilities). Because of this, solar energy technologies do not produce the same problems for local communities in terms of providing public services and housing.

(3) A number of city and regional policies were identified that can affect the location of solar energy employment. These include zoning, procurement and purchasing, and financial policies. Therefore, DOE should determine and clarify the appropriate role of local, state, and federal policies in promoting the development of solar energy technologies.

(4) The residential solar energy market can be divided into retrofit and initial installations. While this distinction will have an effect on the timing and extent of employment in particular areas, it does not affect the skills required or the infrastructure organizations involved.

(5) Because the skills required for manufacturing and installation of decentralized solar energy technologies are concentrated in the skilled, semiskilled, and unskilled labor areas (rather than scientific and engineering fields), they are more likely to be available in local employment markets than are the skills required for power plant construction.

(6) Some solar technologies (e.g., centralized solar thermal plants, wind energy conversion systems) require more land or unique conditions not available in urban areas. Because of this, some solar technologies may contribute to and be affected by regional concerns rather than city concerns. DOE needs to include a variety of government levels in its program to allow for differences among the solar technologies.

(7) A crucial issue for state and local governments is the type of certification and licensing required for contractors and subcontractors, and the certification of workers involved in decentralized solar installations. These policies should protect the quality of solar installation and, hence, encourage its acceptance by the public. DOE should provide financial and technical assistance to state and local governments in this area.

(8) Agencies of the Federal Government have extensive employment information for industries similar to the emerging solar industry. DOE should develop procedures for using this information in regional and national analyses of the employment effects of an accelerated solar program.

MS. NADER: (Woodrow Wilson Institute) We are misleading the public when we call our speculations "conclusions."

CHAIRMAN LARSON: (SERI) The first conclusion was that solar energy systems did not appear to be more labor-intensive. That is a controversial statement, and Laura wants to know how you can justify that.

MR. LYONS: (AFL-CIO) Obviously, we don't know that. We concluded that based upon the information we have. The research that was done by the panel participants in the earlier studies, which said that this was going to be a highly labor-intensive area, is not really holding up based upon their own studies.

When we talk about the future, I think it is very important to say that these are our most thoughtful speculations and they disagree with earlier speculations.

OBSERVER: I would like to point out a very large caveat in about the third sentence, that all of our findings are subject to change upon new information.

MS. BURNS: (SERI) We are trying to indicate that we need a much more comprehensive discussion of what the labor effects are, rather than the traditional arguments of higher direct employment.

MR. TATUM: (Department of Energy) The administration currently has an Energy Management Partnership Act pending on the Hill. Would you recommend direct funding to local governments to undertake the solar transition?

MR. LYONS: I don't believe I could comment on that bill, because I am not familiar with it.

MR. TATUM: Assistance to the local government would be coming in a form pretty close to what you are describing. That bill says that the local governments will be able to set up an operation financed by the government, which would then receive all of the data that we are asking DOE to collect and then dispense that into the community.

CHAIRMAN LARSON: We have three panels that will address that issue.

MR. TAYLOR: (Department of Energy) Did the panel address this topic with any specific recommendations, conclusions, or speculations in regard to low income and the unemployed?

MR. LYONS: We started to get into that, Lawnie, and then we came to the conclusion that if we tried to go into it in depth we would never get a statement out. Therefore, we stepped back and decided that CETA programs are better utilized with respect to bringing into the work force training up to a certain level and then utilizing the existing apprenticeships to upgrade from that level.

MR. GUY: (Urban League of Rhode Island) I am not sure of the differentiations, because if you are not looking at solar as being a labor-intensive industry, then you are looking at it as being a capital-intensive industry. Could you comment on that?

MR. LYONS: We were concentrating more on the numbers of employees for whom employment would be made available as we move into the technology of solar. We feel that there will be a lesser number of employees, and that the employees are available in the communities that can meet these demands, and they are available in the skills needed.

It is not going to require such huge specialized training programs as had been thought. In other words, the workers are there and the skills are there.

PANEL

NUMBER

SIX

SOLAR TRAINING—A PRACTICAL APPROACH

Invited Paper by Wilbur L. Fillippini
National Training Fund

Participating in this exchange on solar technologies is one more bit of evidence that "solar is now"—not a fuzzy idea to be played with for another score of years before it becomes practical. America cannot wait another 20 years or so before it gets serious about the utilization of solar energy. Events of the last year or two have demonstrated that the American economy rests on a fragile foundation in that we rely on foreign oil wells for a substantial portion of our energy supply. Whatever we may have thought about the Shah of Iran or about his successors in the control of the government of Iran, the events of the last year in that troubled nation have served us with a valuable reminder: the oil that comes out of the ground in exotic places can be easily turned off at the wellhead.

As an American citizen, I do not relish the prospect of this nation having to beg, borrow, or buy our energy supply at very high prices from sheiks or shahs or Third World dictators. The oratory at the recent conference of allegedly nonaligned nations in Havana directed much of its hostility to our country. While many of those nations might indicate, through channels of quiet diplomacy, that they don't really believe the oratory they voice in public, I think we should take their message at face value.

That message, it seems to me, is that America should be striving through every possible method to achieve energy independence—or at a minimum, we must seek to move resolutely toward that goal, even as we recognize that it may never reach 100% achievement. To my mind, the move toward energy independence places high priority on the development of solar energy. The sun has a unique quality: to quote the old popular song, "No, no, they can't take that away from me." When we build solar energy into our economic system and into our energy supply, we build a permanent asset for America. The use of solar energy hurts no other country: everyone has access to the sun.

A far-flung American solar energy system is not only a permanent contribution to our national wealth—it is an almost indestructible one. At least so far as heating and cooling are concerned, there is not one central location, or a relatively limited series of concentrated locations, that can fall prey to possible enemy attack or to sabotage by terrorists. This decentralization of solar, this diffusion of collectors, appears to me to enhance the value of the solar addition to our energy supply.

At this stage, some of you may be looking at your programs, and wondering what all this has to do with training workers for jobs in the burgeoning solar heating and cooling industry of the years ahead. My answer, very simply, is that it has everything to do with it. We are not, in this emerging solar industry, building little toy prizes to put in candy boxes. We are not building a fad item, like skateboards or bicentennial souvenirs, to be enjoyed briefly and then discarded. What we build and install as solar systems must be designed to function well for many years to come.

If our products and installations are of low quality or if they are improperly prepared and maintained, there will be an adverse consumer reaction that could turn people off to solar very quickly indeed. When the owners of property go to considerable expense to install solar equipment—even with the benefit of tax incentives or governmental grants—they want products that will operate efficiently with minimum requirements for maintenance and repair.

To achieve that goal, we need a well-trained, broadly skilled, highly motivated work force. We do not need to acquire a reputation as a fly-by-night, unreliable, fast-talking industry with a shoddy product. We do not need the kind of reputation that clings to used car salesmen, or that bedeviled the television repair industry for many years. Let us face the fact that there is a lot of shoddy work and a flood of shoddy products on the American market that are doing our country no good. We must not let the same thing happen in the solar energy field.

Those among us who belong to the older generation can remember the days between the two World Wars when the products of the new industrial economy in Japan were scorned because they were flimsy and poorly designed—in a word, shoddy. The Japanese were wise enough to learn the lesson. Today, Japanese products of high quality have won substantial portions of the world market. I know that American industry and American workers also can produce high quality items that stand up in use because they are well-designed, well-manufactured, and well-installed.

And that is what the National Training Fund of the Sheet Metal Industry—together with the contractors and the Sheet Metal Workers Union—is determined to do. We are single-minded on this issue; we will let nothing deter us from the idea that the people who work on solar systems must have the best possible training, the broadest possible knowledge of the materials and products they deal with, and a dedication to high skill and craftsmanship in their work.

Let me hasten to add that, in this context, the issue is not union versus nonunion. If anybody wants to discuss that issue outside this meeting, I will be glad to. As a card-carrying union member and a former union business agent, I have some strong ideas about the desirability of a strong union of the workers in this industry. But that is not the issue we are talking about. The issue that involves us is the well-trained worker, whether he is a union member or not, compared with the untrained worker, the partially trained worker, or the helter-skelter trained worker. On this issue of principle, I do not believe there is much room for debate.

The problem that I see in solar job training is this: it is a matter of delusion and, not infrequently, self-delusion. Many of the people and institutions who are offering what they describe as job training are not offering job training at all. They are giving what amount to crash courses, which cannot possibly make fully trained solar installation workers out of the green personnel who sign up for their courses. The graduates of these courses may, perhaps justifiably on the basis of the sales talk they receive, think they are fully trained and qualified. In fact, they may be quite deluded.

If I signed up for a six-month piano playing course at a community college in my home county, I might learn in that period to play "at" the piano. I might gain enough skill or have enough inherent talent to tinkle a few tunes at a family party, but I would be wary of trying to perform on a concert stage in circumstances where people were being asked to pay hard-earned dollars for admission. Obviously, I am not complaining because the educational institution offered some piano courses. I am suggesting that these courses be regarded for what they are, without delusion. In translating this into the realm of job training, I see some direct parallels.

Let me hasten to add that the organization I represent is not looking for an elitist solution to this problem. We hold no monopoly on the ability to teach the solar workers of the emerging future. But I do maintain, on the basis of all our past experience, that the long, careful, and standardized instruction offered to both apprentices and journeymen in

the sheet metal and air conditioning industries is the kind of solid training that the solar industry must have if it eventually is to be successful. While expressing that view, I want to emphasize my own personal belief in and support for government programs that help millions of Americans climb out of the depths of poverty and assist so many of our minority citizens in escaping from discriminatory practices. The Sheet Metal Workers Union and SMACNA—the industry trade association—have supported these programs, and both the union and the industry have responded to the emerging needs of the times.

There are no shortcuts to acquiring technical education and skills. One cannot become a brain surgeon in a couple of years or a sheet metal worker in a couple of months. A good instructor under a CETA program can teach a young man or woman how to build a simple solar collector to heat a residential hot water heater or a modest swimming pool. That kind of instruction has its place, but that place is not in the mainstream of solar energy installation as we envision it in an expanding future.

Recently I happened to look over the curriculum of required major courses offered by a community college in a major American city. If taken at face value, the curriculum seems impressive. To achieve an associate degree in solar energy and maintenance, one must take 60 credit hours in a number of subjects: bricklaying: 60 class hours; structural carpentry: 60 hours; solar system design and layout: 60 hours; advanced solar controls: 60 hours; and so on. But I submit that structural carpentry, bricklaying, or other various aspects of solar installation and maintenance cannot be learned in a week-and-a-half. Courses like these will turn out a group of "jacks of all trades and masters of none." If large numbers of these graduates emerge into the real world with the confidence that they are competent, then I fear that the solar industry is headed for the same dismal experience as the early era of television repair. To quote the old song, "We'll have nothing but plenty of trouble." But that kind of trouble is not inevitable. There is another way.

The other way is careful, quality training combined with supervised experience. That way leads to quality craftsmanship, averts waste, and develops consumer confidence. These are our objectives in the joint labor-management training courses sponsored by a fine industry and a responsible union, aided by the most modern possible technical input from our organization, the National Training Fund.

When we get to the practicalities of solar installation, we are faced with the incontrovertible fact that a solar system is, and must be, a component of a finely tuned heating and air conditioning system. It does not have a truly independent existence, but is "part of the team." There are very, very few locations in this country where a reasonable person could expect solar energy to carry the full load of heating or cooling a structure. Solar equipment, to be cost efficient, must be part of a well-functioning heating and air conditioning system. Otherwise, we can forget about it as a viable economic factor. In an inefficient heating and cooling system, solar energy will not reach the level of efficiency we need. But in an efficient system, it can play a strong economic role.

The young man or woman who emerges from a four-year apprenticeship training program using the curriculum of the National Training Fund has the knowledge and experience necessary to work on every aspect of heating and air conditioning. This student is broadly trained in welding, testing and balancing, hydronics and air velocity, draftsmanship and blueprint reading, service work, and every other aspect of the craft. He or she is equipped not only to work on solar installation, but to fine-tune the whole heating and cooling system. So, unlike the 60-hour wonder from a quickie course, the fully trained apprentice is at home with every aspect of the job. In a word, he or she is prepared.

Billions of dollars will be spent in this country for retrofitting work in the next few years. The trained, skilled worker will be able to do that work efficiently and properly—the poorly trained worker will not be so equipped. Without properly trained workers, much of that money will be wasted, and we will not be conserving the energy that retrofitting, combined with solar systems, will make possible. The skilled sheet metal journeyman is under considerable pressure from his peers to work efficiently. The union, union president Edward J. Carlough, and employers have spent a considerable amount of time and money to make sure that the training program is modern and of high quality. Both the union and the contractors have been among the strongest supporters of the introduction of solar energy into our energy package.

The union has taken the unprecedented step of publicly guaranteeing the quality of the work in the installation of solar equipment by a contractor under union contract. The contractor, the union, the supervisors, and the employees are united in wanting to see solar work grow to the proportions it should. Of course, there is a self-interest motivation here that is collectively beneficial.

The union knows that solar installations in the 1980s can provide the number and quality of jobs that air conditioning offered back in the 1950s. A lot of work is available at fair wages and at fair profits for the contractor. All of that could be endangered by public disappointment in shoddy engineering, shoddy merchandising, shoddy construction, or shoddy workmanship. We can't let that happen. Furthermore, we must do better with solar equipment than we have in our first efforts.

Too many hundreds of thousands—if not millions—of dollars have been spent on slipshod demonstration projects. The Department of Energy, for a number of reasons—none of them very good, in our opinion—heavily weighted its research funds and grants on water systems and only recently came to realize the importance of air systems.

When funds are available, people, organizations, schools, and colleges will find projects—good or bad—on which the money can be spent. Some of the money has gone down the drain, some will produce meager returns, and fortunately some will make a major contribution to bringing America into the solar age.

I am proud of the record that we in the National Training Fund, together with our contractor and union components, have been able to achieve in preparing for that inevitable era of solar energy. It started when the Fund commissioned a study at Syracuse University in 1976. We asked the engineering professors there to survey the implications of technological change on our sheet metal industry training methods. That study told us that the courses we have been offering could teach the skills necessary both for energy conservation in buildings and for new energy sources. The study pointed out that the techniques of testing and balancing and adjusting that we have been teaching are needed in the retrofitting process.

With this as a background, and with our interest in solar energy, the NTF has been able to revise old curricula and develop new ones. We have accumulated a substantial quantity of training aids and a variety of teaching methods using modern technology so that our students—apprentices and journeymen alike—will get the best available training from instructors who are kept constantly up to date on new techniques and methods.

In our four-year apprenticeship curriculum, we have included new segments on solar installation. We have developed and disseminated new material essential to the fine-tuning of heating, ventilating, and air conditioning systems. Furthermore, we are nearly

ready to distribute a whole new series of materials in brochure form and videotape cassettes to our joint apprenticeship chairmen and instructors.

In a word, we are doing everything we believe will be helpful to provide the skilled work force that widespread acceptance of solar energy will require in the years just ahead.

Let me point out one important fact. This program is a product of labor-management cooperation. In the journalistic profession, strikes make news on page 1, and agreements get printed on page 28. The work of the National Training Fund, a vital product of labor-management agreement, doesn't ordinarily even rate page 28! But whether the papers tell the story or not, we are here, and we are now. Our mission is simple: to give our students not just a minimum of job training for solar installations, but to turn out broadly trained, highly skilled workers with pride in their craft and a feeling for the importance of the solar energy component of our total energy package.

That sense of responsibility on the part of our people is essential to the future of solar, and I believe that it is fundamental to the energy future of our nation and our democratic civilization.

CLOSING

PANEL EXCERPTS

PANEL NUMBER SIX

SOLAR ENERGY AND EMPLOYMENT
JOB TRAINING

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EDITED COMMENTS

The following comments have been excerpted and edited to reflect the main points raised by participants, and comprise approximately 10%-15% of the panel dialogue. Emphasis has been placed on comments that could be influential in establishing or changing national policy. The order of presentation has been preserved; transcript page numbers are shown for further reference. Full transcripts are available at SERI and at DOE.

FIRST DAY

CHAIRMAN RUTTENBERG: We will take for granted that jobs will exist in industry, and we will move forward from that perspective rather than become bogged down on the issue of the number of jobs. I would like to know if the panel agrees that we are talking about the jobs that are related to the immediate problems of solar energy, space heating, air conditioning, hot water, and the equivalents. (pp. 3-4)

MR. LANE: We do perceive the issue of solar training and the solar industry to be a natural extension of the existing heating and air conditioning industry. Our experience is that a contractor will not hire someone who has been specifically trained only as a solar installation technician. (p. 8)

MR. HILTON: One of the issues that have not even been mentioned is RCS (Residential Conservation Service) and the impact on solar manpower needs. (p. 12)

MR. KARAKI: I believe that this country has a very broad spectrum of education and job training centers. We can and should utilize these training centers to their maximum capability by adding a new technology for the marketplace to their overall efforts. I think that to do otherwise, to set up trained specialists in solar technology only, is to do an injustice to the graduate. (pp. 14-15)

MR. LOOPE: I can't see that anything very special is going to be demanded here in order to meet whatever manpower demands might arise by the solar change. (p. 17)

MR. JAEHNE: We feel that one of the values of these training programs, like the SUEDE program, is that it can build stronger, healthier, more decent communities. We feel that the training programs should be comprehensive. It's not just one tool or one task. It's a range of skills so that

a person coming out of the training program has numerous job opportunities, what we call multilevel entry skills into the job market. We believe that any training program of this type should be integrated with extensive field experience. There are a couple of reasons for this. One is to get the knowledge of the trainees out into the community where it counts. People need practical experience. There is no competition with the private sector there because those people are not going to be purchasing. It helps commercialization because people see the process in action. It builds trust because people from the neighborhood become trained and they work with their neighbors and those are the kind of people you tend to trust. A kind of synergy evolves when you install your systems coherently in a neighborhood. Instead of one system engulfed in an entire neighborhood, suddenly you have ten greenhouses functioning. That makes a big impact. By integrating programs into neighborhoods you can tap existing resources instead of spending your time in Washington creating new resources. My final comment is that such training programs should be sufficiently staffed and planned to allow for double-duty applications. (pp. 18-21)

MR. DENNIS: When we train people for jobs, and follow our obligation to place them on jobs, we have to go where the jobs are. I think that makes a lot of sense for the people we are training as well. The limitations of it are obviously that if and when some day the market does shift, they will need additional training; they will need additional work. We are doing our level best to avoid getting into any jurisdictional disputes with different unions. (p. 24)

MR. LaPLANT: We anticipated an overwhelming response and it turned out to be kind of underwhelming, because of the cost-effectiveness of solar right now. Solar is almost dead as a nit in the northern climates as far as we can tell by what people are willing to spend on it. (p. 26)

MR. SCHMIDT: Our attitude is that there is quite a big job market, a potential job market, that's really going to burgeon. We have to open up this market for the unemployed and underemployed and in order to do so, I think it's important to develop a separate category, and break it into a 3-tiered classification.

The unique thing about solar is that it's not strictly plumbing. It's not strictly carpentry or electrical work. It encompasses all those skills. We are developing a

curriculum to be used by community groups such as community colleges or community-based organizations. The second phase of our efforts in California is to set up what we are going to call a solar work institute. A solar work institute would now take this curriculum that we developed in Phase I and go out into the community and work with the local groups that are interested in setting up solar training programs. We are very careful to make sure that before a training program gets funded, at least through CETA funds, they take great pains to be sure that the employers are committing themselves to participating in the training, perhaps in the curriculum development, and also definitely in hiring these people. We're concerned about this whole idea of career development. So we want to make sure that these CETA people receive, in addition to basic skills training, remedial academic training. At the other end of the spectrum we want to make sure that the CETA people have the opportunity to learn additional skills so that as the market grows they can grow and they can go into sales; they can go into management; they can go into apprenticeship programs and become journeymen or they can go on for advanced training. (pp. 28-31) There needs to be a stronger effort stressed toward a solar future in order to lay the groundwork for jobs. There needs to be a commitment to bring about the underemployed or unemployed depending on their situations within the job training programs. Solar is much more than an add-on to existing heating systems. I think that's misleading because the state of the art has limited solar energy to do only that right now. I have been talking to people who have heated their homes totally with solar energy and renewable resources without using any of the conventional heating systems. That leads me to believe there is room for the solar technician or a status separate from integrating existing jobs. By doing so, you are not only emphasizing the ability to bring about these new technologies, you are also opening a greater opportunity to employ people. I don't believe you need as much as a four-year program to adequately train people. Wind systems are just around the corner. There need to be programs developed for that. We must also anticipate job training in the use of woodburning stoves, photovoltaic cells, methane digester systems, and other integrated or hybrid systems. (pp. 31-34)

MR. FILLIPPINI: I think it's very misleading to make young people think they are going to have a full career in this whole thing. For you to say that unions or even the nonunion segment cannot assimilate these CETA people and properly train them, is stretching it pretty far. We have been doing that since the history of not only trade unions but

vocational and technical education to meet the needs of this country. (pp. 36-37)

MS. LUDLAM: The reason that I am involved in training is for employment. (p. 37)

MR. FILLIPPINI: I don't think solar should be used as a vehicle for training. (p. 39)

MS. LUDLAM: I don't care what is used as a vehicle. I am saying only that my people have been skilled. (p. 39)

CHAIRMAN RUTTENBERG: One of the key issues that's certainly been raised in the presentations hits upon the issue of quality of the training and what kind and how much training does one need to really be successfully employed? (p. 41)

MR. LAITNER: With respect to the industry and the unions, I think their position stems more from territoriality: trying to maintain their own place in the market, which is not wrong. There are appropriate reasons for discussion of the solar technician apart from simply adding on to present skills or present programs within a union or within an industry or within a contractor. (pp. 41-42)

MR. DENNIS: Training programs ought not to be limited to one kind, whether through an extension of a sheet metal worker or through whatever contractor programs exist. (p. 42)

CHAIRMAN RUTTENBERG: What kind of a solar training and employment program are we talking about? How should we proceed? (p. 47)

MS. METTZER: One of the reasons you can't get away from the union versus nonunion issue has to do with the level of training that the unions and the nonunion programs believe is necessary to install solar equipment. Now, we have developed a curriculum within which we teach plumbing, roofing, and basic electricity. We hope to turn out people who have a variety of skills which will enable them to effectively install solar energy equipment. (p. 48)

MR. O'CONNOR: If there aren't really solar jobs now, we should address the reasons. Is it because the barriers to solar installations are still too great? Are we being unfair if we train people specifically in solar today? When will the solar jobs come along? (p. 49)

MR. FILLIPPINI: Even with the complete knowledge that sheet metal workers have and the diversification of everything that we teach them, employment runs somewhere between seven and eight months out of the year. (p. 51)

MR. SCHMIDT: The swimming pool industry in the fifties apparently had a lot of in-fighting with the trades as to who would have jurisdiction. I think the swimming pool market around the country is pretty much an enterprise of private contractors. I think we can use that analogy with the solar systems. I think we have to use solar because those people who are underemployed, unemployed, and economically and socially disadvantaged cannot make the transition from where they are now to the apprenticeship programs. There has to be some intermediary step. We are looking at solar as a definite vehicle. For every slot that's open there are about 15 to 20 applicants, a figure that far surpasses any other type of training program. It has everything that people want, that "motherhood and apple pie" kind of image. I also think that these are preapprenticeship training programs. (pp. 52-54)

CHAIRMAN RUTTENBERG: I don't think any of the union people would disagree with what he is saying. That seems to me to be a very interesting and important conclusion and recommendation for us to be making. (p. 54)

MS. LUDLAM: He has just defined my program and the way it works. (p. 55)

MR. HILTON: Who is installing solar systems now? New types of contractors. Right now I think that actually the sheet metal workers don't really have a market in the solar industry. Our program is very successful and our people are getting placed. They are not an extension of somebody's plumbing business, a sheet metal shop, carpentry, or any of the other areas. (pp. 57-58)

CHAIRMAN RUTTENBERG: I have heard on the one hand that solar is an important element but it ought to be integrated into the overall heating, ventilation, and air conditioning industry. I hear

[others] saying that a solar technician is a separate entity as an occupation. I think it's important we pursue this issue. (pp. 58-59)

MR. DENNIS: We have letters from employers all over the country who are hiring for jobs in the solar industry—in most instances working predominantly, not 100%, at solar. I suspect this is a question we have our own opinions on, but we are never going to resolve it. Unless there is a major upheaval in this country, the majority of the jobs are likely to remain in the nonorganized portion of the industry. We will have solar specialists within a variety of trades who are capable of doing excellent solar work where that is part of their duties. I strongly urge that it is not the function of government to do anything about that. (pp, 59-61)

MR. KARAKI: From my point of view it is difficult to define a solar job. This panel has an obligation to address the passive retrofit issue because, in the future, there is probably going to be much greater growth in that area. (p. 62-65)

MR. LANE: It's recognized that the existing HVAC industry does traverse a multitude of trades. There is a job classification under the Department of Labor that calls them air conditioning mechanics although at this time there is no corresponding category with any of the organized labor unions. These people tend to do anything. One comment was made that the Sheet Metal Workers International is not capable of absorbing these people. I don't believe that is true. Whether they are union or open shop, they are always looking for qualified personnel. (pp. 66-68)

MR. LAITNER: The level of training is never enough. That prompts the question, "What level of initial training is enough for job placement?" and, as a corollary to that, "Is it necessary that they be gainfully employed in a job for which they have been formally trained after they have been through this thing?" (p. 69)

MS. LUDLAM: I think you need to identify the market that you are training for. (p. 73)

MR. HIRSCH: I would like to throw in a term that might be useful in trying to determine what level of training we are talking about. That term is entry level. (p. 75)

CHAIRMAN RUTTENBERG: Then the next question is, "How much and what kind of training, if any, ought that individual have to move forward?" It is a question of how well organized that on-the-job training should be. Should it be related to apprenticeship programs? Should it be related to instruction off the job? Should it be in addition to working on the job as such? (pp. 75-76)

MR. SCHMIDT: It would be pretty difficult for us here today to actually determine what skills are required. (p. 77)

MR. DENNIS: We made a lot of dumb mistakes, a lot of bad installations. You see all kinds of companies who have in fact now had to develop their own training programs, their own curriculum, and are engaged in doing exactly that for the products they manufacture. So I don't think we can do a darn thing. In fact, the market is already doing it. (p. 78)

MR. LAITNER: With two exceptions. If we are going to achieve a goal of 20%, the market alone will not be able to do it. It needs to be catalyzed on some basis. The second exception involves the issue of equity to be considered here. I agree with just about everything Mr. Dennis said with the sole exception of his reference to the solar industry—I have stated quite clearly it is our belief there ain't no such animal. I think the key here is that these training programs should be set up by private industry, to meet all levels of expertise. If the government wants to accelerate the market viability of solar installations, perhaps they should look at stimulating the market rather than stimulating the training programs and hoping that the market will be there some day. (pp. 79-80)

MR. DENNIS: I don't know that we differ. The primary thrust has to be to stimulate the market. (p. 80)

MR. LaPLANT: Two points. First, we can't train enough people in-house to service the industry. We market our software and hardware to schools across the United States. You talk about stimulating the market. From a manufacturer's standpoint that is most critical because the solar market is in the embryonic stages. It changes constantly. We don't really know where solar is going; I don't think anybody knows. It could spell doom for a company if they didn't make the right guess the first time and analyze the situation properly. Economic investment in solar takes a

concerted effort between Federal Government training, institutions, and manufacturers; everybody marches in unison. (pp. 81-82)

MR. KARAKI: We can advise DOE from this panel to be reactionary—i.e., follow what the market demands. The other course of action perhaps would be to anticipate what the job market might be and make policy that leads us in a direction that society will be ready to respond to when the need arises. One popular way would be to mandate solar systems in, say, all new buildings or mandate them in federal buildings or all public buildings or in schools. We ask, "Why job training?" I think one of the needs for job training is to provide protection to the customer. The system that is installed will have at least two qualities and perhaps three. The first one is reliability, the second is durability, and the third factor is economical systems. I don't believe we should try to debate the preapprenticeship program or the apprenticeship program or the union question. (pp. 83-85)

MR. LAITNER: I agree with what you said, up to a point. I disagree on another basis. I think the recommendation we ought to make to DOE should stem from the idea that we fully and wholeheartedly support the need to go solar to the extent of 20% by the century's end. First of all, we need to take a serious look at what the traditional marketplace, industry, contractors, and unions can handle with an accelerated development and then determine what deficiencies or shortfall in labor availability will exist and what programs need to be created to make up that shortfall. But then, secondly, we need to take a serious look at the new technologies. The heating, ventilation, and air conditioning people have had the advantage of being able to track those systems as they have been converted to solar energy. There are few industries that are able to track the development of wind, methane digesters, and so on, down the line.

Therefore, there is clearly a role for developing training programs for people to install and work with those types of new solar technologies. Finally, there is the need to move toward training programs that emphasize equity. (pp. 85-86)

MR. O'CONNOR: Are we going to recommend analytical studies to DOE that still need to be made? (p. 87)

MR. FILLIPPINI: If we are going to do that kind of survey, I think we should separate two things. There is a lot of work that should be done by our universities and our junior colleges in the areas of research and development by the people who are familiar with the technology of all types of solar systems. I think that sort of training is just as important, perhaps more important, than just confining ourselves to the guy who is going to have the hammer in his hands. (pp 87-88)

MR. KARAKI: I find myself troubled about following a political direction that says we should address a 20% goal as a specific recommendation. I would like to bring myself closer to what I am looking for a couple of years from now or four years from now. (p. 89)

MS. LUDLAM: The price of oil jumped from 48 cents a gallon to 98 cents a gallon, and we're looking at $1.50 a gallon. That in itself is going to make not only passive solar but active solar and all kinds of alternative energies more cost-effective. The market is going to have to meet that need. And in meeting that need we are going to have to have trained people. (p. 90)

MR. HILTON: I mentioned RCS earlier—Residential Conservation Service. It goes on line about six months from now. Are we going to have people available that are trained in the passive areas? (pp. 90-91)

MS. LUDLAM: There are not sufficient numbers of auditors. We are now sending people to junior colleges to be trained as auditors. That is going to be an absolute necessity. (p. 91)

MR. LAITNER: I have to respectfully disagree with both the impact of this past winter and the impact of RCS on solar installation activities in residences. There is going to be a lot of interest in conservation aspects, but that doesn't really address the solar issues. (p. 92)

MR. FILLIPPINI: The auditing question absolutely must be integrated with solar and conservation. Solar energy is not going to achieve this ultimate degree of efficiency without first having a system that works properly in a building. (pp. 93-94)

MR. LAITNER: One thing that I think we should address is the legislation now pending in the Senate Finance Committee that will raise the tax credit to 50%. That is something that could very well be the marketplace stimulus that we are talking about. (pp. 94-95)

MR. JAEHNE: We have two choices. We can either educate and provide incentives from the government point of view or we can let mandating take over. That is the kind of choice DOE has to make. One of the first recommendations to DOE is that they reinstitute SUEDE on a larger scale. Right now we have to get people out there putting up installations. Second, I would recommend to DOE that they establish a series of pilot regional training institutes to take advantage of the natural climate zones. We look at the pilot regional facility for the Northeast to be about $250,000 a year. Third, I think we should continue to support union programs. It is in their best interest to keep solar energy developing and take advantage of the jobs that will be created. My final recommendation is that CETA should be encouraged to put their primary emphasis into energy training programs. (pp. 95-97)

MR. LOOPE: I would respectfully suggest that DOE give consideration to coordinating with institutional, governmental, private, and other national mechanisms—such as the Department of Labor and the Department of Health, Education, and Welfare—that are already in place and for decades have been addressing these kinds of questions. Changes in technology are not that horrendous a question. What we need now is a national policy by the Department of Energy to start expediting all of these processes and coordinating them with all of the existing mechanisms. (pp. 98-99)

MR. SCHMIDT: I would like to take Mr. Jaehne's fourth recommendation and further break it down. There are just five short points. The first is that funding for the programs be based on the availability of jobs. The second one is that the training programs should be short-term in nature—roughly six to twelve months. Third, we need a task analysis based on the local job assessments. Fourth, I think that CETA training efforts should be based on a cooperative planning process that involves community-based organizations, apprenticeship programs, local businesses, and educational institutions. Fifth, I think that the programs should be evaluated continuously, to be updated to take into account the changes that are being made, and to consider other areas of importance that may combine with solar to enhance job prospects.

For instance, we were talking about auditing. This is just an example of potentially combining solar installation maintenance work with energy audits for residential homes. (pp. 100-102)

MS. LUDLAM: The big problem we have found with CETA is that it sometimes takes a little more than six months to really get the kids' attention and make them understand what's expected. I got involved with solar and some of the people working with me got involved in solar because we saw it as a breakthrough for new employment. (pp. 103-104)

MR. FILLIPPINI: I have to respond to the great plea for CETA programs, and as I said in my opening remarks, there are good CETA programs. I have to take a moment to give you an example. I am opposed to this broad concept of the total approach of CETA as the answer. I received a letter from a big engineering company executive asking to use our curriculum and our materials. I said, "What are you going to teach?" He said, "We have a CETA program where we can take 26 people off the streets and we are going to teach them to be solar technicians." He said their contract with the city lasts eight weeks. I told him we have about 42% unemployment among construction workers who are capable of doing that and the law says you can't create a CETA program to train people for jobs when there is unemployment. I said, "What are you going to do with these poor kids when you put them out after eight weeks? Don't you realize what you are doing to them from a social point of view?" It is a travesty. I told him I just don't understand why people think the Department of Energy has the responsibility to solve all of the social issues of this country. It belongs to the Department of Labor. It belongs to the many departments in the government who can do something about it—programs that I have supported all my life. (pp. 104-106)

MR. HIRSCH: The SUEDE program exists no longer. (p. 107)

MS. LUDLAM: That happened. We have to try to find other ways of getting the job done. Our instructors had to be $10,000-per-year people. This year the Congress cut them to $7,099 a year. That's what we received to train our people, and somehow we get the job done. The only thing I am saying is, don't put another constraint on us—there are enough problems.

MR. LAVALLEE: We need to focus on consumers and how they will see solar energy. If jobs are shoddy there are less likely to be orders for solar systems. You need to have people who are properly trained, adequately trained, to ensure good and safe work. That involves expensive and prolonged training. (pp. 107-108)

CHAIRMAN RUTTENBERG: Let me see if I understand what I have been hearing. First, job training exists to provide the consumer with the assurance that the system is reliable, durable, and economical. Now, that is a clear-cut position. We are saying that CETA funds can be and should be used to train the disadvantaged to move into what might be either preapprenticeship or additional training programs. One needs to look at the reasonable expectation of employment from various types of technologies. Flowing from residential conservation service audits will be these reasonable expectations of employment; therefore, the CETA-type monies could be used to prepare the disadvantaged so they can move into more skilled occupations. We need to do something about ensuring that in our school system, all the way from elementary through secondary schools, through voc. ed. training, through two-year community colleges, on even into the four-year universities, people are trained and given a better understanding of what solar energy is all about. I think we also need to talk about having a pilot regional training institute or institutes. There are similar programs within the Department of Labor at regional university institutes which train people. One might suggest here that either that institution or similar kinds of institutions be given this additional responsibility of preparing people on the technical assistance levels. I wholly agree we need to continue discussing the issue of job evaluation and the re-institution of the SUEDE program. (pp. 108-113)

MR. HILTON: The difficulty that the Committee had with it was that the Department of Energy had no business running CETA training programs. In some ways I wouldn't disagree with them. But the problem is, that meant the demise of a good training program: SUEDE. DOE doesn't have to run these training programs. They can facilitate with technical expertise. (pp. 113-114)

MR. LAITNER: The purpose of a training program is more than just providing reliability to consumers. The training program should also be developed to accelerate the development of solar energy. The training ought to be helping the unemployed. Finally, there ought to be training programs

which are more long-term to develop new technologies. (p. 116)

MR. KARAKI: I think some of what was just mentioned belongs in the information dissemination sector, not in job training. (p. 117)

MR. LAITNER: One of the reasons we have gotten into the energy mess is that we tend to categorically and narrowly conceive the programs without any integration whatsoever. (p. 118)

MR. KARAKI: I don't believe this panel has the responsibility to develop program details. I think we have to address policy. (p. 118)

MR. LAITNER: That is policy—deciding on what type of training is policy. We have an obligation and responsibility to stimulate creativity, if nothing else. (p. 119)

MR. FILLIPPINI: Maybe I misunderstood what you meant by having the Department of Energy research for the numbers of people. I listened to Senator Kennedy's Subcommittee on Appropriations commission the Department of Labor to come up with all of the facts that you are now going to ask the Department of Energy to come up with. Do you know that the Department of Energy has a department within itself to study all of the manpower needs for all solar applications? It is already doing survey work. (p. 119)

MR. LAITNER: I am not suggesting DOE go out and do all of these macro studies when other agencies are doing them. I am suggesting that the definition of training is an important one. What training is designed to do will very seriously shape the programs that emerge. (pp. 119-120)

CHAIRMAN RUTTENBERG: The problem is that neither DOL nor DOE is doing an adequate job in terms of what the job implications are for various energy systems, including solar. (p. 120)

MR. JAEHNE: You can't talk about jobs until the consumers express the desire to have solar installations. Therefore, I recommend that training programs be structured in such a way to generate consumer demand. They can create

market demand by being interviewed on the spot, by having newspapers there, by having the media come around, by taking tours of the building, meeting builders, planning officials—all kinds of things like that. This should be policy. This isn't program management. If you are going to put a dollar in the community, make it do twice as much work. There also seems to be an emphasis that the people who come out of the SUEDE training program have only entry-level skills. It is our experience that some of our people, after three months in the classroom and six months in the field, are now training union carpenters in how to do solar installations. (pp. 121-122)

MR. HILTON: The point I want to make is that a SUEDE-type training program turns out, as you would expect, a bell-shaped curve of different kinds of people. Some people are super qualified: they will become entrepreneurs. have their own businesses, and be millionaires. I don't want to promote the notion that we are taking the uneducated and are making them a little bit less dumb. (p. 123)

MR. DENNIS: I think the simplest way to handle the CETA issue is to demand that the Department of Labor spend a certain percentage of its employment and training budget across the board on alternative energy and solar energy-related issues and not try to push that function onto the Department of Energy. It is not a function of the Department of Energy. It belongs in the Department of Labor. (pp. 123-124)

CHAIRMAN RUTTENBERG: It is going to be done by the community-based organizations being used by the prime sponsor. (pp. 124-125)

MS. LUDLAM: That is the reason for the triangle. It has nothing to do with the Department of Energy running the Deparment of Labor program. The Department of Energy, under their mandate, put in the hardware. The Department of Labor, under their mandate, put in the CETA monies. CSA, under their mandate, put in the administration money. (p. 125)

CHAIRMAN RUTTENBERG: Wait a minute. Maybe I misunderstood you before. Would there be any major disagreement with suggesting that CETA monies be used to train and provide the preapprenticeship or pre-employment activity? (pp. 125-127)

MR. HILTON: There are 15 CETA programs. They should find out what worked the best and why and then come out with a new slim-line SUEDE. (p. 127)

CHAIRMAN RUTTENBERG: I have been a Vice Chairman of the Board of the Corporation for Public/Private Ventures, which is an intermediary corporation founded by the Ford Foundation and Department of Labor that has been involved in a residential rehabilitation program with the youth administration. One of the responsibilities of this corporation is to do ongoing evaluation. October 1 was the end of the first year of the program for eight different communities. We know what has been happening in those communities. That is the sort of thing that should have accompanied the SUEDE program. (pp. 127-128)

MR. FILLIPPINI: The CETA programs would still be funded and your program would be funded today had funds been used according to the regulations. You are drawing the whole Department of Energy into a social issue and it is not going to work.

MS. LUDLAM: They pass it out to the political jurisdictions—the local jurisdictions.

MR. FILLIPPINI: I would go on record as being absolutely opposed to the CETA programs per se, because I know what the policy is.

CHAIRMAN RUTTENBERG: What we will do is put together a sort of summary. Unless somebody else has some other input. (p. 130)

MR. SCHMIDT: We have out of the (California) Office of Appropriate Technology a booklet called "The Solarwork." It is a newsletter. It should be of interest.

CHAIRMAN RUTTENBERG: That does raise another question, which is, "What kind of a communication network and/or clearinghouse ought there be so that everybody doesn't rediscover the wheel?" (p. 130)

MR. SCHMIDT: About a year ago, when I was inquiring about programs on training, I called DOL and DOE. Every agency that I got was a different person coordinating training programs. And every time I talked to the people about what

the others were doing they would say, "Oh, yeah, well one of these days we will try to get together and have some central coordination." That could be a problem to address. (p. 131)

SECOND DAY

CHAIRMAN RUTTENBERG: What you have before you is a draft document based upon yesterday's discussion. I hope to go through it paragraph by paragraph. I can't imagine any disagreement with the first paragraph. Any comments on the second paragraph? (p. 4)

MR. LAVALLEE: I think that the words "job entry" are not complete enough. (p. 5)

MR. KARAKI: I would expect that, in this business, job entry people will work with those who are more experienced and journeymen will work with others under the supervision of foremen, etc. (p. 6)

MR. LOOPE: What happens to this report when we are finished with it? (p. 6)

CHAIRMAN RUTTENBERG: The purpose of this, as I understand it, is to develop recommendations for consideration by the Department of Energy. The panel report cannot be more than a partial consensus of the people who attended the panel. It can't represent the union point of view or the nonunion point of view or the business point of view. It will just reflect the views of those that are here. There was general understanding about the first set of 11 recommendations. There is a set of 14 additional recommendations which reflect less than a consensus. And then there were just a set of comments and observations on the last page. I learned many years ago that people in general discussions can disagree on a lot of things. But when they get specific about what to put on paper, there is more agreement than disagreement. If there is no disagreement on the first point, the second one, training the disadvantaged, should be emphasized. "CETA programs can be utilized for preapprenticeship-type programs. Where there are not apprenticeship programs, there would be a qualified training program advancing the unskilled to the semi-skilled and skilled program." (pp. 6-10)

MS. LUDLAM: I wish that were a true statement. I wish that we were training for preapprenticeship. I have no problem with the statement. (p. 10)

CHAIRMAN RUTTENBERG: Point three: "Both new training and retraining programs should be funded and should be responsive." (p. 12)

MR. O'CONNOR: Reword it, "responsive as a result of ascertaining available local solar jobs." (p. 12)

CHAIRMAN RUTTENBERG: Would you not combine points three and four, because they really deal with the same problem? I think I keep up on what is going on at least in the Department of Labor, and the kinds of assessments that need to be made have not been made in this area. We ought not to imply that assessment work is now done or being done, because it really isn't. (p. 12)

MS. LUDLAM: I would hope that that did not remove the training in solar because if you are doing an assessment for availability of solar jobs you must have people that are placed in solar. Which comes first, the chicken or the egg? The solar training or the solar job? We have got solar manufacturers beating on the doors for solar installers. (pp. 13-14)

CHAIRMAN RUTTENBERG: Let's go on to the fifth point, the RCS service and the need to provide auditors. Is the training of the auditors a DOE responsibility? (pp. 15-16)

MS. LUDLAM: DOE should support that kind of training, not necessarily financially but verbally. The local junior colleges all over the country now are gearing up to train auditors. (p. 16)

MR. HILTON: Each state has to develop a state plan for training, under RCS. (p. 16)

CHAIRMAN RUTTENBERG: Should this point then not be more specific in terms of the funds? Funds ought to be available to train auditors? The sixth point is the more general educational one. (pp. 17-19)

MR. SCHMIDT: There is a distinction in number six in terms of community awareness, whereas number one is more general, just job training. (p. 19)

CHAIRMAN RUTTENBERG: I thought point six was more directed to really promote solar; everybody needs to more fully understand what it is all about. (p. 19)

MR. KARAKI: That is very much the concern of the Energy Extension Service. (p. 20)

MS. LUDLAM: They are going to be doing a lot more than just educating. But basically the purpose is to disseminate information. (p. 21)

CHAIRMAN RUTTENBERG: Could point six be carried out through the Energy Extension Service? Point number seven: technical assistance. (pp. 22-23)

MR. SCHMIDT: The clearinghouse concept would involve regional organizations that would disseminate information. (p. 23)

CHAIRMAN RUTTENBERG: Well, there doesn't seem to be any general disagreement with point seven. Point eight: continued evaluation should occur. One of the most important and key things that anybody can do is a continuing evaluation program. Point nine is the SUEDE program, and it should be continued. (pp. 23-24)

MR. HIRSCH: CETA training should fall under one umbrella, a program in concept similar to SUEDE but administered out of one agency. (p. 25)

MR. SCHMIDT: Am I to understand that you really agree with him? His idea is very good, but in practice it is virtually impossible to pull off. (p. 26)

CHAIRMAN RUTTENBERG: Right. (p. 26)

MS. LUDLAM: It is interesting, though, that it was pulled off. It was pulled off at the mid-level management level. (p. 26)

MR. JAEHNE: Looking over number seven, I do have a small problem with it. It is not so much technical assistance programs at the regional level, but that pilot regional training institutes will be set up. (p. 28)

CHAIRMAN RUTTENBERG: I wonder whether it might not be a good idea to go back and put point ten in the introduction in which we talk about the need for greater incentives to solar. In this way it would create more opportunities for solar and therefore extend the responsibilties of this panel in terms of solar training. (p. 31)

MR. LAITNER: I would suggest that maybe we would want to offer an investment tax credit to industries that have adopted some form of job training program. (p. 32)

CHAIRMAN RUTTENBERG: To number eleven. Essential coordinated effort of information dissemination for the solar job training community is defined as a needed program. (p. 33)

MR. SCHMIDT: We need some sort of information network or clearinghouse so that if a group wants to do a training program, they know where to go for what type of funding, what type of program is available, what job studies have been done, and so forth. (p. 34)

MR. KARAKI: I want to raise a point that was not discussed yesterday. There is an action under way within DOE that relates to job training: to set up a voluntary certification program so that installers can be certified by examination. I think we ought to recognize in our recommendations that a voluntary certification program be continued and/or established. (p. 35)

CHAIRMAN RUTTENBERG: Why do you put the word "voluntary" in front? (p. 35)

MR. KARAKI: Because I think the building industry has trouble with other than a voluntary effort. They would not participate in a program that is mandated. (p. 35)

MR. HIRSCH: I don't understand why DOE should be in that business at all. The Department of Labor has its job standards and qualifications for apprenticeship. (p. 36)

CHAIRMAN RUTTENBERG: But you are agreeing with the fundamental point of voluntary certification regardless of who does it, right? (p. 36)

MR. HIRSCH: I am not supporting that position at all. I am just saying that to even think about it in terms of DOE is, I think, not right. (p. 37)

MR. LAVALLEE: The voluntary certification program has not been funded yet. Our recommendation should be that this program be funded. I would add one further thing: to fund an initial start-up or a pilot program to get it going. (pp. 36-37)

MR. SCHMIDT: What we tried to do in California was categorize the field into a solar mechanic installer at the first level of trades; the technician at second level; and the engineer or architect at the third level. If we acknowledge that there is a job classification system, then I would go along with it wholeheartedly. (p. 8)

CHAIRMAN RUTTENBERG: California is one state that has moved more extensively than any other to certify all kinds of occupations. (p. 40)

MR. KARAKI: DOE does not intend to be a permanent watchdog over the certification business, but it is supposed to be industry supported and for industry protection. I think such a program should be started. (pp. 40-41)

CHAIRMAN RUTTENBERG: That would be stated under the next section we are going to go into: minority and other considerations. Discussion of the first point, then: "We should not create specifically solar-trained personnel who may not have a job in the marketplace. It may be unfair to the program graduate." (p. 42)

MS. LUDLAM: That was discussed at length yesterday, and I think the conclusion was we are not training people that have only one job skill. All that does is set up another roadblock before solar training programs. (pp. 42-43)

MR. LAVALLEE: I think we should be assured that, if some training is going on, that there is some sort of a position or spectrum of positions which a trainee would be, could reasonably be, expected to enter into. I am supporting this. (p. 44)

MR. HILTON: I object to it. I think we ought to just drop it out because throughout all these recommendations, we have implied this indirectly. (p. 44)

MR. JAEHNE: I suggest if we want to retain the notion, we ought to rephrase it positively rather than set it up negatively. (p. 45)

MR. O'CONNOR: I think the point is that it may be detrimental, or it may give DOE an excuse not to fund solar training programs with that statement as it exists. (p. 47)

CHAIRMAN RUTTENBERG: Unless there is strong objection to keep it as a nonconsensus item, we will drop it. Point two: "Solar training programs should be strongly considerate of passive technology and of other renewable, softpath approaches." (p. 47)

MR. HERRINGTON: Would that combine with number ten? (p. 47)

MR. SCHMIDT: I don't think we have to make that great a distinction between active and passive. (p. 48)

MR. LAITNER: The point is that all discussion on job training has been almost exclusively limited to HVAC approaches, and there are many others to be considered. (p. 48)

CHAIRMAN RUTTENBERG: All right, we will combine points number two and ten. Going on to three: "Solar training should be suited to multilevel job entry positions." I am not so sure that wouldn't be a majority or consensus recommendation. (p. 48)

MR. JAEHNE: I would rather see it as a majority consensus recommendation. (p. 48)

MS. LUDLAM: Right. (p. 48)

CHAIRMAN RUTTENBERG: Any objection to that? All right, point number four: "The solar market today is domestic hot water and swimming pool heating. Training efforts should be oriented at the technician and training levels for the jobs." (p. 48)

MS. LUDLAM: That should be included in the training, but I don't think all training should be geared toward that. (p. 49)

MR. SCHMIDT: We have already discussed this. Any job training program should be directed at where the jobs are. If the jobs aren't there, no money is there. (p. 50)

CHAIRMAN RUTTENBERG: No problem. Going on to five: "For the disadvantaged, solar training should include remedial academic training." (p. 50)

MR. SCHMIDT: In order to alleviate the discouraged-worker syndrome, I think we must train people with academic skills so that they can cope with society. That also is true in career development—that the skills training does not lead to a dead-end route. (p. 51)

MR. LAVALLEE: Is that to say that funding from the Department of Energy is going to be geared solely toward basic training as opposed to energy-oriented training? (p. 51)

MS. LUDLAM: To take someone off the street and train him or her to size a house for a solar system without teaching reading and comprehension is ludicrous. (p. 51)

MR. HILTON: I would suggest one wording change, and that is that solar training should be combined with remedial academic training as needed. (p. 52)

MR. SCHMIDT: And so five is a very strong part of number two on the first page (consensus recommendation). (p. 53)

MR. HILTON: Even at the community-college levels, we have to upgrade math skills and reading skills. I think this applies to all training. (pp. 53-54)

CHAIRMAN RUTTENBERG: All right, let's go on to six: "There is a place for the solar trained person. Programs should continue in this regard, because solar is a new trade requiring specialized training." (p. 54)

MR. HERRINGTON: I disagree with that. (p. 54)

MR. SCHMIDT: Just to refresh memories, I use the analogy of the swimming pool industry. I understand that there was infighting on the part of the trades, and what emerged was a separate industry which is still viable. I think that is the way that solar can also go in addition to being part of the trades. (pp. 54-55)

CHAIRMAN RUTTENBERG: All right, there is no question about a disagreement on the point, but it is still nonconsensus. Point seven: "Four years of training is generally more than one needs to become proficient in solar installations. Depending on background and experience, six months to two years may be required to bring one up to a level of expertise." (p. 55)

MR. JAEHNE: What we are saying is that there is a whole variety of training programs, and they have different durations for different kinds of training needs. (p. 56)

MR. LAVALLEE: I think it falls probably more under the consideration subtitle to this section. (p. 56)

MR. LAITNER: My specific concern was suggesting that reliability was equated with at least a four-year program. I wanted to dispel that notion. (p. 57)

CHAIRMAN RUTTENBERG: All right. We will move it back. Point eight: "DOE should be committed to doing everything possible in solar training to reach the President's stated national goal of 20% solar by the year 2000." (p. 57)

MR. JAEHNE: Why not in the preamble? That seems to be a consensus. (p. 57)

CHAIRMAN RUTTENBERG: Let me read nine: "DOE should be sensitive now in evaluating the training needed to accomplish the 20% goal. That is, a shortfall of appropriately trained personnel should not be allowed to occur." It seems an unnecessary recommendation in view of the one we already have on evaluation. Point ten we have already handled by including it with point two. Number eleven: "In all training programs, equity for all to participate should be emphasized." (p. 59)

MR HERRINGTON: I have some problem with it, because I think we are mixing apples and oranges here. We should cross it off because does not say anything. (pp. 59-60)

MS. LUDLAM: I would say drop it. (p. 61)

CHAIRMAN RUTTENBERG: Drop point eleven and move to twelve: "Union training activities in solar should continue to receive support." (p. 61)

MR. LAITNER: Why just union training programs? (p. 61)

MR. JAEHNE: I would stress that DOE should strive for a variety of training programs including union, industry, and— (p. 62)

CHAIRMAN RUTTENBERG: Let's leave DOE aside. That would begin to conflict with what we were talking about earlier in terms of trying to coordinate the programs through at least one agency. All right, thirteen: "DOE should play the end role in coordinating the total job training effort in order to expedite the process of initiating new programs." We should recommend central coordination, without implying whether it should be DOE or Department of Labor or any other agency. Is that acceptable? Fourteen: "CETA solar programs should continue to receive funding based on availability of jobs. Training should be short-term with emphasis on basic skills. Programs should be responsive to local needs." Haven't we already said that in various ways?

We should drop fourteen. (pp. 62-65)

MR. LAITNER: I am not sure any of these necessarily need to be put into our report. I move to strike the entire page. (pp. 66-67)

CHAIRMAN RUTTENBERG: We can say that there are many observations and statements that people can read in the transcript. (p. 67)

MR. JAEHNE: Could we dispense with half a day of introductory speeches and get down to having a full day of meetings? (pp. 67-68)

CHAIRMAN RUTTENBERG: I don't disagree with that at all. We could have done a better job with our recommendations if we had had more time within the panel discussion for meetings. (pp. 68-69)

MR. KARAKI: I am not in favor of convening this sort of panel unless we have evidence that what we do is useful. We are all wasting our time. If this panel's recommendation, however well-written and well-intended, doesn't get to the right places. DOE program people should be responsible for establishing the training program or the ground-level program and should deal with the people who are doing the work. (p. 70)

MR. SCHMIDT: A follow-up report could be published that would be of some use to various groups that are just thinking about beginning training. (p. 71)

FINAL REPORT
PANEL NO. 6—SOLAR JOB TRAINING

Presented by Panel Chairman Stanley Ruttenberg

Introduction

The panel on solar energy and job training was brought together for the purpose of discussing relevant issues; if possible, resolving those issues; and finally, deriving a set of recommendations for the consideration of the Department of Energy's (DOE) program planning effort. This report is divided into a summary of recommendations which seemed to elicit consensus, and a set of minority or nonconsensus recommendations for consideration.

In its general discussion of solar job training, Panel Number Six recommended strong support of the President's stated goal of solar supplying 20% of the nation's energy needs by the year 2000. The Department of Energy is urged to provide support for all measures which will help to insure that this goal is met. A specific measure which the committee cited for DOE support dealt with the 50% tax credit for the solar industry.

The overall purpose of job training in the solar industry is centered on providing reliable, durable, economically viable systems for the solar end-user. Panel discussion dealt primarily with near-term solar job training for installation and maintenance of solar systems. Job entry positions are included in the description of job training.

Recommendations

(1) Job training programs in the solar industry should focus on providing the consumer with reliable systems, which will not be in need of frequent service; with durable systems, which last a long time; and with economical systems, which can be demonstrated to save money for the investor.

(2) Training the disadvantaged should be emphasized. CETA programs can be utilized for preapprenticeship-type programs. For the disadvantaged, solar training should be combined with remedial programs to help alleviate the discouraged worker syndrome.

(3) Both new training and retraining programs should be funded and should be responsive to available local solar jobs. In consideration of solar training programs, an examination and assessment should be made of the reasonable expectations of employment in solar.

(4) The Residential Conservation Service (RCS) job training demand may be around 15,000 persons. DOE should be aware of the upcoming need for training people to perform RCS solar and energy conservation audits. The use of disadvantaged, underemployed, and unemployed persons should be considered in this program. Funding for RCS should be made available to State Energy Offices, which have implementation responsibility without financial support.

(5) Community awareness programs oriented to give the general population a feeling of confidence about solar and general knowledge of how systems are installed, maintained, and operated should be considered. If the public is not made to feel comfortable about solar, solar systems will not be purchased, and, hence, there will be

no solar business. The popularization of solar in the K-12 area should be the concern of the Energy Extension Service.

(6) Regional conservation/solar training centers should be established and funded, taking advantage of existing institutional linkages where possible. These centers should be mandated to provide training and technical assistance in conservation/solar for a broad spectrum of identified clients.

(7) In training for specific solar jobs, continued evaluations should occur that will address the need for continuing and/or revamping the training.

(8) A reinstitution of the Solar Utilization for Economic Development and Employment (SUEDE) program is recommended. There is a continued need for the solar portion of the CETA effort, which in the past was a cooperative program under CSA (project administration and overhead); DOE (hardware procurement); and DOL (CETA job training). To insure quality and administrative control, the SUEDE program should be placed under one umbrella.

(9) A central, coordinated effort of information dissemination for the solar job training community is defined as a needed program. DOE should play the end role in coordinating the total job training effort to expedite the process of initiating new programs.

(10) Solar training should be oriented to multilevel job entry positions.

(11) Union, industry, and other training activities in solar should continue to receive support.

(12) In consideration of any new national energy programs or approaches to energy solutions, overall job implications in all societal/economic sectors must be examined to determine the full effect on the national employment and economic spectra. Any approach should be holistic in nature.

Nonconcensus Considerations/Recommendations

(1) Solar training programs should be strongly considerate of passive technology and of other renewable, soft-path approaches such as wind energy and biomass conversion.

(2) A major solar market segment today is domestic hot water and swimming pool heating. Training efforts should be especially oriented at the technician training levels for these solar jobs.

(3) There is a place for the solar trained person. Programs should continue in this regard because solar is a new trade requiring specialized training.

(4) The DOE should support the existence of a Voluntary Certification Program for solar installation and maintenance personnel.

CHAIRMAN MILLER: (Department of Energy) You recognize the difficulty of coordinating between agencies. Where should the focus for these job training programs be? When it is in DOE, we are saddled with the criticism that it's not our business. When it's in Labor or Commerce or some place else, there is generally a tendency there for people to worry about their own programs.

MR. RUTTENBERG: (Ruttenberg, Friedman, Kilgallon, Gutchess & Assoc., Inc.) The central responsibility for training is within the Department of Labor, and that is where it should be. There should be, however, coordination between the government agencies, and the leadership must come from the very top of those government agencies. It would be far better if all the appropriations went to one agency like the Department of Labor. But I find that when you pursue that kind of a position, you usually end up getting less money than if you have two different agencies getting the money and then working through the top secretaries to combine them.

MR. TAYLOR: (Department of Energy) The concept of all training programs being primarily started through the Department of Labor may be a concept in theory that is acceptable, but in practice would not work very well.

MR. RUTTENBERG: I really believe that that's part of the problem here—coordination between agencies—and if it doesn't happen we are going to end up with nothing.

MR. TAYLOR: Coordination between agencies has been well demonstrated by the SUEDE program. It came about by people working together in the Departments of Labor, Interior, Agriculture, and Energy; and in the Community Services Administration. We sat in many meetings and discussed the special interests of each of the departments. We decided that what we wanted was a program that did something for people who needed it, regardless of the missions of each one of the departments; and as a result, we got SUEDE. Most of the problem of the SUEDE program was the inordinate time it took for some of the grantees to get their money.

CHAIRMAN MILLER: I think what Mr. Ruttenberg was saying is that it takes top-down commitment to solve some of the problems that you had.

MR. RUTTENBERG: There could be created an intermediary corporation, which the Department of Labor has done in at least four different instances.

APPENDIX A

PARTICIPANTS

CLOSING

Chairman Miller
U.S. Department of Energy

This has been, in a real sense, your meeting. Last year we were criticized because there were too many people from DOE, so what we decided to do this year was to let the panels work their own wills in private. We can go back to a more involved approach next time.

This conference is the kind of thing I think is essential to hold on a regular basis, and I personally would like to see it done more often. I recognize the liability that attaches to that, particularly when it comes to showing positive movement in the area of implementing the recommendations. I would like to assure you of three things: first of all, we will generate a complete set of the proceedings so that there is, indeed, a public record of all of this; second, my commitment, as I said a moment ago, to these kinds of public meetings; and third, there will be a complete report to you within about six months on the steps that DOE has taken or a position that DOE will take with respect to these recommendations. I can assure you that we will not act positively on every one.

In return, I would like a commitment from the people here to continue this kind of dialogue. It is absolutely essential in order to provide the kind of linkage that ultimately is going to make solar happen.

Thank you very much.

APPENDIX A-1
PANEL MEMBERS

Open Workshop on Solar Technologies
October 23-24, 1979
Washington, DC

Panel 1—Solar Energy in the Cities:
Economic Development

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PANEL MEMBERS

Open Workshop on Solar Technologies
October 23-24, 1979
Washington, DC

Panel 2—Solar Energy in the Cities:
Impact on Specific Groups and Institutions

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Panel 3—Solar Energy in the Cities:
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Open Workshop on Solar Technologies
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Panel 4—Solar Energy and Employment:
Macroeconomic Implications

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PANEL MEMBERS

Open Workshop on Solar Technologies
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Panel 5—Solar Energy and Employment:
The Local Economy

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APPENDIX A-1
PANEL MEMBERS

Open Workshop on Solar Technologies
October 23-24, 1979
Washington, DC

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Job Training

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APPENDIX A-3

GENERAL SUPPORT

Second Open Workshop on Solar Technologies
23-24 October 1979
Washington, D.C.

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16. Abstract (Limit: 200 words)

This report details the deliberations, conclusions, and recommendations of six panels asked to provide advice to the Department of Energy on the subject of solar energy. Approximately 60 invited panelists and 120 observers met in three panels devoted to Solar Energy and Cities and three panels on Solar Energy and Employment. The day-and-one-half meeting occurred at the Department of Energy's Forrestal Building headquarters in Washington, D.C., on 23 and 24 October 1979. The report contains introductory speeches by seven experts, excerpts from the succeeding two half-days of discussion, the final reports for the panel chairpersons, and subsequent discussion and questioning. Approximately 125 findings and recommendations were developed by the six panels covering a wide variety of topics. Major recurring themes were recommendations for increased funding, federal program improvement, conservation, outreach programs, small business funding, and solar training programs. Detailed responses from the Department of Energy have been prepared for all recommendations and are contained in a companion volume.

17. Document Analysis

a. Descriptors: Building codes; Commercialization; Economic development; Economic policy; Employment; Energy conservation; Energy management; Energy policy; Financing; Industry; Labor; Legislation; Occupations; Public utility; Renewable

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