PDWA I 106

REPORT ON THE FIRST INTERNATIONAL CONFERENCE ON ENERGY AND COMMUNITY DEVELOPMENT

ATHENS, GREECE

JULY 10-15, 1978

by

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September 28, 1978

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Bureau for Development Support
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U.S. Department of State
Washington, D. C. 20523

2

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The Conference was the product of a joint project between the U.S. Department of Energy and the National Energy Council of Greece to develop a new community on the Island of Crete which would incorporate to the maximum energy conservation and use of alternative energy sources. The project is named ENSYDECO for Energy Systems and Design of Communities. The development of the new community on Crete is a research and development project as well as a demonstration.

The "First International Conference on Energy and Community Development" was designed into the project to focus international attention on the activity and to solicit international opinion on appropriate methodologies, technologies, and approaches that might be applied in the ENSYDECO demonstration project which is in the initial physical design state.* The Conference grew to have much broader scope and implications.

Although it did not evolve from spontaneous international consensus on a felt need, the timeliness and appropriateness of the Conference was evident in its ability to attract more than 300 participants from developed and developing countries.

The writer presented a paper, "Development With Resource Conserving Urbanism," to one of the five workshops. An abstract of the paper is appended to this summary report of the Conference. In addition to highlights of the keynote address, the report contains the results of five concurrent workshops.

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* Further information on the ENSYDECO project can be obtained from Steve Cavros, Chief, Community Systems Branch, Division of Buildings and Community Systems, U.S. Department of Energy (Tel. 396-4618).

Inspiring Keynote Address

The following are highlights of the very inspiring keynote address by Janos Stanovnic, Executive Secretary of the U.N. Economic Commission for Europe.

There are substantial differences between the energy consumption levels and dynamics of advanced and of developing countries. For example, the world consumed the energy equivalent of 2.5 billion tons of coal in 1950. By 1978 energy consumption was projected to be 9.0 billion tons of coal equivalent. The developing country share of 1950 consumption was 15%; in 1978, it still will be only 15%, despite a dramatic increase in the proportion of global population residing in developing countries over the same period.

One of the great problems reflected in this disparity is the tremendous technological and capital investment needed for energy production. Capital costs for energy production per standard unit of output are higher than any other industry and four times that of steel production. The potential for every country to enjoy the energy consumption levels of the U.S. exists through solar energy sources alone. It would be realized if we could capture only 5% of the earth's share of solar energy at just 1% efficiency. Unfortunately, this possibility is extremely remote. Solar energy research is only at the stage of atomic energy research in about 1930. Considerable time will be required before technological developments will permit even marginal realization of this potential. It also will take time to develop other alternative energy sources on a meaningful scale.

Meanwhile, we are faced with a "Catch 22" situation. Economic growth, which is essential to slowing down population growth and overcoming widespread deprivation and misery, will continue to increase global energy demand. Moreover, economic growth will have to be achieved primarily with imported oil, coal and atomic energy, all in the category of diminishing non-renewable energy resources. Transition to alternative sources is essential and inevitable but much basic research still is required and this will take time. We are not ready for this transition technologically, and it must be considered a long-run solution.

In the short run there is no alternative to conservation. Conservation will permit us to have economic growth with existing energy resources and will help lessen long-term demand. Conservation is one of the most central issues for our civilization, but where can we best conserve?

It is estimated that 50% of the world's energy production is consumed by industry. However, prospects for conserving energy in industry are not good in the short run. In industry, a gradual transition to alternative energy sources is required and this, as noted, will take considerable

time and resources for major technological developments.

The other 50% of energy production, broadly speaking, is consumed in households and in transportation; in other words, in areas directly related to our personal comfort. This is the area in which, through modifying the way we live, significant conservation is possible in the short run. To achieve this conservation, we must look carefully at our communities and cities.

It is a truism that there is a close correlation between urbanization and energy consumption and that the rapid urbanization of this century is largely responsible for today's "energy crunch." At the time of the French and American Revolutions only 5% of the world's population -- roughly 15 million people -- lived in cities. By 1900 the figure had climbed to only 13%. However, it was 30% in 1950, 40% in 1975, and will reach at least 50% by the year 2000. We owe much of this growth to the automobile, which increased the possibility for enlarging cities.

Unfortunately, urban growth in this century often has been as haphazard as it has been rapid. Costs in areas of greatest access are high and those without superior financial resources have had to move out. Growth of cities frequently has run afoul of the needs of nature and of human beings. We have today a convergence of three essential problems in our urban environment: social disintegration, deterioration of the natural environment, and wastage of capital. Dealing with these three convergent interests at the level of the community is a challenge.

It is suggested that they be addressed at three levels: (1) through the community planning and development process, (2) through more rational transportation systems in cities, and (3) through modification of energy behavior in the household. Urban planning should stress accessibility and efficiency, e.g., through clusters and corridors and through cogeneration in energy and other public utilities. Transportation leaves much room for improvement. The United States, for example, consumes 20% more energy in transport than does Europe.

Individual and public dwelling places, however, offer the greatest potential for energy conservation. One third of the energy we consume is used where we live and work; 65% for heating, 15% for cooling and 5% for cooking. Since much of this energy is wasted, it is estimated that one-third could be saved without sacrificing our comfort. While many of our attempts at conservation to date have been normative in nature (thermostatic control, sealing of leakages, etc.) much more could be done through more dramatic changes. For example, we have been known to subsidize industry for producing energy wasteful appliances.

It is suggested then that international collaboration and exchange on short term energy conservation be focused on these three areas: community planning; transportation and the household.

Five Workshops

In addition to plenary sessions, the Conference was organized into five simultaneous workshops. They adhered closely to the Conference theme, "The Rational Use of Energy in the Planning, Development and Operation of Human Communities," and addressed the Conference's two major goals:

(1) Initiation and promotion of comprehensive policy and technical approaches to the planning, design and operation of urban and rural communities and their supporting energy systems, with emphasis on energy conservation and use of non-depletable energy resources; and

(2) Establishment of a foundation (basis) for international collaborative efforts and mechanisms designed to support the adoption and implementation of these approaches.

These were ambitious goals and the Conference was reasonably successful in their achievement. In the final plenary session, the conclusions and recommendations from the five subject area workshops were presented by the chairmen and these statements were issued in draft by the Secretariat shortly after the Conference. Copies are available through the Office of Urban Development. The final report of the Conference, to include plenary session papers, summary workshop papers, and conclusions, is in preparation.

The five workshops, which consumed the bulk of Conference running time, each focused on a different perspective of the Energy and Community Development framework, namely:

(1) planning -- the community as an energy consuming system and appropriate planning methodologies;

(2) technological options -- those supportive of the conservation and rational use of energy and the development and use of non-depletable and recycled energy resources;

(3) economic criteria -- the application of economic criteria for energy-related community development decisions;

(4) policy and decision making -- at national and community levels for implementation of integrated community energy systems; and

(5) international cooperation and information exchange -- problems, needs, and collaborative mechanisms.

The results of these workshops are summarized in the sections that follow.

Workshop A: Methodologies for Integrating Energy Considerations into The Community Planning Process

The material covered in this workshop related to the importance of planning space heating, cooling, and transportation, the conflict between attempts to raise standards of living quickly while at the same time conserve energy, the question of centralized versus decentralized energy supply, the issue of urban concentration or urban sprawl, the various types of planning tools, international guidelines for planning communities, and ongoing evaluation of the effectiveness of planning. While none of these questions and issues was resolved, a great deal of information and opinion was exchanged between energy experts and planners to their mutual benefit.

The group concluded that energy concerns must be integrated by planners into the planning process and energy technology and systems must relate to community planning. Planning methods such as energy analysis, energy impact analysis, energy potential analysis, energy threshold analysis, alternative energy scenarios, energy revenue, and systems analysis should become commonplace in the planning profession. Further, planners should remain current on energy technologies, systems, and alternative energy scenarios. Handbooks for this purpose should be kept current. Similarly, there should be systematic inquiry into local potential in renewable energy sources, taking into account climatic differences and the unique characteristics of each community.

Workshop B: Technological Options for the Design of Community Energy Systems

This workshop covered key policy concepts, including energy sources, integrated planning, codes and standards, waste recovery, and consumption and conservation monitoring. Four different areas of specific technologies were also given attention:

(1) Building-Scale Technologies -- cooking, hot water, space heat, air conditioning, refrigeration, and lighting;

(2) Community-Scale -- heat pumps, bikeways, communications, heat and power, and agricultural techniques;

(3) R&D Needs -- heat exchanger, heat transfer fluids, energy storage, heat engines, meters, materials, and information requirements;

(4) Technical Education -- computer programs, training, exchange, cost allocation methods, prediction of peak demand, impact evaluation matching community growth, and demonstration projects.

Participants recognized the need to place priority on utilization of renewable sources of energy in order to reduce pollution and, for the long run, preserve fossil fuel for their chemical values. Great stress was placed in this workshop on the need for development of community energy profiles as a prerequisite to design of community energy systems. Systems must emphasize economy, recovery and cogeneration, and communities should be given the means for monitoring consumption and conservation effectiveness. Centralized energy systems were advocated for high population density areas, and decentralized systems for low density areas.

Workshop C: The Application of Economic Criteria in Energy-Related Decisions for Community Development

Difficulties in applying cost-benefit analysis to community planning, the need for a better data base, and problems in designing simulation models were discussed in this workshop. It concluded that no comprehensive formulas exist at present to help planners determine which energy system would be most effective economically in community design. The participants also found that projection of energy prices in relation to other prices is, at best, an imperfect art. Greatly divergent results were generated by different analysts, their models being extremely sensitive to small changes in parameters.

While the importance of economic analysis in energy planning for communities was fully acknowledge, the state-of-the-art was seen as woefully inadequate.

Workshop D: Policy and Decision Making at the National and Community Levels for Implementation Of Integrated Community Energy Systems

This workshop discussed the roles of the various actors in the decision-making process--politicians, bureaucrats, technicians, local government, and citizens--in terms of the goals of effectiveness, economy, and flexibility in community design. The workshop pointed to the

difficulties of integrating the responsibilities of all these people and looked at models of decision-making. It recognized that while institutions often are the focus of discussions about decision-making problems, decisions ultimately are made by people and that insufficient attention is given to this fact.

The workshop defined the objectives of an integrated community energy system as one designed to:

(1) make the most effective use of available energy resources;

(2) deliver its products at the lowest possible price;

(3) be inherently reliable yet flexible enough to adjust to change and amenable to innovation; and

(4) deliver benefits equitably to all its potential users.

While such a system requires the cooperation of all levels of government, it was agreed that national or central governments should have the basic responsibility for assuring an adequate supply of energy at a reasonable (equitable) price and for promoting the research and development, data and information exchange required to assure uninterrupted energy flows. States and provinces, where they exist, were seen in a regulatory role while local governments, the workshop agreed, have the critical task of implementing the system for the benefit of local citizens, commerce and industry. A strong commitment of local governments to these objectives was thought to be essential to the success of the system.

An important role also was assigned to technicians and substantive experts, who must persevere in the collection of data, development of needed R&D efforts, and identifying and articulating with clarity and precision the various options available.

In all of this, the citizens were thought to play an important role, but the workshop fell short of its definition.

Workshop E: International Cooperation and Exchange of Information

This workshop focused on the ways in which international exchange and collaboration could help meet the problems addressed by the Conference. It reemphasized the general Conference conclusion that energy issues and decisions should not be considered in isolation from other aspects of community development.

The workshop stressed the need for improved transfer of information on energy conservation and supply, while recognizing the differing needs among communities, particularly with respect to developed and developing countries and urban and rural communities. Two types of information need stressed were:

(1) Information on community goal options, and

(2) Information on community energy consumption patterns for both developed and developing countries.

Mechanisms for international information exchange and collaboration discussed include:

(1) Regional centers for technology transfer composed of countries of like characteristics,

(2) Development of urban institutes of science and technology, integrated with the business and social structure of the community -- a recommendation keyed to developing countries and their unique coping problems in the face of rapid urbanization and diminishing energy resources, and

(3) Exploitation of existing organizations, such as the International Energy Agency (OECD) in Paris, to help achieve some of the objectives of the Conference.

Conclusion

The Conference was extremely worthwhile to the writer and to most of those with whom he spoke. As in all such events, the quality of presentations was uneven, but the overall impact more than made up for this factor. The most common complaint among workshop participants was that they could not attend all or most of the simultaneous sessions. There obviously was wide interest in the topics being covered.

The conclusions of so comprehensive a Conference hardly could be expected to be definitive. However, it did bring planners, technical experts, administrators, and policy-makers together to focus on the single problem of energy in community development. The need to integrate these two elements was endorsed enthusiastically by the Conference and important problems, issues, and options were defined. Considerable information was exchanged and, in effect, a new international network was created.