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CEER X-84

PUERTO RICO STATE SOLAR SUPPORT PROJECT

ANNUAL REPORT
FY 1980

SUBMITTED TO:

SOUTHERN SOLAR ENERGY CENTER

UNDER

CONTRACT NO. SSEC-1200-C-330-0016



CENTER FOR ENERGY AND ENVIRONMENT RESEARCH
UNIVERSITY OF PUERTO RICO - U.S. DEPARTMENT OF ENERGY

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1.0 INTRODUCTION

The State Solar Support Program sponsored by the Southern Solar Energy Center (SSEC), was established in July 1979 to facilitate the regional and institutional coordination fundamental to the effective promotion and rapid commercialization of solar technologies. Its established goals have been to augment the capacity of state agencies in renewable resource activities and to provide state assistance to SSEC in pursuit of its mission.

The Center for Energy and Environment Research (CEER) began its participation in the Puerto Rico Solar Support Program in July 1979. It was continued during FY 1980. William Ocasio has served as Project Director and State Solar Contact. Able secretarial support has been provided by Sylvia Medina and Blanca Maldonado.

The budget for the project for FY 1980 was \$28,000. A total level of effort of 1720 man-hours was provided as required under contractual agreements. A monthly distribution of the level of effort is provided in Table 1.

In this annual report we will provide a technical accounting and comprehensive description of the work performed and the results achieved. Emphasis will be placed on project evaluation, including benefits and impacts, problem areas and recommendations.

2.0 OBJECTIVES

As part of its mission to accelerate the utilization of solar and renewable energy technologies, and in support of its programmatic efforts, the SSEC has established the following objectives for the State Solar Support (SSS) Program:

- . Facilitate state level input to SSEC planning and program implementation activities.
- . Develop and maintain a primary communication linkage between the agency and SSEC.
- . Provide essential response and liaison presence for SSEC program efforts.
- . Establish a solar resource catalyst in a state energy agency.

The first three objectives are related to the SSS project goal of providing state assistance to SSEC in pursuit of its mission. A monthly Interim Progress Report, as well as special technical reports are provided to SSEC in accomplishment of these objectives.

The final objective relates to the SSS project goal of assisting in state initiated solar and renewable energy activities. The technical capabilities of the chosen agency, CEER, are augmented through the State Solar Contact (SSC). Project meetings and solar information materials also serve to add to these capabilities.

CEER utilizes the SSC in support of the solar commercialization components of its Energy Assessment and Analysis and Community Awareness efforts. Through these, the Puerto Rico State Solar Support Project provides staff support to CEER planning and programming efforts in the area of solar and renewable energy technologies.

Table 1

MONTHLY LEVEL OF EFFORT IN MAN-HOURS

<u>Month Reported</u>	<u>Level of Effort</u>
October 1979	143
November 1979	144
December 1979	143
January 1980	143
February 1980	143
March 1980	144
April 1980	143
May 1980	144
June 1980	168
July 1980	119
August 1980	143
September 1980	143
	<hr/>
	1,720

3.0 MAJOR ACHIEVEMENTS

The major achievements of the Puerto Rico State Solar Support can be classified into four categories as follows:

- . Support of SSEC Program and Planning Efforts.
- . Monitoring of Solar Activities in Puerto Rico.
- . Institutional Liaison for SSEC.
- . Support of CEER Program and Planning Efforts.

These categories correspond to the four major objectives of the SSS Project. The written and oral reports and presentations listed in Table 2 have helped to transmit these achievements. A technical account of these and their impact is described.

3.1 SUPPORT OF SSEC PROGRAM AND PLANNING EFFORTS

A major portion of the effort of the Puerto Rico State Solar Support Project was devoted to assist SSEC program and planning efforts as requested through twelve Project Task Memorandums. In addition, CEER participated in pilot efforts of the SEIDB network. Task specific efforts included the following:

- . A Solar Consumer Protection Assessment was undertaken for Puerto Rico as part of the DOE-SSEC Solar Consumer Analysis efforts. Representatives from public and private agencies involved in consumer protection and officials from the solar industry were interviewed to obtain their views on consumer problems with solar equipment and with the consumer protection mechanisms existing to prevent and/or resolve such problems. The study indicated that the representatives viewed the solar consumer protection problem in broad terms. Major problems frequently mentioned were high prices and costly equipment financing. Most of the respondents questioned the effectiveness of the consumer protection efforts of the Consumer Affairs Department but there was a lack of consensus on the need for and the effectiveness of solar-specific efforts. A survey of existing consumer protection legislation in Puerto Rico applicable to solar was included as part of the project report.
- . The project provided support to SSEC's planning efforts on the Puerto Rico Electric Power Authority utilization of solar and renewable energy sources, particularly its efforts to comply with the Public Utility Regulatory Policy Acts. An initial report was prepared for SSEC and monitoring of PREPA activities regarding the implementation of PURPA is being continued.

A. Project Reports:

1. "Puerto Rico State Solar Support Project: Interim Progress Report", October 1979.
2. "Puerto Rico State Solar Support Project: Interim Progress Report", November 1979.
3. "Puerto Rico State Solar Support Project: Interim Progress Report", December 1979.
4. "Puerto Rico State Solar Support Project: Interim Progress Report", January 1980.
5. "Puerto Rico State Solar Support Project: Interim Progress Report", February 1980.
6. "Puerto Rico State Solar Support Project: Interim Progress Report", March 1980.
7. "Puerto Rico State Solar Support Project: Interim Progress Report", April 1980.
8. "Puerto Rico State Solar Support Project: Interim Progress Report", May 1980.
9. "Puerto Rico State Solar Support Project: Interim Progress Report", June 1980.
10. "Puerto Rico State Solar Support Project: Interim Progress Report", July 1980.
11. "Puerto Rico State Solar Support Project: Interim Progress Report", August 1980.
12. "Puerto Rico State Solar Support Project: Interim Progress Report", September 1980.
13. "Puerto Rico Solar Consumer Protection Assessment", June 30, 1980.

B. Other Publications:

"La Situación Energética de Puerto Rico", by Juan A. Bonnet, Jr. and William Ocasio, September 1980.

C. Oral Presentations:

1. February 29, "Community Participation in the Development of Energy Self-Sufficiency for the Island of Culebra", Culebra, Puerto Rico.
2. April 29, "Renewable Energy Community Activities in Culebra", SSEC State Solar Contact Meeting, Atlanta, Georgia.
3. July 10, "Solar Commercialization Efforts of SSEC and CEER", Radio interview, WRTU-FM. .

.CEER, through its State Solar Support Project is one of the pilot efforts participating in the Solar Energy Information Data Bank Network (SEIDB) sponsored by the Solar Energy Research Institute with the cooperation of SSEC. William Ocasio and Alejandro Singer attended a two-day SEIDB training session in Atlanta, Georgia in September 1980. The SEIDB includes solar data, bibliographies and computer models. Access to the SEIDB network is available through CEER. The project began in September and full implementation is expected during FY 1981.

.Smaller-scale efforts to provide support to SSEC activities was undertaken in the area of passive buildings, School and Hospitals program, state solar legislation, information on the solar industry, state science and vocational education program, Energy Extension Services and the Solar Display Unit.

The direct benefits achieved through the efforts undertaken for support of SSEC activities are dependent on the outcome of region-wide efforts and its evaluation is beyond the scope of this report. Nevertheless, its indirect impacts, specific to Puerto Rico, can be accounted for. First, significant institutional contacts were made. These serve to form an informal communication and support network which is conducive to solar commercialization efforts. A more detailed description of these efforts is provided in Section 3.3 of this report. Second, the information collected through these efforts have, in many instances, being of use to CEER projects in the areas of Energy Assessment and Analysis and Community Awareness. Third, they have stimulated local efforts by CEER for complementary work in the area. In particular the PURPA monitoring project has increased agency awareness on the importance of federal regulatory measures on the adoption of solar technologies by the electric utility. As part of the FY 1981 activities of the Puerto Rico State Solar Support project, a closer examination of actual electric utility behavior and of policy alternatives open to it, will be examined. Plans had been made to undertake part of the analysis during FY 1980 but time limitations prevented it.

3.2 MONITORING OF SOLAR ACTIVITIES IN PUERTO RICO

Knowledgeable coordination and implementation of regional efforts toward solar commercialization requires the creation of information collection and dissemination mechanisms that will support both SSEC and local activities. The Puerto Rico State Solar Support Program helps develop and maintain an information and communication linkage between SSEC and Puerto Rico. Solar projects and activities are monitored by the SSC and reported to SSEC via the Monthly Interim Progress Reports.

SSEC utilizes the information transmitted as an input to planning and program implementation efforts. A "Summary Review of Interim Progress Reports" of all participating jurisdictions is published monthly by SSEC.

The information collected and monitored by the SSC is also of use to CEER's solar efforts. The IPRs serve as a catalogue of solar activity undertaken in Puerto Rico. This constitutes a valuable information source for CEER.

The solar activities reported by the SSC include:

- . Commercial solar installations in the residential, commercial, industrial, and governmental sectors.
- . Solar research, development and demonstration projects and/or proposals undertaken in Puerto Rico. The solar technologies include direct solar, biomass, bioconversion, OTEC and wind.
- . Solar related legislation submitted and/or approved in the Puerto Rican Legislature.
- . Regulatory actions of state government that impinge upon solar commercialization.
- . Solar-related educational activities of private and public educational institutions, including colleges and universities.
- . Solar-related projects and activities undertaken by private interest groups.
- . Information on seminars, conferences and workshops that relate to solar technologies.
- . Energy-related policy and planning documents prepared by state energy agencies and others.

- Solar related news articles. Three major dailies The San Juan Star, El Mundo, and El Nuevo Día are monitored as well as one weekly Caribbean Business. News articles from other publications are also submitted.

The efforts to catalogue and monitor solar activities in Puerto Rico are, admittedly, incomplete. For FY 1981 a more systematized effort is planned.

3.3 INSTITUTIONAL LIAISON FOR SSEC

Efforts toward the commercialization of solar technologies require the concerted actions of private and public institutions. The achievement of this goal requires the establishment of formal and informal communication networks that will include the solar industry, trade and professional associations, private and community interest groups, the communications media, colleges and universities, state and local government, and others.

One of the achievements of the Puerto Rico State Solar Support Project has been the establishment of institutional contacts that will aid in regional and island solar commercialization efforts. The SSC has served as liaison between SSEC and others in supporting solar efforts. Table 3 lists the main institutional contacts established and/or continued during the past fiscal year. These contacts have increased awareness of the efforts of SSEC and others toward solar commercialization and have served as a part of the information and communication network necessary for achievement of solar goals.

The institutional contacts made through the SSS project have in many instances been a by-product of other project activities. The example of the Puerto Rico State Solar Consumer Assessment has already been mentioned. Activities undertaken for accomplishment of other project task memorandums and of general information collection and monitoring efforts have also accomplished this objective.

Specific mechanisms for institutional contacts have included written and oral contacts with institutional representatives, dissemination of SSEC publications, and joint participations in meetings and seminars dealing with solar commercialization projects.

Table 3

Institutional Contacts

Energy Center:

Center for Energy and Environment Research

Government Agencies and Public Corporations:

Puerto Rico Office of Energy
Puerto Rico Electric Power Authority
Department of Agriculture
Department of Consumer Affairs
Department of Education
Department of Justice
Department of Natural Resources
Planning Board
Regulations and Permits Administration
Administration for the Conservation and Development of Culebra
Commonwealth Office of Federal Affairs

Local Government:

Municipality of Caguas
Municipality of Culebra
Municipality of San Juan

Colleges and Universities:

University of Puerto Rico
Catholic University of Puerto Rico
Puerto Rico Junior College

Community and Interest Groups:

COTACO (Committee of Workers to Help the Consumer)
Energía Verde
League of Women Voters
Committee of Citizens of Culebra

Trade Associations:

Puerto Rico Homebuilders Association
United Retailers Center of Puerto Rico

Professional Associations:

College of Engineers and Surveyors of Puerto Rico
Institute of Electrical Engineers of Puerto Rico

Industry:

Solar Devices, Inc.
Olshen Trading
Nestle-Libby's, Inc.
ARCA Enterprises
MITRE
Johnson & Johnson, Inc.
Sears Roebuck, Inc.
Raytheon Service Corporation
Puerto Rican Development, Inc.
Energy and Environment Dynamics, Inc.
Levitt Homes, Inc.

Communications:

WRTV-FM
WZUS-FM

3.4 SUPPORT OF CEER PROGRAM AND PLANNING EFFORTS

One of the principal impacts of the Puerto Rico State Solar Support Project has been to provide resources in support of CEER program and planning efforts in the area of solar and renewable energy technologies. The SSC serves as staff support to the Director's Office of CEER, particularly with respect to efforts in the areas of Energy Assessment and Analysis and Community Awareness. Some of the support has been in CEER initiated projects. But the SSEC planning and program support, information collection and monitoring efforts, and institutional contacts have also served to support CEER's programmatic and planning activities.

An account of principal activities undertaken in support of CEER-initiated efforts is described below:

- . The State Solar Support Project has supported CEER's Energy Assessment and Analysis efforts through participation in proposal preparation, including those of its international programs; programmatic planning efforts for the CEER Five Year Plan, particularly with respect to energy demand analysis, socio-economic studies of energy systems and international programs; monitoring and evaluation of CEER's Base; Institutional, Developmental and Competitive Projects, including assistance in preparation and updating of "Background Data on CEER's Progress" and in reporting to UPR President; energy data analysis; and preparation with Juan A. Bonnet, Jr., CEER's Director, of a survey on the energy situation of Puerto Rico to be presented at the Panamerican Union of Engineers (UPADI) Congress in Mexico City in October 1980.
- . The State Solar Contact has served as a catalyst in increasing awareness on the part of the CEER of the impact of national and regional efforts on the commercialization of solar technologies in Puerto Rico. The SSC monitors DOE, SERI, and SSEC publications, as well as others for their impact upon Puerto Rico. Specific instances of increased awareness and interest include the effects of PURPA, the effect of proposed solar legislation (EMPA) on local solar initiatives, the need for greater inclusion of Puerto Rico in federal and regional planning efforts regarding solar goals, etc.

- . The State Solar Support Project has supported CEER's Community Awareness efforts through proposal preparation, coordination of the annual report preparation and organization, and participation in seminars and presentations. The visit of the League of Women Voters to CEER was arranged as part of Earth Day activities and it included a presentation of CEER projects and programs, particularly those of solar and biomass. A visit from NASA's Coordinator of Large Wind Turbine Project was also arranged. The State Solar Contact participated in an interview on WRTU-FM. He discussed the programmatic efforts of SSEC and of CEER for the commercialization of solar and renewable energy sources.
- . As part of CEER's Community Awareness efforts, the SSC has been instrumental in the project "Community Participation in the Development of Energy Self-Sufficiency for the Island of Culebra. Several visits were made to Culebra to coordinate activities including a half-day seminar to community leaders on solar energy technologies and the role of community planning efforts. A proposal was submitted to the National Science Foundation Science for Citizens Program for funding of the project. The project includes need assessment efforts, community planning and interest group support as well as a series of one day workshops for the community at large on solar and renewable energy technologies. Contractual negotiations are undergoing with NSF and if final plans are approved the project will begin December 1.
- . The SSC is one of the original members of the local planning committee for the 1982 National Conference on Renewable Energy Technologies planned for San Juan. Planning efforts undertaken by the SSC have included proposal preparation, initial logistical arrangements, planning of information dissemination, activities, etc.
- . The SSC has represented CEER's Director in various meetings and seminars which relate to efforts in the area of Energy Assessment and Analysis and Community Awareness. These include the "State Strategies for Energy Security Conference held January 31-February 2 in Little Rock Arkansas, the March 17 meeting of the Steering Committee of the (First) National Conference on Renewable Energy Technologies, and the August 21 meeting of the SSEC Board of Directors.
- . The SSC has attended various local and national meetings and seminars dealing with solar technologies, including the SERI-DOE Second Open Workshop on Solar Technology and

the SERI-DOE Second Annual Conference on Community Renewable Energy Systems, among others. The Second Conference has served as training for the State Solar Contact which will help increase the effectiveness of the activities undertaken through the State Solar Support Project. A list of official travel undertaken by the State Solar Contact is listed in Table 4.

Table 4

Official Travel:

1. October 23-24, 1979, "SERI-DOE Second Open Workshop on Solar Technology", Washington, D. C.
2. October 24-26, 1979, "DOE-NASA-HUD Seminar on University and Small Business Collaboration on Government Research Programs", Arlington Virginia.
3. November 7-9, 1979, "Technical Congress on Investigation and Conservation of Energy Resources, San Juan, P. R.
4. November 29, 1979, "Seminar on Energy and Environmental Matters of Concern to Industry in Puerto Rico", San Juan, P. R.
5. January 29-30, 1980, SSEC State Solar Contact Meeting, Atlanta, Georgia.
6. January 31-February 2, 1980, Official representative of the Governor of Puerto Rico and of CEER in the "State Strategies for Energy Security Conference", Little Rock, Arkansas.
7. February 12, 1980, Visit to Mayor of Culebra to discuss seminar plans.
8. February 27, 1980, "Seminar on the Kreps Report", San Juan, P. R.
9. February 29, 1980, "Seminar on Community Participation for the Development of Energy Self-Sufficiency for the Island of Culebra", Culebra, P. R.
10. March 17, 1980, represented Dr. Juan A. Bonnet, Jr. on the Steering Committee Meeting of the National Conference on Renewable Energy Technologies.
11. March 18, 1980, met with officials of NSF's Science for Citizens Program to discuss Culebra proposal.
12. April 20-30, 1980, SSEC Solar Contact Meeting, Atlanta, Georgia.
13. May 29, 1980, "CUES Public Utility and Energy Technical Assistance Seminar", San Juan, P. R.
14. July 30, 1980, Visited officials of Raytheon Service Corporation to study Puerto Rico's participation in federally funded solar and renewable energy projects, Arlington, Virginia.
15. July 31-August 31, 1980, SSEC State Solar Contact Meeting, Atlanta, Georgia.
16. August 21, 1980, represented Dr. Juan A. Bonnet, Jr. in the Board of Director's meeting of the Southern Solar Energy Center, Huntsville, Alabama.
17. September 2-5, 1980, "SERI-DOE Second Annual Conference in Community Renewable Energy Systems" Seattle, Washington.

18. September 5-7, 1980, "Annual Convention of the American Economic Association" - Allied Social Sciences Association".
19. September 9-10, 1980, "SEIDB Data Access Training Workshop", Atlanta, Georgia.

4.0 PROBLEMS AREAS

The achievements of the Puerto Rico State Solar Support Project, as described in Section 3, have been substantial. But a general evaluation of the project for FY 80 requires that "problem" areas be recognized and discussed. The following have been identified as problems and considerations which must be addressed for improved success in the achievement of project goals and objectives:

- . Special considerations relevant to Puerto Rico.
- . Coordination with other SSEC programs.
- . Resource and budget limitations.

4.1 SPECIAL CONSIDERATIONS RELEVANT TO PUERTO RICO

Puerto Rico differs from most of the Southern region in important considerations which must be accounted for in regional planning and implementation strategies for solar commercialization. The relevant factors include:

- . The location in a different climatological region (humid tropical climate) with the resulting differences in energy needs and in technologies suitable for the climate.
- . The inapplicability of federal tax laws and subsequently, Federal tax incentives for solar commercialization. This is part of Puerto Rico's unique political and economic relationship with the federal government.
- . Puerto Rico's exclusive reliance on imported petroleum for its energy needs.
- . The utilization of the Spanish language as the principal form of oral and written communication.
- . Cultural differences which affect individual and community response to commercialization efforts.

SSEC program efforts and publications, including those of the State Solar Support Program do not always take account of these special considerations of Puerto Rico in their planning and implementation. Given the great need and potential solar commercialization in the island and its importance with respect to region-wide efforts, it is imperative that the above mentioned factors be fully taken into consideration. SSEC has moved in this direction: the special geographical considerations of Puerto Rico are discussed in its preliminary Institutional Plan for FY 1981-FY 1986. Another example is the special solar display unit being designed for Puerto Rico.

4.2 COORDINATION WITH OTHER SSEC PROGRAMS

The objectives of the State Solar Support Program include facilitating state level input to SSEC planning and program implementation activities as well as developing and maintaining a primary communication linkage between the state energy agency (CEER) and SSEC. In the case of the State and Regional Coordination, and the Information activities of SSEC, these objectives have been successfully met. Unfortunately communications and coordination with other SSEC programs have been less complete.

As the principal example, there was little coordination between the SSEC Passive Cooling Design Competition and the Puerto Rico State Solar Support Program in spite of the SSC's efforts to assist SSEC in the project. This work to the detriment of the project objectives. State level input to SSEC activities is crucial if through the State Solar Support Program the special considerations relevant to Puerto Rico are to be accounted for.

4.3 RESOURCE AND BUDGET LIMITATIONS

The Puerto Rico State Solar Support Project was funded the amount of \$28,000 by the Southern Solar Energy Center in FY 1980. The amount proved insufficient to support the expenses of a one man-year level of effort. Given the support provided by the SSS Project to other CEER activities it proved beneficial to CEER to absorb the cost differential. But the budget limitations constrain the capacity of the project to achieve its goal of augmenting CEER's role in fostering the adoption of solar and renewable energy technologies.

The human resource and budget limitations have been mitigated somewhat for FY 1981 by the new contract for \$35,547. Nevertheless actual direct and indirect operating expenses for a one-man year level of effort in FY 1981 have been estimated at \$43,387. CEER has indirectly cost-shared in funding the project and will continue to do so in FY 1981.

Resources and budget limitations serve to constrain the project in its support of support of CEER initiated activities toward the support of solar and renewable energy technologies. But project time has been invested in seed efforts to obtain funding for related projects such as limited CEER Institutional funds for a book in Spanish, discussing the energy alternatives for Puerto Rico; DOE-SERI-SSEC-PROE funding the Second National Conference on Renewable Energy Technologies and NSF funding for Culebra Community Energy Self-Sufficiency project. The results of these efforts are still pending.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The principal impacts of the Puerto Rico State Solar Support Project have been to augment the technical capabilities of CEER in support of solar and renewable energy technologies and to support the program and planning efforts of the Southern Solar Energy Center.

Despite resource and budget constraints, the SSC project has provided support to CEER's community awareness and Energy Assessment and Analysis efforts. It has been instrumental in the planned Culebra Community Energy Self-Sufficiency Workshops, in pre-planning for the Second National Conference on Renewable Energy Technologies and in the continuing preparation of written materials on energy alternatives for Puerto Rico. Successful continuation of those projects will require obtaining outside sources of funding.

The impact of the project in supporting SSEC activities has appeared most direct in its regional coordination efforts. More direct local input into SSEC program and planning efforts are needed to fully account for the special considerations relevant to Puerto Rico which were previously discussed.

The Center for Energy and Environment Research considers the Puerto Rico State Solar Support Project a useful adjunct to state and regional efforts to achieve the transition toward renewable energy technologies. To increase its usefulness the following recommendations are submitted:

- (1) An initial activity proposed for FY 1981 is the preparation of a Solar Plan for Commercialization Activities by CEER. The plan will analyze the target recipients of commercialization efforts and how existing and future activities by CEER can contribute to the transition to solar and renewable priority areas will be established. Implementation of additional activities will require outside sources of funding, including increased support by the Southern Solar Energy Center.
- (2) Greater input into SSEC program planning and implementation by state jurisdictions is required. A strengthened State Solar Support Program can help serve to accomplish this goal. Consideration of special geographical, economic, and cultural circumstances of Puerto Rico is paramount.
- (3) Increased financial support of the Puerto Rico State Solar Support Project is needed to implement the above recommendations. In addition increased project funding is required for the support of solar commercialization efforts of local interest groups.