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PROBLEMS AND POSSIBILITIES IN THE DEVELOPMENT OF

?A CARIBBEAN BASIN EXERGY PROGRAM

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PROBLEMS AND POSSIBILITIES IN THE DEVELOPMENT OF
A CARIBBEAN BASIN ENERGY PROGRAM

Wallace W. Keahler, Jr.

Summary and Conclusions

Various institutions, including international organizations, universities and research centers, are concerned with expanding their roles as vehicles for energy and environment technology transfer in the Caribbean Basin. Current United States policies as well as the needs and interests of the various Caribbean Basin nations make this an especially propitious time to consider and explore alternative strategies for delivery of such services in the region.

The primary purpose of this report is not to offer suggestions for possible programs, although some recommendations are provided. Rather, it seeks: (1) to explore the multiplicity of impediments that various institutions

might encounter as they expand their mission; (2) to and

offer some tentative alternative strategies.

Several important problems are found. These range from lack of information to competition-

among the many international and governments' donors. Other

sufficient infrastructure in possible recipient countries

Negative factors identified include inadequate planning, insufficient data upon which to predicate decisions, and potential competition with already existing programs. Finally, there are cultural, political, developmental and economic variables which spell differences among potential recipients. These differences must be taken into account

both in substantive and procedural terms.

Strategies will also have to be tailored to reflect the type of recipient. These include governments, individuals, domestic enterprises, multinational

corporations, universities, aspiring profes

and so on.

Department of Political Science, Vanderbilt University, at the time this report was researched and written.

Mead, Technology and Policy Assessment Division, CEER, Since June 19%

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Political realities are recognized. Development of an effective

strategy will have to be consistent with the broad policy interests of

regional governments, concerned international organizations, private
Sector Planning, and perhaps most importantly consistent with the
interests of the governments of Puerto Rico and the United States. The
ca

Energy Initiative, though not yet fully implemented, offers

some real opportunities, particularly in Puerto Rico,

Careful planning is necessary to devise effective strategies. In
order to develop the most effective plan, it will be necessary to call
upon the talents of diverse groups of people. Since it has long been
recognized that energy problems are not just technical problems, but
have political, economic and cultural components

ts, 36 will be necessary

to bring expertise to bear in those areas as well as in the technical

Strategies which seek to take the various impediments into consideration should follow free what must be the first step in developing an overall Caribbean Basin strategy. It will be necessary to decide early on what the institutional role should be in providing energy assistance to the nations in the Caribbean Basin. that role could be large and inclusive or it could be small and specific. In effect, it will be necessary for each institution to "stake out" its range of

At WIL also it is necessary to consider the needs and interests of the various Caribbean Basin nations. Perhaps the best way to do this would be to convene, at the earliest possible time, a conference or working group of private sector, university and government personnel from the

Caribbean Basin nations, the United States, and international organizations. The conference or working group should concentrate its efforts on: (1) defining the range of the problem; (2) cataloguing existing data on energy supply, consumption, and demand in the region to determine further data needs; (3) considering future energy needs; (4) considering the variety of institutional problems each faces; (5) Agents tying the various donors and their agendas; (6) exploring cooper

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ative agreements oné (7) determining the overall and individual needs

anstitutions might respond to.

once te scope of needs is explored and the range of interests of

each institution established, strategies can be developed to meet those

needs.

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PART 1

THE RANGE OF THE PROBLEM

Introduct

?This report is concerned with the role that various organizations,

universities and research institutes might assume in developing programs to assist nations in the Caribbean Basin. It considers implementation problems each may encounter as it seeks to expand its role in technology transfer and the development of energy programs and policies. The report is neither prescriptive nor proscriptive, but

seeks to: (1) map the range of problems; (2) identify the key actors;

and (5) consider possible approaches. Given the resource and time

constraints on the development of this study, the recommendations incorporated herein should not be considered exhaustive, but merely as

points of departure.

Problems of implementation cover a multitude of issues. First, the needs and resources of recipients must be considered. What are the indigenous resource base, the consumption patterns, the development stage of the domestic technical/scientific infrastructure? Each

country has unique needs and resources.

It is likewise necessary to explore the range of assistance these countries already receive in order to avoid duplication of effort and to provide assistance where it is needed in the most efficient manner.

?There appears to be an ongoing proliferation of institutions to address

either problems of development in general or the more particular energy
issues. One good example of this is the recent creation of the Latin
?American Energy Development Bank. This report will suggest methods for
cooperating with such organizations.

It is also desirable to consider the types of domestic institu-
tions--be they scientific, technological, economic, social or govern-
mental--and how these can be worked with to provide for these needs
And, because "People will prove to be the dominant single factor in

technology transfer," the report will consider the various political,

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institutional, social, and economic problems and impediments which may

exist in Puerto Rico, the Caribbean Basin and the United States.

Finally, no effort will be made to evaluate any given technology, except insofar as implementation issues may be affected. Thus, neither general evaluations of the appropriateness of nuclear or fired electrical generation plants, nor arguments in favor of centralized or decentralized systems, will be made. Nor will appropriate or high-tech technologies be favored one over the other. These are issues which must be decided both by recipients and donors, and are too complex and important to be decided here.

The General Problem

The Link between energy and development is well known and documented." Though some would question the continuing importance of that link in post-industrial societies, the need for both "conventional" and non-conventional energy growth in developing societies is generally unquestioned. Efforts have been made to estimate energy growth patterns and energy needs of Latin America, and of developing countries in general.* the general, though not exclusive, conclusion is that demand will continue to increase both for liquid fuels and electricity. Planning for the Caribbean must not only take into consideration local supply and demand patterns and future projections, but the impact of particularly in the West. It has been generally observed that U.S. energy policy in particular may have

decisions taken elsewhere

serious consequences both for other developed countries? and for the developing world.© Developing countries have adopted a variety of strategies to take cognizance of this interdependence and to partially decouple from it. Several strategies have been developed to deal with changing energy problems. Brazil, for example, has followed a policy of energy substitution and export promotion," while Venezuela follows an import substitution program. Mexico is said to be following an ambitious global development plan. Supply substitution and/or demand current problems. As

reduction have been employed to address:

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Development proceeds, these may have to give way to conservation and attempting to increase supply. The solutions for these problems will in part follow from global energy issues, but they will also be significantly affected by domestic institutional, economic, and political issues. These issues will follow in part from domestic problems, but

they will also contribute to those problems.?

Many developing countries have turned to the developed world for technology and other assistance. For example, the Tennessee Valley Authority (TVA) model has been exported to as diverse a group of countries as the People's Republic of China and Mexico. Some countries have purchased "high technology" on a turn-key basis, as have the Brazilians for example, whose nuclear power program has its roots in Germany. India has announced it will accept a Soviet reactor. These high technology strategies have been criticized as being too complex, too capital intensive, too large, too politically sensitive,[®] or

inappropriate to the needs of developing countries.?

Oftentimes more decentralized, less technologically sophisticated systems are prescribed.!? these ?appropriate? technologies are desirable in developing societies, the argument continues, because they are easily understood and adopted by & generally unsophisticated population. The range of recommendations is generally limited to very simple and inexpensive changes in current practices. These range from charcoal cooking stoves to design modification for biogas digesters.

The other side of the coin is to identify ways to adapt, economically and/or politically, high technology to developing regions.

Brazil, Paraguay and Argentina,

?antagonisms, have found it possible to cooperate in development of the hydro-electric potential of the River Parand. Once fully on line, the Teaipy complex will generate 12600 Mie from eighteen turbines. Simi-

larly, there may be inetitutional arrangenente to make nuclear power

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three nations with a history of mutual

both politically and econcnically feasible in developing counts

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There 1s also a middle way, one which does not necessarily eschew electricity, but which seeks to generate electric power and other forms

Of con

unable energy through decentralized, 1

complex systems.

These systems, it is argued, can be learned by local populations,

require far less capital, and permit users to make appropriate use and

Maintenance decisions.)

Not only have three levels of technological sophistication been

identified, but three types of technology transfer can be described,

(It is) the process whereby knowledge and know-how originating in and

Drought to practical demonstration in one institutional or national

setting are adapted for use and applied in another setting. The

process may involve

(a) the direct transfer without (or with minor)

modification; (b) adaptation or modification of a basic process, plant

design of product to local conditions, situations, and markets, and (c)

the utilization of the know-how as a steppingstone to further creative

indigenous or joint advances in the state of the art. What is appropriate in any given national or institutional setting will depend on the ability of the organization to absorb and adapt technology as well as the way in which the technologies are transferred.

A variety of technologies have been proposed, studied, and explored in the literature. Three general approaches have been mentioned above. Two things must be considered before strategy for the Caribbean is developed. First, the countries of the Caribbean are quite

diverse. They range from the Central American states of Costa Rica, El Salvador, Belize, Nicaragua, Guatemala, and Honduras to the relatively large island economies of the Dominican Republic, Haiti, Jamaica, and Trinidad and Tobago, to the microstates of Antigua to St. Lucia. There is, in sum, no simple "fix" for the Caribbean Basin nations. Thus neither the "high tech," "no-tech," nor the "medium-tech" strategies should be embraced. Flexibility is required.

appropriate for the entire region. Instead,

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Implementation Issues

Infrastructure Questions

Let us recognize at the outset that "science and technology" have
not rendered politics meaningless, as some nineteenth century philoso-
phers believed: ° thus the admonition that the solution to the world's
Problems is to give the engineers a free hand is neither possible nor
workable. "People problems? create implementation problems. The

National Academy of Sciences observes, for example that "...learning to
use energy in new forms and new ways may require years--perhaps even a
Generation or more--to break down the economic, cultural, social and
institutional barriers that impede technical changes in developing
countries." studies of energy cooperation in developed countries
Suggest that there is @ wide range of barriers. They may include a
sense of "not invented here," juste retour, nationalism, commercial
applicability and other factors."© in sum, the idea that "...to meet
Projected crises, states will eventually cooperate or forfeit the

advantages of economic growth and political stability has but limited

visibility, ?There are problems of technology transfer between

developed and developing countries, and these are even more complicated

by dependence concerns.

Implementation and infrastructure have special cogence for institutional

and policy scientists, In simplest terms, does structure

dictate function, or does function dictate structure? David Davis, in

his examination of U.S. energy policies, concludes the latter. Use and

Physical characteristics of fuel has, he concludes, had the determining

effect on federal policy over the years. organization itself may

have an impact on policy. It has been popularly argued, for example,

that the Atomic Energy Commission, because it was both a regulator of

the technology as well as its primary promoter, was unable or unwilling

to adequately explore reactor defects, Larger political institutions

may also contribute, For example, political arrangements in Canada?

Parliamentary government superimposed on a federal entity, coupled with

inadequate representation of energy producers--almost irrelevant to political

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Peralysis."° although probably resolved, the crisis could have led to national fracturing

eticnal development policy may alec be formulated to reflect gaan and not so hidden agendas.*? program developsent will have to be seneitive to those possibilities, and hard political decisions may lhave te be made or precipitated in the process.

Institutional science can contribute te the effectiveness of strategy. It car assist in determination of appropriate institutional arrangements and predict with some accuracy the types of policies and effects generated hy that institutional type. It is recognized that there are wuny aifficulties associated with inpresentation theory.

For example, * ...implementation success depends on a

sions; the implementation question dissolved into multiple aspects.

?These include demand and supply forecasts, their accuracy, and the coordination of programs. ?There are, likewise, @ variety of reasons why there may be deviation from the plan. These include (1) problem Feoppraivals (2) unanticipated impediments; and (3) authority dissipation and cospeting interests.?

Second, the governments of the

wribbean Hasin nations are widely

Giverse. They differ in form, political ideology, culture, Language, colensal roots, temperament, and so on. Some are authoritarian, while others are desocratic. This se an important distinction. for

suthoritariun-bureaucratic Latin American regimes tend to depoliticize

?social and political issues to ?technical? problens,"* while

Aonocratic regimes have a tendency to politicize technical problems to social and political issues. Tt is inherent in the quthoritarian-

Duresucratic leadership style that political order be mainained and

that ?sues reach rationalization.??>

Because Of this ané because mst governments quest after perma

Pence, there is a certain reluctance in

some regimes to permit the

benefits of development programs to reach the poor and needy.²⁰ There

is some theoretical justification for this, Ted Robert Gurr is perhaps

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the best known exponent of relative deprivation theory.²⁷ The abso-

lutely deprived are not likely candidates for revolution because they

lack the knowledge, know-how, and desire for change. More importantly,

they are unaware of their deprived status. It is only after persons

become aware of their relative deprivation status that rebellion

becomes possible. Education, communications media, nutrition, health

care, public utilities all contribute to improvement of the population,

but they also raise the possibility of increased relative

deprivation. My purpose in raising this issue is not to counsel

against assisting certain developing countries, but to flag these

concerns as possible impediments to program development. some

governments may be reluctant to follow plans which appear to have a liberalising effect or which may be perceived to undermine political legitimacy. Where this is the case, special efforts will have to be taken to mitigate those fears.

There are other problems and issues which impede national energy planning. The case has been made that problems of energy policy making in the Caribbean are aggravated by inappropriate policies and institutional constraints, which can take several forms. Ramsey and Shue, for example, examine three infrastructure variables they consider important to implementation of decentralized new and renewable energy systems in developing countries: "local credit facilities, rural roads

and transport, and repair and maintenance facilities." They conclude that the first is a necessary condition; the other two may or may not be important, depending on a number of factors.

Another variable is the degree of government participation in the economic and energy sectors. Electric services tend to be government

owned. Whether government owned or not, there hi

been a proliferation

Of regulatory boards and a general extension of government power since the early 1960s, Some of this results from a dissatisfaction with Private sector contributions to development. But it is also linked to increased nationalism and policies to diversify sources of foreign capital. These developments have resulted in institutional overlaps,

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wnefficiencies, and a continuing technical dependence on the developed countries. Finally, there ie concern that some countries, particularly the English speaking, lack the necessary planning infrastructure to

make decisions at 211.7%

This List should be expanded to include centralized and conven tional energy systems as well. Clearly one option is to provide Carsbbean governments with policy advice, to develop programs of public administration in energy, and to advise governments on the implications

and impacts of policy proposals. Assistance could range from complex

computer modeling to the drafting of legislation.

We are concerned with infrastructural barriers to rational energy

use. We must remain sensitive to technology transfer issues. We must

promote

ourselves of the interests of the recipient states. Wionezek

Provides an important distinction: "(T)he developing world considers

that technology transfer takes place only when know-how is incorporated

into the stock of the available knowledge in such a way that the

receiving society can use it for many purposes." He warns that if

technology transfer is to be successful, each recipient state must

decide which technologies to adapt and how they are to be incorporated

into society. These must therefore be local decisions, local responsi-

bilities. To develop these responsibilities, decisions, and skills

to carry them through, participants from the receiving state should be

made an integral part of any planning, and should participate in

Program development and delivery. Recipient organizations, to the

Whenever possible and appropriate, should share in the manpower and financial needs and costs of projects, in part to inculcate a sense of

Importance, but also to develop continuity and cooperation.

Research and development concern many developing countries

Alonso suggests that there are four phases to the innovation process: Research, development, engineering, and production. Most developing countries profit only at the fourth. In order to develop strategies for technological innovation, to become more sophisticated, several infrastructural questions must be addressed. These are the engineering

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consulting and research capacity of the country, informational services and an adequate financial base.?? several other infrastructural variables have been identified. A report prepared for the FEA and ERDA suggests Alonso's as well as several others. ?These include: (1) ?market demand," (2) ?national policies, laws and regulations," (3)

"corporate policies," (4) "education," (5) information availability,
(6) "individual personalities and roles." For this last point, one
could add sensitivity to local mores, customs and practices.

The shallowness of scientific, technical, and planning personnel

As another infrastructural impediment to development. By shallowness
of personnel I do not mean to imply that these people have personality
deficiencies or that the depth of their training is insufficient.

Rather, what is implied is that there are too few trained people in

developing countries, and those who have received appropriate
training tend to be found in government and other administrative

positions rather than "out the bench." Thus it is not only possible but

likely that one will encounter technical personnel whose training has
been not

moreover, tend to be slow and deliberate. One observer described sort

quite to the task they are asked to perform, Planners,

Caribbean planners as competent but "still in training." All this

together will render the decision process slow and at times tedious.

Perhaps because of their training and perhaps for other reasons,

there also tends to be a preference for highly sophisticated, complex
jession of
high technology contributes to a sense of prestige and power, may

technologies over the more simple, traditional ones. Po:

contribute to energy independence, and enhances a country's perception
of scientific and technological development, among others.?? Recommen-
dations, when made for the time tested technologies, will have to take

this ?preference* into consideration.

OF grave consequence is the tendency to ignore proper maintenance
technol

schedules and to follow repair procedures. Particularly at
estes employed become more coaplex, # sense of the need for routine

ce Will have to be installed or inculcated in all concerned.

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These three concerns, in addition to all the others require that any institution seeking to transfer technology to developing regions take them into consideration as it designs its program. either the technologies being transferred will have to be kept to @ minimum of complexity or proper: maintenance and repair will have to be built into

the training, hence into the thinking, of those who will have to run

?These Lists suggest immediately a number of potential impediments to development of @ cohesive program, but they also suggest a series of strategies. Through a variety of methods (Literature review, elite interviews, country visits, etc.) other variables should be identified and examined. Some of these could be tax incentives and disincentives, working considerations, foreign and domestic capital investment regulation, consumption patterns by sector and the potential for

ention But a few. Thus one ongoing, long-term effort could be the identification, examination and cataloguing of infrastructural variables. These, in turn, will serve as important

tools in policy development.

Data inadequacy

A number of studies have addressed energy demand and supply.

These range from United Nations data sets to far more complex examinations by nations and subnational entities. While the number and complexity of studies have increased and improved, data for developing countries, particularly sufficiently complex data of a comparative nature, remain inadequate. These data inefficiencies limit the effectiveness of decision making and of modeling. One analysis of energy patterns in a small, developing island country finds development of adequate and standardized statistics the sine qua non of energy planning. Energy data alone, however, are insufficient for policy

development. Energy is an element, albeit an important one, of a development strategy. As a consequence, broader information will be required to plan energy usage in the future. For example, industrial and commercial plans in the short, medium, and long term, must be entered into the energy planning equations.??

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(One of the more pervasive threads which ran through the interviews conducted in October 1982 in Washington, D.C. was that energy data in the Caribbean are inadequate. As a first order requirement, methods by which an adequate, standardized data basis for the Caribbean Basin can be developed could be considered. It might be useful to convene a meeting or series of meetings to explore these issues, to outline data requirements, and to assess the degree of need each country has for

I am not going to belabor the energy data point by going into long and explicit detail of the types of data required. Suffice it to say that energy consumption, resources, and production data are required. Moreover, it will be necessary to consider the range of substitutability (of, for example, alcohol for liquid petroleum fuels, or hydro for oil), the opportunity for more efficient use of energy (that is, conservation"),

and the availability of conventional and non-conventional resources. The latter range from idle agricultural land, to biological wastes, to under-utilized hydro potential. In addition, the

conservation value of passive and active architectural design should be considered.

Data have their limits. Many discussions of solar and biomass energy alternatives presume the uniform and universal availability of resources, land, manpower, and other needed factors. Even when these factors are taken into consideration, resources may not be accessible.

For example, one study of woody biomass resources concluded that while there may be abundant "total" supply, because of ownership patterns, in circumstances there may be an inadequate exploitable supply. That conclusion was reinforced by the observation that many owners had purchased their property in order to maintain it in its pristine state, that they would vigorously oppose any effort to develop it.*? Like wise, the nuclear industry often complains that regulatory regimes in the United States have contributed to a doubling of construction time of nuclear power plants. We have seen recently where other regulatory regimes have effectively stymied pipeline construction, landfills, and ?one underscore the importance of

other public works. These examples

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of Various political, social, and economic factors in development of energy policy. It is essential that we develop an inventory of aggregate energy supply and demand, but it is also necessary that an understanding of the constraints on that supply and demand be understood. To ignore ownership patterns and intended uses, to ignore regulatory structures and political and economic realities is to invite failure. Part and parcel of any effective development strategy for the Caribbean must be an analysis of these issues, how they affect decision making and the rational use of resources, and what the political and economic realities affecting change are

Social Impacts

Social and environmental impacts deserve attention. Rural

electrification has sometimes been painted the harbinger of desecration in the third world, just as it was for Franklin Roosevelt in the U.S.

An the 1930s and 1940s. It would be very difficult indeed to argue that these programs have not had a profound impact on the rural South of the United States. The argument has been made, however, that rural electrification programs presently proposed for developing countries may have the opposite effect, that they will further entrench existing elites and retard the march of progress and social justice.??

?These arguments are problematical but bear reflection. The development of energy policies will have a significant impact on development in the future. Some analysts take explicit and normative

positions (i.e., to view ??, commoner, Most others suggest possible

alternatives under varying assumptions (i.e., Stoubaugh and Yergin,

as 4

where, where)?°. Most analysts provide us with implicit assumption

Generally, that to maintain the status quo, certain

Stoubaugh scenarios will be required, Some long term thinking is desir-

able to establish premises from which to act.4?

Social impact assessments are somewhat mundane but extremely important elements in any development strategy. Before any project is developed, assessments of the impacts of that project should be made.

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The literature on social impact assessments in developing countries is

sparse, but nevertheless suggests that there are a number of important positive and negative results. These include increased demand for government and social services, increased employment opportunities, increased alcoholism, and so on. Moreover, project design may play an important role in mitigating negative impacts and in enhancing the positive. Thus social impact assessments should be offered along with any in-country assistance, not only to help the recipient country but to expand understanding of these impacts and to further refine the methodology.

A policy issue

There is a potentially serious political impediment. Some Caribbean nations and the United States are at odds with one another.

It is important to remember that security is an important element of

Caribbean Basin

the Caribbean Basin Initiative; that in fact, security considerations give rise to it, Cuba, Grenada, and Nicaragua may provide complications to the development of a comprehensive Caribbean energy plan. This is true if a pan-caribbean presence is sought and if the Plan is to be implemented in cooperation with other state actors or multinational international organizations in the area.

In light of this I believe there are essentially three choices.

The first is to address the problem exclusively in the context of the Caribbean Basin Initiative. To do so, however, is to make the program hostage of the political vagaries in Washington and may antagonize various Caribbean Basin governments which might question the underlying rationale of the CBI. A second, equally unfortunate strategy would be to ignore the opportunities of the CBI, to seek to develop a program at arms length to Washington. Clearly AID and perhaps the Department of

nersy will provide the predominance of direct and indirect funding for
ary efforts in the ore. A third approach is to work closely with
Washington @s well as all other donors and recipients in the region.
1m \$0 doing institutions should develop their own programs, circum
scribed by the political and economic realities of the moment. They

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should be sufficiently flexible to move into areas of opportunity and
to work with @ fairly wide range of participants. Fach should provide
services not offered elsewhere. In this fashion, the program my

maintain @ level of political and economic impartiality, yet remain
Responsive to policy changes.

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PART ir

THE KEY ACTORS

Regional and international Actors

?There are @ large nusber of actors whose interests must be taken
Ante consideration in development of a Caribbean strategy. Clearly,
the various governments of the Caribbean Basin nations have to be

consulted and considered before any strategy can be developed. There are, similarly, 9 number of other governments of concern. The interests of the United States, Britain, France, and the Netherlands must be considered since each of these countries has a continuing presence in the region. Other governments have shown an increasing interest as well. These include Colombia, Mexico and Venezuela, three countries with marked regional interests. Canada, too, has shown increased

interest, particularly in the Commonwealth Caribbean states.

Of great importance are the international organizations which have either global or regional interest in the Caribbean. Some of these are the more "general" international organizations like the United Nations (UN) or the Organization of American States (OAS). The World Bank has taken an active interest in the region as has the Inter-American Development Bank (IDB) and the Caribbean Development Bank (CDB). CARICOM and OLADE must be taken into consideration through consultation and coordination to ensure cohesive and rational Caribbean Basin energy policies.

There are other actors of importance which should also be considered. The Brandt Commission and Mexican President José López Portillo have called for development of international energy centers. The World Bank at one time sought to expand by developing a special bureaucracy dedicated to energy. The Canadian Prime Minister, Pierre Elliott

Trudeau, pledged increased assistance to developing countries perhaps most eloquently at the UN Conference on New and Renewable Sources of Energy in Nairobi in August 1961. The Organization of Petroleum Exporting Countries (OPEC) has made pledges which deserve

consideration

Finally, the private sector in a number of countries has shown a growing interest in the development and marketing of technologies appropriate to the needs of the Caribbean.

Brazil and Sweden have shown an interest in the development and marketing of technologies appropriate to the needs of the Caribbean.

ing interest in

the development and marketing of technologies appropriate to the needs of the Caribbean.

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Regional Government.

The governments of the Caribbean Basin states are concerned and interested in development of rational energy policies and programs. Their needs are so diverse and their infrastructures so varied, it is not possible to make sweeping generalizations. The government of the Dominican Republic, for example, has for some time been actively engaged in the planning process, a process which has resulted in some interesting policy developments. Partially, for this reason, Dominican Republic energy policy and needs have been closely studied and reported,

Trinidad and Tobago, a country possessing oil resources, faces

problems different from those of Haiti, Martinique and Guadeloupe, because of their ties to France, will perceive their energy needs differently from Costa Rica. We understand these things on a visceral level, but it is essential that a more empirical and objective understanding be developed.

Second, there are other governments with a regional interest in

the Caribbean. The two most important are Mexico and Venezuela which have been providing assistance in the form of discounted oil to Caribbean countries. The very nature of their fine gesture restricts the effect of the marketplace on defining energy alternatives. By providing oil below world market prices, there may be less economic incentive to identify policy alternatives. However, given the rather unenviable problems presently faced in the Mexican and Venezuelan economies, one should give some thought to the possibility that each Government might, in the medium term, withdraw favorable price treatment of oil exported to Caribbean countries.

These considerations aside, any comprehensive program in the Caribbean may very well require some form of coordination with the Mexican and Venezuelan governments, if only to rationalize the use of scarce capital and technical resources. To this end, it would be useful to discuss these issues with the appropriate Mexican and Venezuelan

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Venezuelan officials in advance of final development of any strategy. In this context, these governments might be approached either to assist in administration of aid programs or for support for ongoing

Programs.

Third, other hemisphere governments have shown an interest in the Caribbean. Canadian interests have already been mentioned, but it might prove fruitful to enter into discussions with appropriate officials in the Department of Energy, Mines and Resources and/or with the International Development Research Centre either at its Ottawa headquarters or its Boston office.

One student of Canadian policy argues that bilateralism rather

than multilateralism will guide aid policy in Latin America in the 1980s. There is an important exception however. Canada will probably develop important multilateral assistance programs in the 1980s at a minimum one should be familiar with Canadian policies in order to avoid technical

Caribbean, particularly for Commonwealth members.

Of geographic redundancies.

U.S. Interests

The concerns of the United States government will play a very significant role in the development of any strategy. We can consider that President Reagan's February 24, 1982 speech before the Organization of American States sets the Administration's Caribbean signed to help "our neighbors help themselves." The program contains six

Basin Initiative policies. The CBI, according to Reagan, 48 a&

Points of interest to development of a CEER strategy:

1. Free trade for Caribbean Basin nations for twelve years
2. Tax incentives for investments
3. 350 million assistance program
4. Provision for technical assistance and training to help the Private sector in

© investment promotion

© export marketing

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© technology transfer

© Peace Corps assistance and trained individuals

(© enhanced competition assistance

5. Development of close work with Canada, Mexico, and Venezuela,

and encourage others:

6 Implementation of special measures for Puerto Rico and the

U.S. Virgin Islands, for "... they can play a leading role in

the development of the area

The Reagan Administration has expressed a strong interest in the region. Again, to quote from the President's speech: "Make no mistake, the well being and security of our neighbors in this region are in our own vital interest. Thomas O. Enders, Assistant Secretary of State for Inter-American Affairs has provided further elaboration of the concept. He argues that "Because the peoples of the Caribbean Basin are our neighbors, we cannot turn our backs on their plight.

"Their troubles are inevitably our troubles." The basis of the CBI is to enhance the security of the region, To do so, he argues, it is necessary to recognize that "security, democracy, and economic development are clearly linked." Economic development assistance will follow several paths. Among these are assistance to local businesses, US firms, and private voluntary organizations.

To meet these goals, Enders calls for development of strategies to remove impediments to growth including lack of marketing skills, unskilled manpower, poor regional transport, and inadequate infrastructure." Enders also echoes the President's

position on a special role for Puerto Rico and the Virgin Islands in implementation of the cer.

The Caribbean Basin Initiative as expressed by President Reagan and elaborated by Secretary Enders provides a framework within which actors can develop their strategies, begin creation of contacts with regional governments, and others, and establish a sound fiscal basis. The strong emphasis on private sector initiatives suggests that, where possible, programs should be targeted for the domestic private and

Semi private sectors. Provision should also be made for education, training and other programs to provide

stance to these private

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sector interests, Programs done in cooperation with Caribbean Basin governments and universities should also contain as much private sector Participation as possible. because energy for energy's sake is not Developed in the President's message, it will also be important to

underscore the importance of energy for security and economic development. A sound energy system is an infrastructural variable essential to these nations.

Aside from the Caribbean Basin Initiative, there are a wide range OF private and public aid granting agencies in the United states.

Perhaps best known of all of these is the Agency for Inters

tional

Development (AID), which has funded numerous centers and projects.

Despite appearances, there seems to be a general effort by AID to

Provide assistance to developing countries in a variety of areas,

including energy. AID is, in fact, the most important of the U.S.

Government agencies now providing such assistance. It does this

directly and through a variety of subcontractors. The list of

subcontractors is long and impressive. It includes federal agencies

like the Tennessee Valley Authority, trade associations like the

National Rural Electric Cooperative, quasi-private organizations like

the National Academy of Sciences* Board on Science and Technology for

International Development (BOSTID), and private sector groups like the

Institute for International Education. AID also funds international

organizations, It has, for example, provided the Organization of

American States assistance for the tropical plant resources project.

Because of this wide range of interests and client organizations,

It will be incumbent on any actor to develop AID funding which is not

Duplicates through other AID programs to maintain @ high level of success. Continuous monitoring of AID programs is therefore recommended to assure that redundancies do not occur and to retain familiarity with current AID priorities and interests. Moreover, it might prove useful to include various AID subcontractors on specific projects. If one were, for example, to undertake a hydroelectric project, it might prove useful to coordinate with the TVR. Finally, it is necessary to bear in mind that while AID can exercise @ certain amount of latitude in the assistance it provides, it is nevertheless responsive to policy.

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Another agency designed to assist developing countries is the Peace Corps. Expressly mentioned in the President's Caribbean Basin Initiative speech, the Peace Corps engages in a direct, person-to-person form of technology transfer. The Peace Corps is staffed by volunteers; as a consequence there would be little demand for outside

Personnel to become directly involved in their in-country programs. However, training of Peace Corps volunteers in energy technologies appropriate for the tropics is a possibility. They, in turn, might

transfer that knowledge to people in client countries.

Finally, we cannot forget the Department of Energy and its COCO national laboratories. The national laboratories have taken an active interest either in the analysis of energy issues in developing and developed countries (Argonne and Brookhaven in particular), but are also actively engaged in a variety of direct assistance programs (Oak Ridge, etc.). DOE, however, appears to be caught in a dilemma, and may not yet be at a decision point. There continues to be a question whether the DOE developing country mission aims at assistance for development or for commercialization and development of U.S. export potential." Recent changes in the Office of Secretary and the continuing pledge of the Reagan Administration to dismantle the Department continue to render the DOE mission fuzzy. Moreover, there appears to be a demerphasis of the office of the Assistant Secretary for International Affairs (AS/IA) as well as in the federal support for energy techs

Logies except nuclear.

AMI of this is not to say that DOE in general or the Office of the AS/IN should be discounted or discredited. It is important, however,

te bear in mind that Mor ambiguities Will provide uncertainties, will create possible impediments to the development of @ Caribbean energy policy for any organization. Development of close working Felationthipe with the AS/IA ae well as maintenance of existing good Contacts with DOE Will assist the development of Caribbean interests.

?The essential point is that federal, and particuler DOE polickes are in Flux, There continues to exist some question whether the Pres~

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Adent's Caribbean Basin Initiative Will receive Congressional approval, and if it should, what form the Initiative vill ultimately take.

Moreover, there appears to be some concern in the Caribbean of the Usefulness and viability of the concept.©" to tie all one's hopes to the CBI would be @ mistake, but it would be an equally fatal mistake to ignore it. One should attespt to tind a middle ground, exploring the interests of recipient states and developing @ program consistent with the interests of the donors. It eust not be forgotten that the United States Government is and vill Likely remain the single most important source of support for U.S, based actors. Thus, efforts should be formlated within the spirit of the CBI, but the interests and needs of Potential recipients should be taken in the balance as well. Finally,

45 is discussed in the next section, there are also a variety of international governmental and non-governmental organizations concerned in energy issues either specifically in the Caribbean or in

Developing countries in Latin America

of an general. It may also be

Possible to find opportunities to work with these organizations as well.

International organ:

There are a variety of international organisations either directly

or indirectly concerned with energy issues in the Caribbean. At least two, UNICEF and the Caribbean Development Bank, have as their primary concern Caribbean issues, but consider energy matters an element of development assistance. CB has, however, considerable funding (\$8.4

million) earmarked for

energy development in the region

There are a number of other general development agencies which do not service the Caribbean alone. The best known of these is the World Bank. Between its creation in 1945 and 1976, the World Bank and its affiliates allocated 19% of their funds for electric systems and other in developing countries. In July 1977 the World Bank established a five year plan for mineral resource development. As late as 1981 the World Bank had proposed establishment of a new bureaucracy, but opposition, primarily by the United States, led to its tabling. The

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World Bank is now considering a variety of programs in energy, including a regional program for the Caribbean

The Inter-American Development Bank (IDB) has focused much of its

energy efforts in electricity, concentrating mostly in the areas of

generation, transmission and distribution. Included in its funding are
Projects in Barbados (non-conventional, mainly wind), the Dominican
Republic (solar), and Jamaica (energy rationalization and sector 2?

There are a

variety of United Nations agencies concerned with

energy issues from a variety of perspectives. These include UNESCO,
UNIDO, UNDF, FAO, PCIA, and the Division of Resources and Energy. With
the exception of ECLA, the scope of all these UN organs is global.

Generally, these UN agencies have been concerned with new and renewable
sources of energy, as the Nairobi conference in August 1981

underscored. For these reasons, a good working relationship with

appropriate UN agencies could be useful and might lead to some form of

cooperative work in the Caribbean

There are a variety of Latin American international actors. These

Include the Caribbean Development Bank, the Caribbean Commonwealth, UNICA, as well as organizations with either larger geographical or functional mandates. Most important among these are the Organization of American States, OLADE, and OPANAL. The OAS has a strong continuing interest, manifested mostly through its Department of Scientific Affairs. OLADE is the Latin American Energy Organization. It has shown much interest in solar and other renewables, perhaps best illustrated in its "Latin American Strategic Plan for the Development of Non-Conventional Energy." OPAKAL is a Latin American based organization developed to inhibit and prohibit nuclear weapons proliferation in the region. Closely associated with the Non Proliferation Treaty of 1968 and the International Atomic Energy Agency, OPANAL has an interest in nuclear power for electricity generation. Since Caribbean countries are or can become party to the Treaty of Tlatelolco, it is probable that OPANAL will become an even

more important actor in the development of a Caribbean nuclear energy

policy.

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There are also a number of international organizations whose concerns tend not to be in Latin America or the Caribbean. These include the Organization for Economic Cooperation and Development (OECD) and the European Economic Community (EEC). Each organization has pledged funds earmarked for energy (generally electric) projects in developing countries. The OECD in addition, through its International Energy Agency, is concerned with energy data, and has developed an energy data collection system for developing countries.

Finally, the Organization of Petroleum Exporting Countries (OPEC)

has shown a considerable interest in the problems of developing, energy

importing countries. According to Mureddin Farrag, Managing Director of the Arab Petroleum Investment Corporation, an autonomous body of OPEC, OPEC has developed a long-term strategy to assist non-OPEC developing countries. Its objectives:

1. assured security of oil supplies and priority access to such supplies in times of shortage
2. cooperation in financing their oil imports through direct grants-in-aid,

+ cooperation in financing projects for the development of indigenous sources of energy

cooperation in direct investments in agriculture, processing and manufacturing industries

encouragement of trade in manufactured and semi-manufactured goods and services with the LDC's and

effective support for the establishment of an equitable international economic order covering development, trade, aid, and international finance.

Farrag also develops OPEC's philosophy on energy self-sufficiency:

A policy of energy self-sufficiency regardless of costs in terms of money, manpower, and other resources would be the last-thing to encourage the energy-deficient LDC: to embark upon. They can ill-afford the pervasive misallocation of the

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Limited resources available to them with which such » policy would saddle them.

?This, as well as Farrag's third point, above, are especially interesting, in part because of OPEC's interest in financing development of Indigenous energy in developing countries. It must also be remembered that most Caribbean countries fall well within the group of countries single out for special interest. Finally, three OPEC countries have @ presence in the region, and may therefore have an interest in directing OPEC interest towards St. To this end, OPEC could become a major source of energy as well as technical assistance to the region.

There are a ts

The number of private enterprises in the Caribbean Basin. Because of the emphasis placed on utilization and development of the private sector in the President's Caribbean Basin Initiative speech, it is essential to consider their role and the interface

between CEEK and the private sector.

?The problem of private sector-university cooperation has long been explored. The interface problem can be reduced to its essential:

Private companies are concerned with profit and performance of specific, profit oriented tasks. Universities have different agendas, dictated by the diverse needs and interests of their faculties. Moreover, university research is usually not motivated by profit

considerations

Most research centers are goal directed. Much of their activities, falling within widely defined but specific charters, are

Generated through funding. In a sense, therefore, these institutions

are also concerned with "bottom lines."

Line," with meeting deadlines, and product delivery provided

Ground between research centers and the private sector. Hence, research

This concern with the ?bottom

centers can be used to bridge the gap between the academy and the ?real

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?As Part of @ university, some research centers possess positive attributes which a corporate actor may not. These attributes could assist them to bridge another important gap. They would less likely be perceived as a vehicle for exploitation, and could, through these contacts with regional governments, universities, and local private concerns find it easier to engage in work where the multinationals

would face difficulties,

It might therefore be useful to consider ways university based

Research centers could serve as @ conduit for multinational participa:

?tion in energy development. One seemingly obvious option would be for

these to make available to various companies their facilities for

testing and development. In that way, they might make a significant

contributions in the host country, This might obviate criticisms

revealed against subsidiaries of foreign companies. The "branch plant"

phenomenon had an insidious though often unintentional impact on

domestic scientific and technological capabilities. To bring RDED to

the Caribbean would be to contribute to the development of indigenous

scientific and technical cadres. These cadres, in turn, are a

necessary infrastructural variable of development.

In order to promote development as well as to disseminate energy

technologies, it will also be necessary to work with local enterprises.

Research centers can assist in a variety of ways, ranging from evaluation

of market potential and projection of market penetration, to

provision of energy audits for local industry, to training of technical

personnel. Moreover, it may be necessary to adapt some "off-the-shelf"

technology to local conditions. Research centers might assist local

interests in making those modifications

The difficulty with these suggestions

is a wide diversity of needs, traditions and conditions in the

Caribbean. It will be necessary:

multinational and local companies

5 with many, is that there

try to meet with representatives of both

partners to identify the range of needs and the

Kinds of responses appropriate to meet those needs. It might therefore

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be useful for a research center to convene a meeting of private sector

Representatives as well as meet with them at their places of business

to understand better those needs and to develop a strategy to meet

them. I have recommended elsewhere that a meeting of government,

university and private sector interests in the Caribbean Basin be

convened to determine the scope of the energy problems of the region,

to explore solutions, and to propose work strategies. Because of our vast information lacunae, it might be appropriate to convene a broader meeting before focusing more specific attention on the private sector alone.

The United States is not alone in its concern for and assistance to Caribbean basin states. Canada, Colombia, Mexico, Venezuela and several European countries have had a major presence in the region.

There are a large number of interested international governmental and non-governmental organizations, ranging from the World Bank and the United Nations to CLADE and OPEC. A useful first step could be the cataloguing of these various programs. This catalogue could be useful in two ways. First, ongoing programs could be identified, thus avoiding redundancies and recognizing needs. Second, possible sources of funding might be identified and developed.

This multiplicity of programs may, in fact, become an impediment to useful program development in the Caribbean. Several donors may knowingly or unknowingly provide similar assistance to a recipient. That assistance may prove to be contradictory or competitive, rendering the impact of the program less effective than it might have been.²² Moreover, some observers feel that the international organizations, because they have their own agendas and needs, find it difficult to communicate or work together.²³ That may confuse the recipient, who

may not possess the technical infrastructure to decide among the competing organizations. Moreover, various international donors may co-opt different departments and agencies of the domestic government, placing one department in competition or conflict with another. This

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conflict may result in the paralysis of the decision process:

Finally,

because political systems and concerns play a role in establishing technical agendas, it may be equally necessary to render advice and

assistance of a more political nature.

Recognition of the variety of international actors in the region may not be enough. There are four strategies which could be followed

to deal with these other actors. First, they could be ignored. Second, all could engage in information sharing, at a minimum exchanging information on programs. Third, the agencies could coordinate their

programs. And fourth, programs could be, where appropriate,

integrated.

Clearly, the first two strategies would require little effort. To ignore other programs may result in duplication of effort, but more probably will result in a significant waste of resources and could contribute not to the solution of energy problems but to their confusion. The second is therefore the minimum acceptable strategy. By developing an adequate program of contacts among donors it should be possible to rationalize the program of donors. Given that resources are limited, redundancy should be avoided. Thus, it may prove possible to establish,

that while agencies might compete for programs, once

efforts would be coordinated to avoid redundancies.

Finally, the energy problem is of sufficient magnitude that there will often be opportunities of cooperative work among donors. A system should be considered to make this possible, perhaps one comprising all Directors who, with their appropriate staffs, would meet periodically to analyze and discuss the scope and dimensions of the problem, resources to meet it, and possible institutional and technical

responses. In order to work effectively, to develop a strong fiscal basis, and to recognize and offer solutions for the many pervasive Problems in the region, it will be necessary to coordinate, cooperate, and at times work closely with and/or for these other actors.

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to do so may very well constitute an important impediment to the development of a comprehensive, workable program.

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PART 111

POSSIBLE STRATEGIES

Introduction

The following section contains recommendations specifically designed for the Center for Energy and Environment Research of the University of Puerto Rico,

There are numerous ways to provide assistance to Caribbean Basin nations. In this section we consider some of those options and the impediments which may be encountered. An assessment of the

appropriateness of different strategies is also made, based in large

Part of the practicability of those options.

This section is not intended to be an exhaustive examination of possibilities. Instead, it should be considered a brief exploration of those options and an evaluation of some of the problems and possibilities associated with them. In addition, several policy options are considered in other portions of the report. As a consequence they may

Not be treated in this section.

The ensuing discussion is divided into two parts: 1) Energy Training

Center, a concept to be created in Puerto Rico; and 2) Outreach, an examination of in-country projects.

Energy Training Center

One role CER could assume would be to provide appropriate technical training at a variety of sites in Puerto Rico. Puerto Rico is

particularly suitable for this since there are

least seven different

tropical climate:

ranging from the rain forest to the arid. Likewise,
there is a diversity of soils, permitting training and experimental
agricultural applications in a variety of methods and techniques

A training center could provide a variety of educational, information

and assistance services. It could (1) educate professionals, (2)

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teach the latest innovations to working professionals; (3) provide technical training

and disseminate technical information.

Educate professionals

One effective mechanism for technology transfer is to educate the

professionals of developing countries at various educational institutions

and universities, Undergraduate, graduate, and post-graduate training

in the natural sciences, social sciences, and engineering have been

provided to a large number of these students by many universities,

including the University of Puerto Rico. CEER should endorse these

activities and provide space where appropriate, but it is

inappropriate for CEER to undertake the professional education of

scientists and engineers. whatever increased effort Puerto Rico might

wish to assume should find its locus in the appropriate academic

departments of the University.

?These considerations aside, CEER as a national laboratory is

part of a program coordinated by the Ridge Associated Universities to

place American scientists and engineers in a laboratory environment.

A similar set of opportunities could be extended to professionals from

developing countries.

Innovation

There are already several programs which train engineers and other Professionals in the latest technological developments. Among these are the many universities in the United States and the University of Puerto Rico. At the same time AID, through the Institute for International Education (ITE) and similar organizations, has provided for additional and specialized training for individuals from developing countries. Thus, ITE is to place individuals in industry, the national laboratories (including CRER where appropriate), and universities to receive the specialized training they seek. Thus, while CEER and other Puerto Rican institutions should provide a basis for these individuals when their needs match institutional capabilities, there is little likelihood that CEER could or should find adequate U.S. government

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ing to provide the extensive curriculum necessary either for the nationals of Caribbean Basin countries or in general. But CEER should

Provide resources to ATD fellows and others where appropriate.

Technical Training

Rather than providing basic education or sophisticated specialized

training, CEER could provide practical training at the technical level

An & wide range of energy skills. These could range from small head hydro repair to windmill construction. Because of the special tropical attributes of Puerto Rico, this training could be tailored to the various conditions found in the Caribbean Basin. The Assistant Secretary of Energy for International Affairs stated recently that DOE believes that efforts to educate scientists and engineers as well as to provide specialized training are already adequate. That sense of adequacy does not extend to technical training. The office of the AS/IA might therefore be willing to entertain a proposal to establish

such a center. §?

Given the already extensive efforts to provide assistance and DOE's expressed interest in a technical training center, CEER would be well served to consider the option and to prepare a proposal for the same,

Once funded, (implementation of the Center should prove to be relatively easy. Equipment would have to be purchased, instructors

CeER shouta,

however, be able to use the Rio Piedras and Mayaguez campuses of UPR as

Mixed, class and technical sites found, and so on

well as its own facilities across the island,

A tentative curriculum, 46 sufficiently flexible to respond to

current needs susceptible of being expanded, should be developed fairly

quickly.

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Experimental station

CHER should also consider establishment of a demonstration and experimentation center for various energy technologies. Modeled

Perhaps after the various international agricultural research institutes,

CER would provide a unique tropical island environment in which

to test and develop energy technologies appropriate to those environments

There is already expressed interest in demonstration, ranging from the abortive Kort

Bank effort to the expressed desires of Mexican

President Lopez Portillo in 1979, the more recent endorsement by the

Brandt Commission for a similar idea, to the concern of the Canadian

Government, It might therefore be possible to identify a broad basis

Of political and financial support to establish such a research site.

This could be made even more compelling by expanding the CEER focus

beyond the Caribbean to other tropical island states. Thus CEER could

undertake research appropriate in the Pacific and the Indian Oceans as

well. Motives from the U.S. Trust Territories in the Pacific, as well

as from Sri Lanka, Indonesia, the Seychelles, and Mauritius might

Derive from a comprehensive experimental station.

Center for Science and Technology

Much interest was expressed for a Center for science and Techno-

logy at the CEER twenty-fifth anniversary seminar in November 1982,

The idea is a good one and deserves consideration. Several questions

must be answered. First, should this materialize, what would

be the role of CEER and its present programs? What of future programs?

Are there other existing UPR programs it might conflict with, and how

can those programs be incorporated under a new institutional umbrella.

If established, how important would energy and environmental issues be

considered? Moreover, if established, how would CFER staff interact.

with that of @ new center? Would CEER be enveloped in it, would CER

Provide the central seed of organization, or would it become but an

appendage of a larger organization? Before serious planning proceeds,

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these and similar questions must be answered or the potential for

strain, disagreement, and intramural in-fighting could be great. It

should nevertheless be possible to begin planning with the larger

context in mind.

5. Technical Information

GREK could serve as a central library for collection of technical

and scientific studies focusing on energy and environmental issues in

the Caribbean. It might, for example, be possible to tie in with the

National Technical Information Center (NTIC) network and disseminate information from that channel

At least two significant problems might be encountered. First, the Reagan Administration, already sensitive to technology transfer issues, might object. While much of the information is already in the Public domain, some of Portions of the information contained in the NTIC network are embargoed

is not. It is possible, moreover, that

for transfer to foreign nationals. Moreover, the NTIC system does not contain programs that

discriminate between embargoed and non-embargoed

The second problem is similar, but concerns private sector proprietary information. The direct transfer of proprietary information could expose CHER to potential lawsuits and other sanctions. It might also be perceived as direct competition with American private sector efforts to locate markets in the Caribbean, efforts consistent with the

Caribbean Ravin Initiative.

A decision will have to be made as to the extent of the technical Library. At minimum, CEFR might want to develop a comprehensive collection of technical information appropriate for the Caribbean. It might also wish to expand that collection to other areas and technologies, for these may be found to have either direct or indirect application in the area to be served.

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It seems cl

work that such a technical library is necessary in order to develop the scenarios discus

ed above. It could draw its material

from work done in Puerto Rico and the continental United States as well as in other Caribbean centers and throughout the world. Thus, one role CEFR could play would be to centralize technical information covering the range of options in the Caribbean and elsewhere. One condition, for example, for subscribers of the service, could be to require that they likewise provide technical material for inclusion in the collection.

one natural advantage CEER has

As that it has a built-in competence in Spanish (extensively used in large part of the developing world) and English (the scientific lingua franca). If necessary, staff with other language skills could be acquired as needed. CEER could provide the consulting services of its technical collection in the native language of various clients in the Caribbean, thereby making the technology transfer easier as well as more efficient.

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Outreach

GEER could provide several programs to assist Caribbean Basin nations. These include: (1) establishment of an energy audit program:

(2) an energy extension service; (3) a conference; (4) policy salution; (5) social impact analysis; (6) environmental impact amalysisi (7) data collection and evaluation and (8) other consulting.

Energy audsce

CEER could assist Caribbean Basin nation governments and represen=
?tives of private concerns either with energy audit sethodologies, oF

Xf could engage in in-country energy audite. The methodology is known
land has been devel

?4 fer developing countries

Energy Extension Service

CHR could assist im the development of an energy extension

An appropriate model could be the Agricultural Extencion

Service in the United states, administered by the many land-grant

universities including the Mayaguez campus of UPR. Agents stationed at universities or other institutions could have available technologies appropriate for the region. They could assist locals in the use of these technologies. Energy extension would operate on the principle of emulation of example, Various methods would be made available to people by others, then adopted by them. Training of the energy extension agents could be the responsibility of CEER, and CEER could monitor their successes. This program could also be incorporated in the

the community, The success of these methods would be noted

technical training 4

iter concept discussed in the preceding section,

Conference system

CHER could develop a series of workshops, conferences, traveling

exhibits, and other means to educate and provide technical information and assistance to the people of the Caribbean Basin. This might be

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one in a variety of ways. CEER could publish a handbook series aimed at diverse audiences. The use of videotapes, teleconferencing and other innovative technologies using state-of-the-art methods could make an outreach program even more effective.

Policy Eval

son

A policy evaluation program could be developed along two main lines. The first would be to provide policy assistance based on experiences elsewhere, second, CEER could assist governments in determining the impact of their policies on energy issues. Through

careful monitoring, meaningful and useful recommendations could be given various governments on the range of options open to them in establishing an energy policy. To do these things, it would be necessary to create a policy library and engage in in-depth and long-term research into the policy process and energy. This Library could be an essential part of the technical library discussed in the previous section.

Impact Analysis

The social impact of

development. Methodologies have been developed and tested in the industrialized countries, and some attempt has been made to extend them to the developing. As has already been discussed, the range of potential social dislocations can be large. The religious revolution in

energy technology is a discipline undergoing

Tran may be an extreme example of the social impact of development.

Others are more mundane examples such as increased demand for social services, police, fire protection, educational facilities, public works, and so on, All of these are concerns governments have and have

4 need to anticipate.

Environmental Impact Analysis

Environmental degradation is an issue of growing concern for developing countries. Caribbean Basin governments could be offered

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stance in assessing the environmental impacts of energy and other developments.

Data Collection and Analysis

Detailed energy data collection and analysis is a relatively new discipline, These data are essential to the planning process. It is essential that information be collected "...that is useful in making national energy decisions and to policy making." Policy makers must

be aware of the range of trade-offs and impacts a decision may have. Surveys must, therefore, be flexible and specific for the community in which they are to be administered. In view of its experience in the Caribbean, CER should be able to assume an important role in data collection and analysis for the region.

This list by no means a complete catalogue of possible outreach Programs. Others should be considered and developed. As outreach Programs are developed, planners should keep in mind the diversity of Problems and intercultural in the Caribbean and gear programs to need.

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TePRODUCTION

1, FER and ERDK, International Technology Transfer, TID-27650, Washington, D.C., 1977, p. 41-

2. Jey Dunkerley, William Ramsey, Lincoln Gordon and Elizabeth

Cecelsks, Energy Stretegivs for Developing Nations (Baltimore: Johns

Hopkins Univereaty Press, 1981)

3. Natli Chovcri, Energy and _beveli

Gesington, KY? Lexington Books; 1983)>

in Latin america

4. Zoran P. Zaric, "Future Energy Options for developing Countries,"

Enterencia 7, 3 (May-June 1982), pr 188-352.

5. Mason Wil1ricL, "Energy Independence of Anerica," International

Ganary 1977), pp. 53-66.

6. D. Kose and R. lester, "tuclear Power, Nuclear Weapons and Interna~

tional Stability,? Scientitic American 290, 4 (1978), Pp. 46-61.

7, James J. Street, "Coping with Energy Shocks in Latin America: Three Responses," *Latin American Research Review*, 17 (1982), pp. 126-147.

8. T. Owen Carroll, Romir Chatterjee, and Vinod Mubayi, "Energy Planning in Latin America: A Review of Selected Countries," *Ibid*

pp. 148-172,

3. M.B.A. Crospi, "La Energía Nuclear en América: Necesidades Posibilidades," *Interciencia* 4, 1 (1979), pp. 22-31, and V.d. Muacus Mey "El Debate Nuclear, Sus Aplicaciones en América Latina," *Interciencia* 2 (1977), pp. 264-72.

10. Mario Duayer, Phillip Guemett and Kenneth Green, "The Brazilian Nuclear Power Programme: Case Not Proven," *Energy Policy* 8, 4 (December 1981), pp. 323-326.

11. The best known of this Literature is C.F. Schumacher, *Small is Beautiful* (N.Y: Harper and Row, 1973).

22, Wallace C. Koehler, *Development in Latin America*, * *Interchange*:

The Multinational Fuel-Cycle Proposal for Latin America, 5, 2 (March-April 1980), pp. 92-35.

13. Rohat Vohant, "Rural Electrification: An Alternative for the Third World," *Natural Resources Forum* 2 (1978), pp. 271-277,

24. Arthur A. Chudson, "The International Transfer of Commercial Tech-

---Page Break---

15. For an excellent treatment of this point see Simon Schwartzman, "Science, Technology, Technocracy and Democracy." *Interciencia*, (July-August 1979), pp. 215-218,

26- National Academy of Sciences, *Energy for Rural Development*, Washington, D.C., 1976, p. 3.

27, Lawrence Scheinman, "The IAEA: tonic Condominium," in R. Cox and i. fasobea, eds., *The Anatomy of Influence* (New Haven: Yale University Press, 1978), pp. 276-300.

26. Henry Neu, *National Politics and International Technology* (Baltimore: Johns Hopkins University Press, 1974), p. 4

iy, Pavia WN. Davis, *Energy Politics*, 2nd ed. (New York: St. Martin's Press, 1979),

20. Wallace C. Koehler, Jr. "The Impact of Canadian Energy on Changing Federal-Provincial Relations," *American Review of Canadian Studies*, 4 1 (Spring 1977), pp. 1-33.

22. Carmen Diana Deere, "Agrarian Reform in El Salvador and Nicaragua 1979-1981", *Development and Change* 13, 2 (January 1982). pp. 1-15

22. Benny Mjern and Chris Hull, "Implementation Research as Empirical Constitutionality," *European Journal of Political Research* 10, 2 (June 1982), pp. 105-115,

23. Grant Jordan, "The Moray Firth Working Party: Performance Without Confidence," *ibid.*, pp. 117-129.

24. Guillermo O'Donnell, "Reflections on the Pattern of Change in the Bureaucratic-Authoritarian State," *Latin American Research Review* 13,2 (January 1978), p. 33.

25. Ibid. Also Daniel Levy, "Comparing Authoritarian Regimes in Latin America; | Insights from Higher Education Policy," *Comparative Politics* 14, toctober 1901), pre 31-32.

26. Sison Fagg, "Water and Politics: The Process of Meeting a Basic Need in Waits," *Developoent and change* 13, 3 (July 1962), pp. 347-366,

27, Tet Robert Gurr, *Why Men Rebel* (Princeton: Princeton University Press, 1970).

28. Trovor Byer, Joery-Uwe Richter and Joseph Vardi, "Energy Development in he Coribbean--options and Necessities," *Energy Policy* 8, 4 (Decerbor 1900), pp. 33-335.

29. William Ramsey ond Elizabeth Shue, "infrastructural Problens for

furat Now and Renewable Energy Systems?, Journal of Energy. and
Bovelopment 6, 2 (spring 1981), pp. 232-250,

---Page Break---

20. Aldith Brown, "Issues of Public Enterprise," Social and Economic
Studies 30, 1 (march 1981), pp. 1-6, and Carl D. Parris, "Joint Ventures
H/T Transdad-Tobago Telephone Company, 1968-1972," *ibid.*, pp. 106-126.

Bi, Miguel Wionezek, "Technology Transfer Viewed as a Social Process,"
Anterciencia 2, 5 "(sept.-Oct. 1977), pp. 262-63," Eaphasis in. the
?eriginal.

22, Louis Berlinguet, "Science and Technology for Development," Science
213, (Sept. 4, 1981), pp. 1073-1076.

33. Marcelo Alonso, "Desarrollo ?Tecnológico: Conceptes y Aeciones,"
Interciencia 2, 5 (Sept.-Oet. 1977), pp. 288-292,

34, FER, ERDK, Inter:

DiC., 1977, py. SI

tional Technology Transfer, T1D-27650, Washington,

35. Raphael #. Swaby, "Some Problems of Public Utility Regulation by a Statutory Board in Jamaica: The Jamaica Omnibus case," *Social and Economic Studies* 23, 2 (June 1974).

36. Telephone interview with Leonardo DaSilva, Inter-American Development Bank, November 5, 1982,

37. Jorge Sabato and Jairman Kanesh, "Programas de Energía Nuclear en el Mundo en Desarrollo: Su Fundamento e Impacto," *Estudios Internacionales* 12, 49 (Jan.-March 1980), pp. 708-85.

38. J. Baguant, *Energy Data Book, Mauritius, 1970-1960* (Rédit,

Mauritius: University of Mauritius, 1981), pp. 1-10.

39. On this see Nazli Choucri, *Energy and Development in Latin America* (Lexington, KY: Lexington Books, 1962) p. 78.

40. Theodore i. Schumde, "Institutional and Land Ownership Barriers to Development of Wood Resources," Vol. V, Paper 3, *Solar Energy in the TVA System: A Proposed Strategy*. Prepared for the Tennessee Valley RULMOFIED by the Energy, Environment and Resources Center of the University of

Tennessee, February 1980.

41, Popoa, "New Guinea, Department of Minerals and Energy, Energy Policy and Plan i

for Papua New Guinea; Konedobo, R.N.G., 1979, and Douglas St
Seith, "Rural Electrification and Village Energization," *Interiencia* 5, 2
(March-April 1980), pp. 6-91. See also Daniel. Devaney. "Rivers of
Energy: The hydropower Potential," *Interiencia* 7, 4 (July-August 1982),
pp. 215-222. | We suggest that large-scale hydroprojects may not profit
rural developing populations while small-head hydro might

42. Amory Lovins, *Soft Energy*:
Ballinger, 1977).

Energy Paths--Toward » Durable Peace (Cambridge:

49. Barry Commoner, *Energy Politics* (New York: Alfred A. Knopf, 1979).

43-

---Page Break---

44. Roy Stobaugh and D. Yergin, eds., *Energy Future* (New York: Random
House, 1979).

45. Hans Lansberg, et al., *Energy, The Next Twenty Years*, (Cambridge

Ballinger, 1979).

46. Wolf Hafele, et al., Energy in a Finite World, (taxenburg, Austria, International Institute for Applied Systems Analysis, May 1961),

47. For an excellent statement of the scope of the problems see Enrique V. Iglesias, "Appropriate Energy Strategies for Industrializing Countries = Improving World Energy Production and Productivity, Proceedings of the International Energy Symposium, Vol. 2 (Cambridge: Ballinger, 1982), pp. 42-61; and Umberto Colombo, "The Case for Electricity," *Ibid.*, pp. 20-41.

48. See ⑤-5. Joseph Jorgensen, et al., eds., Native Americans and Energy Development (Cambridge: Anthropology Research Centers 1988) and Tobe Kruse, Sudith Kleinfeld, and Robert Travis, "Energy Development on Alaska's North Slope: Effects on the Thupiat population," *Human Organization* 41, 2 (Summer 1982), pp. 97-106.

49. See, for example,
Foreign Policy,

pple, Robert E. Scott, "National Development and Mexico's
International Journal 37, 1 (winter 1961-82)

50. For discussion see Ministerio de Información y Turismo (Venezuela),

the Interagency Cooperation program for Central American and Caribbean
Countries.

51. See D.R. Murray, "The Bilateral Road: Canada and Latin America in
the 1980s," International Journal 37, 1 (winter 1981-82); pp. 106-131.

52. Department of State Bulletin, 62, 2061 (April 1962), pp. 2-3.

53. Thomas O. Enders, Caribbean Review 12, 2 (Spring 1982), pp. 10-13.

Bruce Russett, "United States Solar Energy Policy for Less Developed
Countries," Journal of Energy and Development 7, 1 (August 1981); pp.

i ~ ?

85. See e.g.) Iliodoro Gonzalez, "The Caribbean Basin Initiative: Toward A Permanent Dole," *Inter-American Affairs* 36, 1 (Summer 1982), pp. 23-59; and Gregory B. Wolfe, "Thoughts on the Democratic Consortium," *Caribbean Review* 11, 2 (Spring 1982), pp- fe!

56. Laura Randell and Margarete Cuddeann, "the Role of International and Regional Organizations in Latin American Energy Development." Unpublished Ms-, June 1981,

57. mia,

tae

---Page Break---

58. Noreddin Farrag, "Basic Issues of Energy and Development 1," the Journal of Energy and Development 7, 1 (autumn 1981), pp. 27-33.

59. this in the conclusion of a number of interviews from @ variety of agencies, private and public, in Washington, D.C., Sept. - Oct. 1982.

60. Simon Fagg, "Water and Politics: The Process of Meeting @ Basic Need An Haiti," Development and Change 13, 3 (July 1982), pp. 247-364.

@. mia., p. a4e,

62. Personal communication, October 21, 1982.

63. National Academy of Sciences, Proceedings, International Workshop on Energy Survey Methodologies for Developing Countries (Washington; DCT

National Academy Press, 1980)

---Page Break---