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**A REVIEW OF ENERGY POLICIES IN THE SUBREGION AND THE
IMPEDIMENTS TO INTRODUCTION OF NEW AND RENEWABLE
ENERGY SOURCES IN THE REGION**

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A review of Energy Policies in the subregion and the impediments to introduction of new and renewable energy sources in the region.

Public policy defined

What is policy, when is policy made and what is a “statement of intent” continues to be the topic of discussion in the region. There is also the argument that doing nothing is a policy. It is therefore necessary to establish what is the meaning of “policy” as intended in this paper. According to Charles W. Anderson, *“a policy is more than a state action or activity. It is a conscious contrivance, reflecting human purposiveness, and it is in some sense a moral act. A distinction is made somewhere, between things that are good for the public and things that are bad. Seen in that light, a policy cannot be satisfactorily explained simply as a product of certain socio-economic conditions, or a given configuration of political pressures, or as the outcome of a particular political process. It is also necessary to know what people thought of prevailing socio-economic conditions, the claims and grievances brought forward by interested parties, and how they debated and assessed these problems.”*¹ This definition is not without some inadequacies. However, it does stress the conscious decision made and the action, in terms of putting structures in place, for implementation. In other words, if inaction is decided upon after consideration, then it can be deemed a policy. An additional benefit to this definition is that it allows for comparison between different policies and administrative structures. Using that definition, the policy process in the subregion can be examined particularly as it relates to new and renewable energy promotion and use.

The public policy process in the Caribbean

Since the above definition did not exclude political structures, we can begin by looking at the obvious and state that the public policy process is a function of the political structure of the State. In that respect the process is varied, since there are various political systems in the subregion, most prevalent of which is a version of the Westminster system, or the Whitehall model, which the English speaking Caribbean adopted after independence from 1962 onwards. There are different systems for the French, Spanish and Dutch speaking countries of the subregion, as well as for the North American dependencies. Without going into the details of the differences in these administrative structures, one can observe that the Whitehall system appears to be more centralized in the decision-making process than the other systems. Would that account for the fact that the countries with the Whitehall system are more resistant to renewable energy use as the data will indicate?

Energy policy

In determining the existence of an energy policy in the subregion it is necessary to provide some insight into the energy sector, especially electricity generation, in the region. For this, the situation in Trinidad and Jamaica will be examined. It is also

¹ Douglas E. Ashford. Comparing Public Policies. Sage Publications. Beverly Hill, California. United States of America. 1978. Page 20.

worthwhile to mention that most of the islands of the Caribbean, with the exception of Trinidad and Tobago, and to a lesser degree, Barbados, depend heavily on petroleum imports for their primary energy needs.

Trinidad and Tobago, which produces oil and natural gas, was the principal source of oil for the British Navy based in the subregion during World War II. Barbados is the only other petroleum producer among the islands. Trinidad and Tobago has been the only exporter of petroleum in the Caribbean since 1912. Jamaica imports close to 90% of its commercial energy needs in the form of petroleum products.² The situation in Jamaica is mirrored in the other islands.

Trinidad and Tobago

The early history of electricity in Trinidad and Tobago is closely connected with public transport. In December 1886, a group of local businessmen was granted a 20-year franchise to run an electric power station and tramway system in Port of Spain. In 1894 the Electric Light and Power Company was formed and in March 1895, electricity was installed for the first time in Trinidad. From 1901 to 1933 the Electric and Transport was owned by a Canadian businessman, after which the company was taken over by the Government of Trinidad and Tobago.³ The Trinidad and Tobago Electricity Commission (T&TEC) came into being by way of the Trinidad and Tobago Electricity Commission Ordinance No. 42 of 1945. Its mandate was to generate electricity and to distribute it outside the city of Port of Spain and the town of San Fernando.⁴ T&TEC is presently responsible for the design, construction, operation and maintenance of the country's electrical transmission and distribution network and supplies electric power to customers of both islands via a single inter-connected grid. Up until 1994, T&TEC was responsible for both the generation and distribution of electricity. The primary source of energy is natural gas. On December 24, 1994, the Commission established a fully-owned subsidiary, the Power Generation Company of Trinidad and Tobago (PowerGen), from which it purchases power for resale. T&TEC is also responsible for securing fuel supplies for the generation company. It is state-owned and regulated and is by law, the sole retailer of electric power in the country. Installed electricity generation capacity in Trinidad and Tobago is 1416.7 Mega watts (MW). Approximately 5,279 GWh is generated per year while consumption per capita is in the vicinity of was 3,667 KWh.

Jamaica

According to a report of the Petroleum Corporation of Jamaica, about 80% of Jamaica's primary energy demand is satisfied by imported oil. The rest comes from wood (12%), coal (2%), bagasse (5%) and hydropower (1%). In 1989, oil imports consumed 25% of Jamaica's export earnings. As of 1998, 87% of Jamaica's energy mix was

² Implementation of and possibilities for renewable energy in the Caribbean with special reference to Trinidad and Tiobago. Indra Haraksingh. Department of Physics, Faculty of Natural Sciences. The University of the West Indies, St. Augustine, Trinidad. 1996.

³ Trinidad and Tobago Electricity Commission – A historical Perspective: The Early Years. <http://www.ttec.co.tt/about/history/history.htm>

⁴ Trinidad and Tobago Electricity Commission – A Historical Perspective: The First Decade 1946 – 1956. <http://www.ttec.co.tt/about/history/history.htm>

petroleum-based. Over the years the consumption of imported oil has not changed, the Jamaica Public Service Company Limited (JPSCo), the transportation sector and the bauxite industry still remain its main consumers. Each organization accounts for roughly one quarter of total consumption. Consumption of electricity, though once dominated by small-scale industries (47% in 1989/1990), is now dominated by private households. Householders' access to electricity has moved from a mere 32% in 1989/1990 to over 50% in 1998. Most of Jamaica's energy is still imported from Venezuela and Mexico under the San Jose Accord. As long as these contractual arrangements remain favourable to Jamaica's national interest, they will be continued. Even with privatization, it is envisaged that the country will continue to enjoy the benefits of crude oil supplies under the existing contractual arrangements in the same way that Jamaica enjoyed these prior to acquisition of Petrojam Limited in 1982. The market has been deregulated for the importation of all petroleum products since 1993. In 1990 the Jamaican government designed and implemented a five-year development plan that included renewable energy technologies. This plan was supposed to reduce the country's dependence on imported oil by developing and utilizing indigenous sources of energy while improving and promoting the rational use of energy. In recognition of the strategic importance of the energy sector to the country's economic growth and development, an Energy Policy has been developed. The policy seeks to diversify Jamaica's energy base with the aim of ensuring an adequate and secure energy supply for Jamaica. Within this energy policy, issues relating to energy sources such as petroleum, renewables and other fuels are addressed. In this regard, the Petroleum Corporation of Jamaica (PCJ) currently has a project on the drawing board to construct a 20-megawatt wind farm near Newport, Manchester, under partnership with a British company, Renewable Energy Systems Limited. The PCJ is the vehicle used by the State to implement its energy policy.⁵

The table below provides information on the net electricity consumption in the region for the 10-year period between 1992 and 2001. It is significant to note that for the same period, the net electricity consumption from renewable sources of energy was so insignificant for the region, that the readings for all countries registered at 0. This does not mean that no electricity was generated or consumed from such sources, however, as evidenced by the case of Dominica, where 40% of the country's energy requirements come from hydrogeneration. With the growing needs of the subregion, coupled with a steady increase in the price of energy from crude oil, the need for a clear policy on renewable energy becomes critical.

Net Electricity Consumption in the Caribbean: 1992 - 2001
Million Btu – British Thermal Units

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Antigua & Barbuda	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Barbados	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7
Cuba	10.1	9.6	10.5	10.9	11.6	12.4	12.4	12.7	13.2	13.4
Dominica	-	-	-	-	-	-	-	0.1	0.1	0.1
Grenada	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

⁵ Interview with Dr. Raymond Wright, Managing Director, Petroleum Corporation of Jamaica (PCJ). Adapted from the Business Observer. January 23, 2002.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Guyana	0.2	0.2	0.3	0.5	0.6	0.7	0.7	0.8	0.8	0.8
Haiti	0.5	0.5	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.5
Jamaica	3.5	3.3	4.2	5.1	5.3	5.5	5.7	5.8	5.8	5.8
Martinique	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.1
Montserrat	-	-	-	-	-	-	-	-	-	-
Netherlands Antilles	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0
St. Kitts/Nevis	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
St. Lucia	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
St. Vincent/the Grenadines	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Suriname	1.6	1.6	1.6	1.7	1.7	1.9	1.9	1.8	1.8	1.8
Trinidad & Tobago	3.5	3.3	3.6	3.8	4.0	4.4	4.5	4.6	4.8	4.9
Turks & Caicos Islands	-	-	-	-	-	-	-	-	-	-
US Virgin Islands	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
British Virgin Islands	-	-	-	-	-	-	-	-	1.0	1.0

Source – Energy Information Administration/International Energy Annual 2001.

The Regional Context

The formation of regional institutions from 1965 with the Caribbean Free Trade Association (CARIFTA) to the present Caribbean Community (CARICOM) and the Organisation of Eastern Caribbean States (OECS), has been the driving force towards efforts at a regional approach to regional development. Some of the major inputs in the development process, for example, energy, although sources are national, have been dealt with in a regional context.

REAP

The first regional project was the Regional Energy Action Plan (REAP). First formulated in November 1982 at the Third Meeting of the Conference of Heads of Government of the CARICOM held at Ocho Rios, Jamaica, CARICOM Ministers responsible for Energy agreed that they should, *inter alia*:

- (i) meet and prepare a comprehensive Regional Action Plan to promote security of intra-regional supplies and markets of petroleum products and seek to develop alternative sources of energy within the Region; and
- (ii) give support to the strengthening of regional institutions so as to enable them to give increased support to member States in their efforts to undertake effective energy planning, conservation and development of alternative energy sources.⁶

The major objectives of the REAP were to “*alleviate within the shortest possible time, the adverse impact of the energy crisis on Caribbean economies, while laying the*

⁶ The Regional Energy Action Plan. Caribbean Development Bank (CDB) and Caribbean Community (CARICOM) Secretariat. October 1983. CDC 12314.

basis for a more coordinated and rational development of the energy resources of the region.”⁷

The specific objectives of the REAP were divided into five major components with a total cost of US\$22.23 million. Regarding procedures for the mobilisation of external resources in support of the REAP, the Heads of Government recommended that the Caribbean Development Bank (CDB) and CARICOM Secretariat prepare the major programmes for submission to donor agencies and that these programmes be submitted, in the first instance, at the forum of the Caribbean Group for Cooperation in Economic Development (CGCED) to solicit the interest of the donor community in supporting the thrust. Specific agencies were identified to provide funding for the individual components including United States Agency for International Development (USAID), German Appropriate Technology Exchange (GATE) and the European Development Fund (EDF) of the European Economic Community (EEC). Financing would take the form of grant funding as well as contributions to a revolving loan fund. It is significant to note that the proposals did not provide for counterpart funding by Caribbean governments.

It should be noted that the REAP was prepared at a time of extreme crisis and uncertainty regarding the future economic and social well-being of the CARICOM. That was why the plan placed major emphasis on specific programmes and projects that could have important beneficial impacts over the short and medium term on the energy balances of individual countries and the subregion as a whole with an allied net reduction in the foreign exchange outlays for energy needed to sustain desired levels of economic activity.⁸

CREDP

More recent efforts to promote the use of renewable energy in the subregion are currently being attempted with the formation of the Caribbean Renewable Energy Development Programme (CREDP). The CREDP was initiated in 1998 when fourteen Caribbean countries and two (2) British dependencies agreed to work together to prepare a regional project to remove barriers which hamper the increased use of renewable energy (RE) in the Caribbean and thereby foster its development and commercialisation. It was proposed that this be done by offering an umbrella under which participating CREDP countries can receive support in the areas of national policy, finance, capacity building and public awareness. It was proposed that the programme be funded by the GEF/UNDP through a grant facility (US\$4.426 million), parallel financing by participating governments and regional and national institutions (US\$1.150 million), other donors (US\$2.2 million), equity from the private and public sectors (US\$6 million) and loans from the CDB or other banking institutions (US\$4 million). The total cost of

⁷ The Regional Energy Action Plan. Background for REAP. 1.01. Caribbean Development Bank (CDB) and Caribbean Community (CARICOM) Secretariat. October 1983. CDC 12314.

⁸ The Regional Energy Action Plan. Background for REAP. 1.04. Caribbean Development Bank (CDB) and Caribbean Community (CARICOM) Secretariat. October 1983. CDC 12314

the programme was estimated at US\$17.776 million. The phases of the project have been undertaken within the GEF project preparation fund.⁹

Other regional initiatives

OLADE projects

In its continuing efforts to promote energy policy and energy efficiency in the Latin America and Caribbean area, the Latin America Energy Organization (OLADE) has been working out the details of a project aimed at overcoming the barriers hindering the development of energy efficiency, especially in the Caribbean subregion. The project is in response to what OLADE identified as the absence in the countries of the Caribbean, of policies oriented to the development of energy efficiency and in some cases, of an energy policy in general. The project involving 16 Caribbean countries, is being implemented in association with three major institutions – the Caribbean Energy Information Systems (CEIS), University of the West Indies Centre for Environmental Development (UWICED) and the Caribbean Electric Utilities Services Corporation. In the development phase, the project is being funded by the GEF with the United Nations Development Programme (UNDP) acting as the implementing agency.¹⁰

The studies for the project began with a survey aimed at identifying the barriers to the development of energy efficiency in the Caribbean. The survey was conducted on the basis of a representative sampling of various sectors classified in five subject areas defined at the start of the project: Energy Policy and Regulation, Financing Alternatives, Business Development, Awareness-Raising and Information and Training Management. The representatives of the participating countries discussed the reports coming from the institutions implementing the project and reached a consensus about which barriers were the most important. Likewise, the possible actions that should be adopted to overcome the barriers should be part of the general plan to be proposed as the groundwork for the development of energy efficiency in the Caribbean. The list of barriers that were identified can be summarized as follows:

- Lack of awareness of energy efficiency benefits among politicians, decision-makers, authorities and executives;
- Absence of energy policy;
- Lack of government commitment;
- No lead organization on energy policy;
- Absence of a strategy to educate and sensitise the general public;
- Lack of utility involvement;
- Funding not readily available for energy efficiency projects from established commercial financial institutions, particularly commercial banks;
- Existing sources of financing for energy efficiency projects are mainly extra-regional;

⁹ Roland Clarke. Project Manager, CREDP CARICOM Secretariat. Design of Financing Mechanisms for Renewable Energy Projects in the Caribbean. Presented at the CARILEC Renewable Energy Conference. St. Lucia. November 2002.

¹⁰ OLADE Energy Magazine. Year 26. Number 3. 2002.

- Regional sources of relatively low interest money are not interested in energy efficiency
- Size of the Caribbean market; and
- Weakness and/or absence of regulatory framework.

The plan proposed would have to integrate several actions with regional scope, which will allow for overcoming of the barriers identified. It is recognised that the actions that are suggested will have to satisfy different perspectives in order to harmonise the diversity of views of the 16 beneficiary countries. Even more, if the plan entails a commitment of economic contributions for its implementation, then such support is indispensable.¹¹

Two meetings, Jamaica, January, 2002 and Saint Lucia, September 2002, have been held to date, to finalise the project.

Efforts at introducing a new renewable energy policy.

The perceived failure of REAP and the return of OPEC to pre 1973 levels of production did not engender a climate of confidence in renewable energy in the region. Private investors and the public sector shied away from the discussion that had begun during the embargo years. However, there were a few believers and converts who envisioned a different approach to the promotion of renewable energy. Whereas the focus on REAP adopted a macro approach, these investors concentrated on individual units that would provide benefits over a short run. It is with that focus that the solar water-heating programme was introduced in the subregion, first in Barbados by a private company, and now in almost the entire region, though not at the scale expected. The Barbados company was able to penetrate Saint Lucia through aggressive advertising and now has a marketing/distribution outlet in that island. In addition, the success of solar water heaters in Barbados prompted a policy framework to be developed for Barbados, whereby users of solar water heaters would be allowed rebates.

In Jamaica, for example, it has been determined that the country receives an average of 177 MJ/M² of direct solar radiation per year. This is enough to supply 5 – 10 times the country's annual energy requirements. Currently, the major method of harnessing this energy is the conversion to electricity through the use of photovoltaic cells (PV). PV power has been installed in Jamaica by companies and private individuals. Solar powered street lamps have also been installed by the State, at least one in each parish. The Government of Jamaica facilitated the expansion of the solar water heating industry by reducing import duty from 30% to 5% on all renewable energy equipment and zero-rating government consumption tax (GCT) on renewable energy equipment. 1065 solar water heater units were installed in 2000, potentially displacing approximately 2000 kW of alternative electric heating.¹²

¹¹ OLADE Energy Magazine. Year 26. Number 3. 2002

¹² Ministry of Mines and Energy. Government of Jamaica. Energy Matters. 2001.

The introduction of water heaters in the other Caribbean countries was not prompted by any policy decision. Instead it was driven by business venture efforts and by those who understood the benefits of reducing electricity bill. Early users of solar heaters received no incentive from government. It was when use became fairly widespread that concessions were given to the manufacturers of the heaters. There is still no incentive either by utility companies or government to promote the use of the technology for consumers.

In 1994 a workshop held under the auspices of the Caribbean Council for Science and Technology (CCST), UNESCO, and the University of the West Indies Centre for Environment and Development (UWICED) brought policy makers, the utilities, and entrepreneurs together to discuss the issue of renewable energy in the region, in the context of Environmental preservation. The proceedings consisted of representatives presenting papers on renewable energy technologies and efforts and initiatives of various Caribbean States in this regard. One of the outcomes of this workshop was a Model Energy Policy. The “RESOLUTION AND MODEL ENERGY POLICY” *inter alia*, urged all governments in the region to develop energy policies designed to encourage energy efficiency and the use of renewable energy sources; and to establish a regulatory framework which would allow electric utilities to undertake the actions called for in such a policy.¹³

Participants attempted to develop the outlines of a regional policy that would guide national efforts. What was produced was a broad generic policy which was to be refined with additional information on the way forward. It was intended that with these broad guidelines, demands from national policies would then drive the regional process, allowing for networking, research and development and technical assistance programmes. Unfortunately, although the representatives from the utility companies were part of the process, their interest in and commitment to renewable energy appeared to diminish immediately after the meeting. The reasons for this lack of interest have been outlined in the paper entitled “Renewable Energy - Where we are; Where we should be”¹⁴. Two of the main reasons were:

- (i) Unavailability of funding
- (ii) Lack of policy

Both reasons were clearly identified as major impediments to renewable energy use in the region. On the finance side, funding would be required for research and development work and to help the utilities offset the additional costs of retrofitting, training and new equipment. On the policy side, it was recognized that for the use of renewable energy to be meaningful in the region, the utilities must buy into the policy and be willing to make incremental changes in their generating strategies. To date, there has been little progress by the utilities.

¹³ Proceedings of the Caribbean High Level Workshop on Renewable Energy Technologies. December 5 – 9, 1994. Aaint Lucia. The World Solar Summit Process. UNESCO. CCST. UWICED.

¹⁴ LC/CAR/G.565. CCST/99/1. 4 June 1999.

At the CARILEC Renewable Energy Conference in Saint Lucia in November 2002, recommendations were presented to overcome these barriers which were identified since 1994. The following suggestions were put forward regarding funding

- (i) Design and demonstrate innovative financing mechanisms;
- (ii) Design a Financial Assistance Fund (FAF)
- (iii) Design a Loan Guarantee Mechanism
- (iv) Develop a pipeline for RE projects.

To overcome policy barriers:

- (i) Establish a Policy Advisory Unit at CARICOM
- (ii) Appoint national Policy Advisory Committees in each State
- (iii) Conduct Capacity Building Workshops
- (iv) Develop training programmes for utility and ministry staff.

The need for public awareness was also highlighted. It was suggested that the existing national RE information awareness should be significantly strengthened and a Regional Information Awareness programme established. These could be augmented by the establishment of a Virtual Regional Demonstration Centre and provide short term consultancies for technology transfer.¹⁵

As to which of these factors, unavailability of funding or lack of policy, play the dominant role, is the topic of much discussion. It has been argued that the lack of resources prevent any consideration of a renewable energy programme by the utilities which must be self financing and profitable for their shareholders. On the other hand, lack of interest in RE, may prevent any effort at seeking sources of funding.

Extracts from and analysis of reports of regional meetings

The following comments point to the growing debate at subregional forums on policy, finance and awareness, all necessary components of a comprehensive approach to energy issues in the subregion if renewable energy promotion and energy-related matters are to be the cornerstone of development strategies in the Caribbean.

*“The point is that we must begin to connect resources and costs in a search for long term value. We must learn that we cannot continue on an energy policy of “no worries”.*¹⁶

“Recognizing the need for regional integration in the Caribbean as a pressing imperative for social and economic development; and understanding the strong role energy economics can play as a catalyst for regional integration.” Participants in the energy session at the CLAA Miami Conference on the Caribbean agreed as follows:

¹⁵ Ministry of Mines and Energy. Government of Jamaica. Energy Matters. 2001

¹⁶ Karl R Rabago, Commissioner, Public Utility of Texas, (2nd Annual Caribbean Energy Conference and Trade Exhibition, St Thomas USVI 1994.

Caribbean leaders and other leaders whose actions or inactions will impact the pace of social and economic development in the region, are also urged to “champion and implement policies that lead to energy efficiency in the Caribbean region as a whole.”¹⁷

“The Economics of renewable energy is the largest barrier to renewables penetration. Within recent times as well, low oil prices would have a negative effect on the pace that alternative non-fossil fuel sources would be brought on stream. Lack of capital and hard currency, inadequate trained manpower and transfer of technology limitations are also some of the barriers faced by the Caribbean islands.”¹⁸

“Energy issues in SIDS have become a major barrier to ecologically sustainable development. Few ACP SIDS have a clearly defined national energy policy, and greater action is needed in the region to draft sustainable energy policies with well defined targets. Energy policies should focus on economic growth in a sustainable manner by reducing the level of imports and increasing the level of self sufficiency. A sustainable energy policy should address the following: (i) replacing unsustainable energy systems with systems based on renewable energy technologies that can be locally manufactured and/or maintained. (ii) promoting energy conservation methods including energy pricing initiatives, and (iii) developing energy databases and monitoring stations.”¹⁹

Current RE programmes

Arising out of these regional discussions the national positions and efforts have not fared better. For example in Jamaica, Raymond Wright of the Petroleum Corporation of Jamaica, reported that the strategy of deregulation of the energy industry, in tandem with liberalisation, removal of trade barriers, and the removal of distortions in prices with the goals of diversifying energy resources, increased private sector participation in energy production, and improved energy efficiency and conservation measures. The new involvement of the private sector in energy has had an important impact on power generation, as well as on the marketing of petroleum products. A number of independent power producers now provide energy to the utility company in the amount of 170 MW to the national grid. It must be noted though, that all the electricity is produced through conventional sources of energy.

In St Lucia, initial efforts at generating electricity through a geothermal project were abandoned within three years. Interestingly, the project was undertaken by the Ministry of Planning and not by the Utility company which had sole right for energy generation.

¹⁷ Energy as a tool for sustainable development for African, Caribbean and Pacific countries. The European Commission. United Nations Development Programme. UN Publications. New York, NY. USA. 1999.

¹⁸ Haraksingh Satis, 1999.

¹⁹ Energy as a tool for sustainable development for African, Caribbean and Pacific countries. The European Commission. United Nations Development Programme. UN Publications. New York, NY. USA. 1999.
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In Saint Vincent and the Grenadines, old hydro-plants were decommissioned and replaced by fossil fuel rather than by newer more efficient hydro-electricity generating technologies.

As noted, the above national scenarios, though similar in the majority of Caribbean States, they do not represent the totality of efforts in the region and there are some success stories.

Curacao

With the utility taking the lead the first wind turbine was installed in 1984. Primarily on an experimental basis, it provided valuable information and data to the utility so that by 1993 with improved technology and operating experience the utility installed 12 wind turbines at 25kw each, giving approximately 3MW of power to the national grid. At present the energy is used to lower the peak demand produced from diesel fuel and replaces 2000-ton oil equivalent. It is expected that generation will be increased to 25MW and that rising cost of fuel will more than offset the cost of installation and operations in the near future.²⁰

French Antilles

In 1991 the installed capacity on Guadeloupe was 260MW and in Martinique the amount was 240MW, the bulk from both islands being produced from hydrocarbons. This notwithstanding, energy sources in Martinique and Guadeloupe are the most diversified in the Caribbean. As well, the projection for increasing renewable energy is the most ambitious.

The following table represents the status of energy sources and projected increases over a ten-year period, in the two islands:

Source of Energy	1991	2001
Geothermal	4.0 MW	20.0 MW
Solar-thermal	20.0 MW	60.0 MW
Photovoltaic	0.4 MW	1.3 MW
Wind		1.0 MW
Bagasse	6.5 MW	6.5 MW
Hydroelectric		15.0 MW
Waste		3.0 MW
Total	30.9 MW	106.8 MW

As in the Dutch Antilles, the utility company, Electricité de France (EDF), is spearheading the move towards renewable energy use, in collaboration with the Regional Departments and the Councils for Energy Management, (AFME) and (PRME).²¹

²⁰ Proceedings of the Workshop on Renewable Energy in the Caribbean. Curacao. 1996.

²¹ Liaison Energie – Francophone. 4th Trimestre. Canada. 1991.

To a lesser extent, as noted before, some renewable energy use obtains in the other Caribbean islands, most notably Barbados and St Lucia, in the form of solar water heaters in individual homes. These are provided by private companies with the utility company playing no role in their promotion or development.

Analysis of reports of RE Projects

In the cases of the Dutch Antilles and the French Antilles, the initiative on renewable energy policy was taken by the utility company. In both cases the company had clear policy and benchmarks for the energy sector. Both undertook analysis of the needs, and comparisons of how these needs could be met with a mix of conventional and renewable energy sources. Such analysis provided the basis for phasing, in terms of how and when, given the uncertainties with renewable energy dependence. For example, in the case of the Curacao wind farm, it was determined that with a subsidy of 50%, the payback period would be five years. Without subsidies, the breakeven period, that is when the investment would be covered, would be 11-12 years. These costs, however, do not take into consideration environmental degradation and other opportunity costs, and revenue generating schemes such as tourism, which could be added benefits to the use of the renewable energy programme.²²

In the absence of a regional policy and programme, renewable energy developed independently in the region in keeping with the different operating modes of the utilities and the relationship of the islands to extra-regional entities. It can be said that the Dutch Antilles and the French Overseas Departments have advanced the most in the utilization of renewable energies reflecting, as mentioned, their access to extra-regional sources of funding.

Efforts at the promotion of renewable energy in the English speaking Caribbean have not been successful. Ironically, the countries that were not part of the REAP are the countries that have made more progress. In Saint Lucia, preliminary studies and test holes are all that remain from a geothermal project, although the island is second to Barbados in the use of solar water heaters. In St Vincent, hydro plants are being replaced by diesel, creating greater foreign dependency. In Jamaica, the 250 kW wind turbine installed in 1998 remains the only memento of the discussions and debate on renewable energy in that country, with the exception of some solar water heaters. In Trinidad and Tobago, the abundance of petroleum and natural gas, makes renewable energy discussions moot. The reasons for this lack of interest are two-fold: (1). Lack of government policy to promote renewable energy, and (2) the monopoly and sole generating rights of the utility companies that have no interest in renewables.

In the United States Virgin Islands, renewable energy efforts are coordinated by the Virgin Islands Energy Office, which is funded primarily by the Federal Government. The office carries out work on public awareness, energy conservation, and piloting of projects. Although not affiliated to the utility company there is a good working relationship, especially on public awareness and conservation measures, as the utility

²² Proceedings of the Workshop on Renewable Energy in the Caribbean. Curacao. 1996.

company realizes the benefits to itself in the implementation of these programmes. The pilot projects are, in the main, undertaken by individual private persons, retrofitting homes and or offices. There is a model self-contained home operating on solar and wind mix on St Johns. However, such efforts have not been replicated though a number of persons and businesses have installed solar water heaters.²³

Responses to questionnaire

In an effort to obtain first hand information for analysis and verification, a short questionnaire was forwarded to Power Utility Companies as well as the Ministry of responsible for Energy in 14 Caribbean States and Belize and the United States Virgin Islands. The following table summarises the responses to the questions asked.

Country	Policy Statement on Energy	Use of Renewable Energy	Energy Pricing Policy	Renewable Energy Use in the foreseeable future
Barbados	NR	Negligible. A 2 kW photovoltaic grid-tied system is installed with a second to be installed at the end of 2003. The purpose is to gain operating and maintenance experience with grid-tied photovoltaic systems. There are an estimated 32,000 solar water heaters installed in residences and commercial properties, representing about 4% of primary energy consumption. The burning of bagasse for electricity production in the sugar factories accounts for .4% of primary energy consumption.	NR	The Light and Power Company is conducting a feasibility study into wind energy development. It is expected to be completed by mid-2003. A capacity of 10MW is being considered.
Belize	No official statement. There is however, an ongoing project with the objective of making a recommendation to the Government on Policy Options to be adopted.	Apart from the Mollejon Power Plant and generating facilities at the Belize Sugar industries, use of renewable energy sources is limited to small scale solar and wind projects oriented towards supplying electricity energy needs at sites on remote locations.	NR	Installation of hydroelectric projects in remote areas.
Dominica	The Government is in the process of developing a policy statement with input from Dominica Electricity Services (DOMLEC).	DOMLEC has renewable hydro generation with a peak capacity of 6MW. It produces 32GWh of energy annually, about 40% of the country's total energy requirements. There are a number of small hydro sites.	NR	Plans to develop additional sites provided they are cost competitive with conventional energy sources.

²³ Caribbean Energy Conference and Trade Exhibition. October 1993.

Country	Policy Statement on Energy	Use of Renewable Energy	Energy Pricing Policy	Renewable Energy Use in the foreseeable future
Grenada	No formal policy. The Government, however, lends support to projects by way of tax concessions on a case-by-case basis, such as solar water heating for hotels. Plans are in place to enact the appropriate legislation.	In limited use. The sugar/rum factory uses the bagasse produced to generate steam for the process. The use of nutmeg shells to produce biogas has generated interest and is used in downstream nutmeg processes.	NR	Use of wind energy is favourable but efforts on this initiative have been thwarted by failure to acquire lands identified as potential sites for wind farms.
Guyana	An energy policy document was prepared in 1994 and is currently under revision.	A 0.5 MW hydropower plant in a remote location is currently in operation. Solar and wind energy in the form of photovoltaics and wind pumps play an important role in remote areas. Some areas are using solar energy for thermal applications.	NR	Plans are underway to develop a 105MW hydro power plant to sell power to the national grid. Additional studies have been done up to the pre-feasibility levels for a number of potential sites.
Saint Lucia	NR	There is some solar water heating and the market share appears to be steadily increasing.	NR	LUCELEC is currently considering the installation of a pilot wind turbine for late 2003/early 2004 and has indicated a commitment to a 10% penetration of renewable energy as it relates to the system maximum demand by 2007.
St. Vincent and the Grenadines	No official policy statement	5500 kW total installed capacity at 3 Hydropower stations providing just over 20% of the country's energy needs.	NR	The feasibility of wind generated energy being considered as well as increased hydro power generation.

Analysis and recommendations.

Early development in the Caribbean based on agricultural export did much to shape the present lack of energy policy in the subregion. The absence of early industrial activity in the region meant that the social aspects of energy use took precedence over the developmental aspects. As such, energy in the form of electricity was provided in the urban areas before the rural areas, even though the majority of economic activity took place in rural areas. This may also explain the lack of downstream activities in agriculture, since these would have required on site energy provision.

Centralization of the generation and distribution of electricity based on cost considerations removed any incentives for independent production. Thus electricity distribution responded to urban expansion, and small-scale industrial activity evolved around the urban areas within the area of the grid. To a greater extent then, the type of economic activities that developed mirrored the relative availability of electricity.

The transportation sector, dominated in the early stages by private vehicles did not become a driving force for energy development in the subregion. For other activities requiring energy, paraffin, charcoal and diesel were employed.

Because the energy sector was dominated by electricity provision as a social good in the city/town, rather than in the rural economic belt, the need for an integrated policy was never recognized. Also, the technology and the capital for generating electricity originated from sources external to the State and in a framework of the colonized administration, the policy was that the administration would provide electricity through its overseas private investment organization.

Independence did not bring changes in the energy sector since by then the provider had been entrenched and the lack of capital and technological options necessitated that the status quo remained. Decisions were made on the basis of extending the social good by providing electricity to the rural areas on a phased basis dependent on ability to pay. Thus very early rural development projects did not factor in energy requirements as a basis for promoting economic activities in the rural areas.

Just as the agricultural sector remained to a large extent externally driven, so too the energy sector in the subregion. Although some nationalization has taken place, the lack of capital and technology remain limiting factors to a modernization of the sector itself. The abundance of solar energy and adequate wind regimes have not been seen as natural resources to be harnessed and managed.

The decision to make use of renewable energy as a viable alternative to hydrocarbons will require concerted efforts at energy policy development. However, the strategy for this implementation is still drawn from outside of the subregion. Neither the utility companies nor governments have yet been convinced of the need to give focused attention to the benefits of using renewable energy. Neither have they given sufficient thought to the implications and challenges of a continued reliance on hydrocarbons to meet the energy requirements of the subregion.

Energy policy in the region is made more on the basis of the needs of powerful interest groups, in this case the utility companies, who are not interested in changing the status quo. That the colonial administrations are taking the lead in the energy policy and renewable energy promotion as a response to environmental group pressure, within the context of sustainable development and environmental protection support the fact that though finance and technology remain critical factors, the development of an energy policy still lacks a proper appreciation of the role of energy in the development process by the majority of policy makers in the subregion..

It will take a concerted effort to linking energy and the environment to development before there will be movement on the part of Caribbean States to seriously address energy policy and renewable energy use in the subregion.

Suggested Reading Materials

1. Caribbean Energy Conference and Trade Exposition, October 22-29, 1993. Conference Proceedings Edited by Solomon Kabuka, DBA. Produced by the Virgin Islands Energy Office/ University of the Virgin Islands.
2. Renewable Energy – An International Journal. Special Issue: World Renewable Energy Congress IV – Renewable Energy, Energy Efficiency and the Environment, 15-21 June 1996, Colorado, and U.S.A. Late papers. Editor-in Chief: A.A.M. Sayigh.
3. Renewable Energy Climate Change and the Environment. World Renewable Energy Congress, 11-16 September 1994, Reading, U.K. Part III. Edited by A. A. M. Sayigh.
4. Caribbean Least Cost Petroleum Supply study (1991). Submitted by consultants: T. G. Steigerwald and J. R. Peet.
5. Proceedings: SATIS'94 Sustainable Alternatives for Tropical Island States, 14-16 March 1994, Barbados. Edited by L. L. Moseley and O. St C. Headley. Produced by the University of the West Indies Centre for Environment and Development supported by the Rockefeller Foundation in association with the Commonwealth Science Council, The World Renewable Energy Congress, UNESCO and the Caribbean Solar Energy Society.
6. Energy-Economic Statistics and Indicators of Latin America and the Caribbean, Quito, May 1993. Produced by the Latin American Energy Organization.
7. Proceedings of the Caribbean High Level Workshop on Renewable Energy Technologies, December 5-9, 1994, Saint Lucia. The World Solar Summit Process. Editor: Rhonda G. Wilson. Supported by the United Nations Education Scientific and Cultural Organization (UNESCO), Caribbean Council for Science and Technology (CCST) and The University of the West Indies Centre for Environment and Development (UWICED).
8. Workshop on Renewable Energy in the Caribbean, Curaçao, October 11, 1996. Papers presented at the NOVEM/KODELA/FAPE, Workshop on Renewable Energy in the Caribbean.
9. CCST/UWICED/UNESCO Workshop on Investment Funding for Renewable Energy and Energy Efficiency Projects in the Caribbean, Kingston, Jamaica, 17-19 January 1996. LC/CAR/G.479 CCST/96/2. Produced by the United Nations for Latin America and the Caribbean Sub-regional Headquarters for the Caribbean, Caribbean Development Committee.
10. Overview of Renewable Energy Sources. Prepared by: Ministry of Public Utilities and Transport, Jamaica.
11. Séminaire sur la maîtrise de l'Énergie des pays ayant en commun l'usage de français. Avec le concours du: Groupe Conseil Eduplus Inc. Ste-Lucie, 16-19 novembre, 1992.