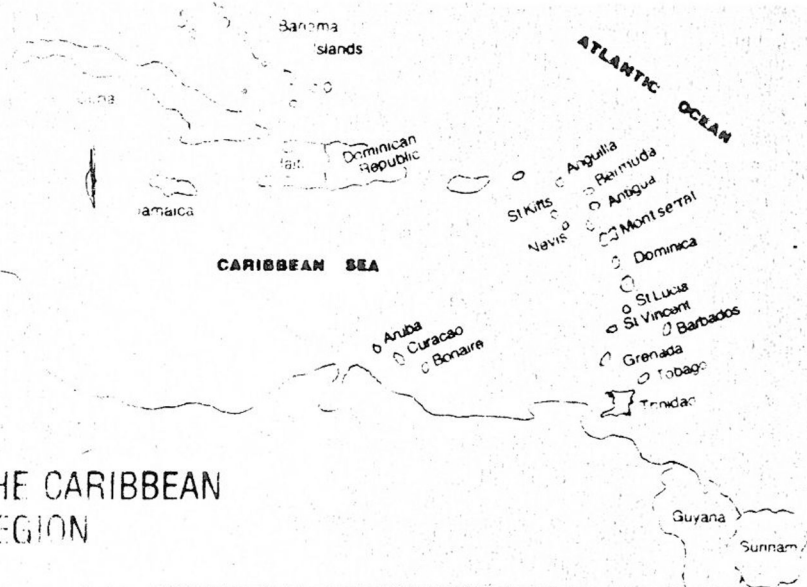


CARIBBEAN
DEVELOPMENT
AND
CO-OPERATION
COMMITTEE

THE CARIBBEAN
REGION



CBCC/PO/WP/78/11
January 1979

ECONOMIC COMMISSION FOR LATIN AMERICA
Office for the Caribbean

CARIBBEAN DEVELOPMENT AND CO-OPERATION COMMITTEE

LATIN AMERICAN INSTITUTE FOR SOCIAL AND
ECONOMIC PLANNING

First Meeting of Planning Officials in
the Caribbean
25-31 January 1979
La Habana, Cuba



CARIBBEAN DOCUMENTATION CENTRE

ENERGY PLANNING IN THE CARIBBEAN

Prepared by:

Trevor A. Byer

U.N. Energy Planning Adviser/Team Leader*

*The views expressed in this paper are those of
the author and should not be construed as reflecting
directly or indirectly those of the United Nations
or any of its Agencies.



UNITED NATIONS

ECONOMIC COMMISSION FOR LATIN AMERICA Office for the Caribbean

ENERGY PLANNING IN THE CARIBBEAN

PREPARED BY

TREVOR A BYER *

U.N. Energy Planning Adviser/Team Leader*

INTRODUCTION

1. In addressing the issue of energy planning in the Caribbean region, during the Era of the "New International Energy Order" which began on October 16, 1973, it is first necessary to define for which countries in the region is one examining the role of energy planning. This is critical since the energy planning process is radically different dependent on the definition chosen above. The Caribbean region has historically always been a "crossroads" and in a manner highlighting the traditional major differences between territories within the region, the energy problems of each territory reveal these deep historic differences. The four major energy classifications amongst developing countries worldwide are to be found within the Caribbean region, these are:
 - i) Member States of OPEC - Venezuela
 - ii) Non-OPEC Oil Exporting Developing Countries - Mexico and Trinidad and Tobago.
 - iii) Developing Countries Oil Refining Centres - Bahamas, Trinidad and Tobago, the Netherlands Antilles and the U.S. Virgin Islands.
 - iv) Oil Importing Developing Countries (OIDC) - Rest of the Region.
2. This paper is primarily concerned with the energy problems and energy planning issues within the OIDC in the Caribbean since it is these economies which are most negatively affected by the New International Energy Order. This New International Energy Order has initiated the

*The views expressed in this paper are those of the author and should not be construed as reflecting directly or indirectly those of the United Nations or any of its Agencies.

beginning of an energy "transition period" from the present predominantly oil and gas based world energy supply mix to a world energy supply that would eventually be structured on less rapidly depletable, more permanent and renewable energy sources, with the depleted oil and gas reserves being smoothly and progressively reserved for presently non-substitutable uses such as transport. The length of the "transition period" is of critical significance in the energy planning process in the OICD. It is however, difficult to determine with any level of confidence at present how long this transition period will last since it depends on many factors, some of which are inter-related. Some of these factors which will determine the length of this "transition period" are:

- (a) The rate at which technology advances to enhance the recovery factor of oil from proven fields.
- (b) The ultimately recoverable conventional oil and gas reserves of the world.
- (c) The scale of worldwide efforts to explore for and develop conventional and non-conventional energy sources and the rate at which these efforts succeed.
- (d) Most important of all, the price of oil and gas relative to the cost and availability of commercially proven alternative energy sources.

3. Implicit in the energy planning process in the OICD must be assumptions regarding the length of this "transition period" since this has major implications on criteria for investment allocation for the energy sector. The transition could be rather rapid, very disorderly and executed in a "panic" framework (oil prices advance, in real terms, very quickly over the time period 1980-1990). However, it could be effected in a more orderly fashion if the actions referred to in (a), (b) and (c) above are urgently executed, and above all that oil prices advance at such a rate (a "moderate rate") so as to maintain a major incentive for the International Community to undertake actions (a), (b) and (c) above to avoid advancing very rapidly (at a "panic rate")

NEED FOR ENERGY POLICIES AND ENERGY SECTOR PLANS

1. The most urgent need within each territory in the region is for the governments to begin preparing and formulating energy sector plans and national energy policies. This immediately results in the need for ~~some~~ re-organization within the Public Sector as far as energy is concerned. Traditionally, Ministries dealing with foreign trade have had portfolio responsibility for all matters dealing with the supply and pricing of imported petroleum products into each territory. In contrast, the electrical energy sector has generally fallen under the portfolio of the Minister responsible for Public Utilities. To compound matters even more Ministries of Natural Resources have invariably held responsibility for the development of the indigenous energy resources within each territory irrespective of whether these resources are hydro, coal, oil and natural gas.
2. There is now a need to consolidate into a single portfolio for energy all aspects of the energy sector in each territory. This means that all matters relating to the development of all indigenous energy resources,, the supply of imported energy sources, the determination of the prices of all energy supplies, the regulation of marketing companies and refinery's margins, the forecasting and management of internal energy demand, must all come within a single ministerial portfolio. This means that energy units, sections, divisions, or departments must be established as a matter of high priority within each territory. This of course, raises the problem of manpower availability to staff such divisions especially manpower with experience and skills in the energy sector.
3. Over the next several years one can expect significant increases in the percentage of capital to be allocated to the Energy Sector relative to other sectors of the economy in contrast to the decades of the 60s and 70s. This will have serious implications for the Caribbean territories in view of the very capital intensive character of the Energy Sector as .

well as the sector's high dependency on foreign technology combined with very low employment possibilities within the sector.

4. National energy policies must address the total range of energy and economic issues within the society particularly the inter-relationships between the economy's performance and the availability and price of energy. For the OIDC within the region the following objectives of any national energy policy would appear essential:
 - (a) the need to enhance energy conservation;
 - (b) the necessity to reduce the energy intensity of the economy while seeking to sustain economic growth. Virtually, all developing countries possess a much higher value of the income elasticity of commercial energy demand compared to the developed countries. This means that within the OIDC a 1% growth in G.D.P. will require anywhere between a 1.3% to a 1.9% growth in commercial energy demand. This therefore means that future economic growth in the OIDC must be achieved with a minimum growth in commercial energy demand through some de-coupling of G.D.P. and energy growth. This means that G.D.P. growth should be preferentially achieved in the less energy intensive sectors of the economy;
 - (c) the need to reduce the dependence of the economy on imported energy, particularly imported petroleum;
 - (d) the necessity to diversify the present energy supply mix of the energy system away from imported petroleum provided that such diversification paths are economically and financially sound at present petroleum prices.

5. Further issues which the National Energy Plan must face and resolve concerns the future role of electricity as an energy source in contrast to other energy sources for those end uses for which commercially proven and competitive alternatives exist. Does the Plan advocate the continual gradual displacements of other energy resources by electricity, and if so, why? It must be recognized that electrical energy is the highest quality energy source available and that simultaneously it is one of the most capital intensive energy source.

ENERGY DEMAND MANAGEMENT AND FORECASTING

1. One of the first tasks facing the Energy Planning Division within each territory is that of acquiring detailed knowledge of the nature and structure of existing and projected energy demand throughout the economy for all energy sources. In this context there is urgent need for the establishment of National Energy Accounting System within each territory. The most important elements to be contained within this accounting system are the flows and prices of each energy supply source within the economy. The Energy Flow Account must establish on a monthly basis the imports, re-exports and internal demand of each energy source by the major consumers in the economy. This Accounting System must also contain the energy price account which will indicate again on the monthly basis the import prices and different internal prices of each energy supply product.

2. There is also a need to have a detailed knowledge of the end use of energy throughout the economy and in particular the type of energy that is used at the end point of consumption be it electricity, for air-conditioning, for water heating, for lighting or cooking; dry heat for calcination, high or low pressure steam for manufacturing processes, and primary fuels for transport and the nature of such transport.
3. There is therefore an urgent need for Surveys to be carried out to determine the energy end uses in the major sectors of the economy, such as:

The Tourism Sector
 Transport Sector
 Residential Sector
 Commercial Sector
 Agricultural Sector
 Industrial Sector, and the
 Mining Sector

Amongst the parameters which these Surveys are seeking to establish are the type and quantity of energy consumed per unit of output and the value added to energy consumed ratio in each activity where this parameter is of relevance. The Tourism Sector requires particular attention in the Caribbean since it is a rather prodigious user of energy.

4. In some of the larger territories there would be need for computer models simulating the National Energy System and Inter-fuel Substitution Models of the energy system.

5. An absolutely vital element of the Energy Plan and one of the cornerstones of energy policy relates to the question of energy prices and energy taxes. Added to this, on the one hand, there is the equally important area of energy incentives which governments too often have a habit of forgetting. It is meaningless to speak of energy conservation unless internal energy prices reflect their true cost. Added to this, taxation policies of all petroleum products and electricity must be carefully developed so as to have an overall consistency. It is meaningless to price gasoline at very much higher levels than kerosene (e.g. five or six time difference in retail prices) for all that begins to happen is that kerosene begins to be mixed with gasoline.
6. It is also vital that in setting prices full recognition is paid to the inter-fuel substitution possibilities of performing the same task. For example, when one turns to the area of domestic cooking there is charcoal, kerosene, L.P.G., natural gas (in those territories with indigenous natural gas supplies), and electricity. The first issue to be settled in the Energy Plan is what fuel does one wish to encourage the population to use over the next decade to satisfy this end use? Pricing and taxation policies relating to the alternative fuels mentioned above must be so set and retained so as to encourage the consumer to move in the direction the Plan has set out as the optimal path. In setting these relative prices and taxes special attention must also be paid to the end use energy efficiency of the devices required to perform a given task. For example, open hearth charcoal pot is grossly inefficient (about 10-15% efficiency) whereas the L.P.G. and electric cookers have efficiencies between 55-70%.

7. A final point worth stressing on the question of energy demand management concerns the import policies for new motor cars, taxis and buses. These policies must reflect the new energy realities. so that vehicles with low fuel economies are not allowed to enter the country.
8. The need for clear and unambiguous incentives to stimulate increased energy efficiency is something the Plan must contain if there is to be any possibility of it achieving its objectives.

ENERGY SUPPLY MANAGEMENT

1. Despite whatever success the Plan may have in restraining the growth in energy demand, one faces the problem of incremental energy supply as long as the economy is growing. It is at this point that the question of the resource endowment of each territory becomes critical'. Recognising the very limited role which non-conventional alternative energy sources (such as wind, solar and bio-gas) will play in the region over the next decade the question of the proven conventional energy resource endowment of each territory which existing technology can currently competitively exploit, becomes critical. There is no substitute for imported oil that is better than indigenous oil. As such in those territories where the possibility of commercial accumulations of oil and gas exist, the beginning of a vigorous oil and gas exploration programme should have top priority. In this context it is exceedingly important that governments in the region adopt pragmatic and realistic policies with regard to the exploration for oil and natural gas within their territories. Technology, manpower, risk and development capital of the foreign oil companies will have to play a critical role in the search for oil in those territories in the region that are still non-proven areas.

2. Steps should be taken to examine the feasibility of developing other conventional energy resources such as peat, lignite and hydro. A further energy supply diversification alternative which must be examined involves for the larger territories the possible importation of 3% sulphur steam coal to displace some of the fuel oil that is presently consumed for electricity and high pressure steam generation. The economics of this diversification path must be carefully examined particularly in view of the fact that Caribbean prices for 3% sulphur fuel oil have been weak over the past two years. Though the diversification path based on imported coal does not reduce the energy dependency of the economy it does reduce the imported petroleum dependency of the economy.
3. A further energy supply source which is widely used in the Caribbean at present is bagasse. This fuel is primarily used captively in the sugar industry, however, if steps are taken to improve the efficiency of energy used in the existing sugar industry a substantial reduction in the use of fuel oil in that industry can be achieved with this being replaced by bagasse.
4. Regarding the new energy sources, it must be recognized that the greater part of the technology required to competitively exploit these sources will be developed outside of the region over the next decade. The one area of end use which would appear at present to yield early benefits to the territories of the region is that of solar water heating. It must be, however, recognized that as far as residences are concerned that the need for hot water within residences may be considered a luxury in most territories of the region. Indeed, it is unlikely that more than about 10-15% of the total households in Jamaica e.g., can be considered having occupants at an income level able to afford

hot water.

CONCLUSIONS

1. Over the short term, one has to concentrate on restraining energy demand and particularly petroleum demands in those territories of the region which are classified as OI DC. The foreign exchange problems of having to meet increasing petroleum import bill even if the volume of imported petroleum products declines, will be continuously pressing for the foreseeable future. This means that the other sectors of the economy will have to undergo a significant expansion in their export earning capacity.
2. Over the medium and long term, the road is going to be hard and indeed precipitous for some of the OI DC in the region. In this context, the actions outlined above must be undertaken.
3. In closing, I wish to focuss attention on one problem which the new ^{for} International Energy Order has created/the Mineral Exporting Countries of the region. This particularly applies to the export of semi-processed or fully processed minerals, the processing of which is energy intensive, such as bauxite and ferro-nickel. This problem arises for those territories which are totally dependent on imported oil for their commercial energy supply.
4. One of the major objectives of the mineral producing developing countries in the past has been to achieve a greater degree of further processing of these minerals within the producer country. However, the New Energy Order has dramatically changed the cost structure of, e.g., the alumina

industry. As such the commercial attractiveness of siting new alumina investment in regions where prevailing prices of primary Thermal energy are low, rather than at the mine head where international energy prices are paid, has been increased. This means that purely commercial forces are creating a trend whereby primary producers of minerals which are deficient in indigenous energy supplies will find themselves having to export increasing amounts of unprocessed minerals ores as distinct from semi or fully processed minerals if such processing is energy intensive and if their mineral sectors are to expand over the next decade.

5. The energy world has changed and it should not be forgotten how the change was initiated. Thus O IDC within the region which are to adjust viably to the new realities will have to change many of their pre-concieved notions of development. Energy must be at the forefront in the planning process if there is to be a a viable adjustment.