

ENERGY INTEGRATION IN THE AMERICAS - A Perspective From The Caribbean

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INTRODUCTION

The Summit of the Americas Conference in Miami, in December 1994, identified seven (7) areas for Hemispheric cooperation in order to facilitate global cooperation and world trade in the new millennium. Energy Integration of the Americas was one of those areas.

This paper reviews the prospects, opportunities, challenges and limitations which affect the countries of the Caribbean as integration in energy matters is effected. The impact of this aspect of modernisation is seen as differing in that the importers and the exporters of the region will be affected in significantly different ways. The paper notes that Venezuela, which is the largest exporter of petroleum in the Americas, is the focus of the hemispheric efforts at energy integration. Many of the opportunities for the development of both the human and institutional resources existing in the countries around the Caribbean sea are outlined. Energy Security as well as the efficiency of the use of both capital and energy are three of the critical issues highlighted.

The paper concludes that the further development of the region will probably be best enhanced if the newly created Association of Caribbean States (ACS) can effect the integration and coordination of policies and strategies which recognise the importance of energy, and particularly energy security, to all the countries of the Western Hemisphere.

The countries which surround the Caribbean Sea are very diverse in size, peoples, geography and culture, having been subject to a fascinating interplay of the historical forces which formed the New World. This has many consequences and pose several unique challenges for the 21st century. The influence of those

early empires has left many legacies, Some may be described as positive, others not, and almost all, requiring at a minimum, recognition of their residual effects and their differing impact on the peoples who now comprise those countries. This differing impact is usually seen as one of the principal obstacles to the integration of these territories/islands.

As such, these countries can be categorised in different ways, an obvious one being by language, there being Spanish, English, French and Dutch-speaking peoples in different countries in the Caribbean. The island countries usually have special issues and challenges which affect all small and island territories. The Caribbean is therefore often taken as referring to the Caribbean islands. Within that subset, the Caribbean Community (CARICOM) exists as a regional organisation designed to foster growth through trade and coordinated policies.

However, more recently, in recognition of the need to have stronger and more viable regional structures, the Association of Caribbean States (ACS), with headquarters in Port of Spain, Trinidad has been formally launched so as to include not only CARICOM with its base of mainly islands inhabited by English-speaking peoples, but the larger islands of the northern West Indies, Cuba and Hispaniola, as well as Colombia, Mexico and Venezuela.

For the purpose of this paper, some adjustment to those two categories will be made, recognising as do all energy people world-wide that it is much more comon to group countries into the basic categoeres of either Importers and Exporters, or Consumers and Producers. For convenience and simplicity, the first of those two groupings will be used, and since Mexico is a critical partner in NAFTA, it will be excluded.

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Colombia with a large common border with Venezuela requires a somewhat different perspective than that from the south-eastern Caribbean, from which this perspective emanates.

The two groups will therefore comprise the following:

A. IMPORTERS

- a) Puerto Rico and the Virgin Islands,
- b) Cuba, Haiti and the Dominican Republic,
- c) Jamaica, Barbados and the Organisation of Eastern Caribbean States (OECS),
- d) Martinique and Guadeloupe,
- e) Aruba, Curacao and St. Marten, and
- f) Guyana, Suriname, Cayenne and Belize and,

B. EXPORTERS

- a) Venezuela and
- b) Trinidad and Tobago

SOME GLOBAL ISSUES

Among the many issues which need to be taken into account in the quest for energy, modernisation must be a reasonable and appropriate perspective on some critical aspects of energy development in the not too distant future. Two (2) items appear as being most important for inclusion on one's most likely scenario. These two are:

- Moderate increases in the nominal price of oil at best (or worst depending on whether you are an importer or a producer), and
- Environmental constraints, directly or through costing, indirectly.

The implications of the assumptions made here are, in the case of the first already alluded to, namely for the oil-producing countries, a conservative assumption and logically leads to a negligible or very low expectation of any windfall profits or surpluses being available for financing energy developments in the near future. For the oil-importing countries, such an assumption may be considered unwise, given the many reasons for perceiving either instability in the

likely price future for oil, or the growing perception that in order to meet future energy demand and likely investment needs in oil and gas production, real increases in the price of oil may become necessary. It may therefore be appropriate for a worst case scenario in the case of an energy development in an oil-importing country to assume input costs or cost recovery so as to factor in somewhat higher energy prices than current ones.

It is however, becoming abundantly clear that in the case of the environment, the challenge which faces all of us, importers or exporters, occurs in every sector of energy, be it in emissions, alternative energies (especially biomass), hydroelectricity, electricity use or transportation, and in every grouping of countries OECD, OPEC, ROW, or whatever label one chooses.

The R.G. Skinner of the International Energy Agency notes that:-

"faced with this challenge, there are several policy approaches that governments can consider. First of all, the establishment of free and open markets is considered a fundamental point of departure. Ensuring that prices reflect economic and, to the extent practicable, environmental costs of production is essential . . . Continued economic structural reform - and much remains to be done - can lead to significant inefficiency of resource consumption and thereby lead to reduced pressure on the environment. But market forces alone do not provide energy security or a clean environment. Governments need to set the right framework conditions".

The World Energy Council in its 1993 report "Energy for Tomorrow's World" produced four scenarios for world energy demand to the year 2020. Of the four forecasts, only the most conservative which can be called the "green" scenario, expects an increase of less than 30% in world oil and gas production in order to meet demand in 2020. Most are larger than 30%. Financing that increase in oil and gas production and the corresponding electricity requirements was estimated to require US\$20 - 25 trillion, a total which roughly equates to the gross output of the entire world in the early 1980's. Seventy (70) to eighty (80) percent of that capital will have to come from the private sector.

The right framework conditions are clearly of

the greatest significance if energy development is to continue in the region and experience indicates that there are several ingredients in any recipe for success: political stability; a known framework of law and its equitable application; clear and non-arbitrary decision-making by the authorities; a record of economic success or reliably good prospects; satisfactory interest and dividend levels and freedom of remittances and receipt of interest and principal; safeguarding of patents and intellectual property rights; appropriate taxation regimes; and sufficiently attractive local rates of return. In summary, the right enabling environment for the critically needed private capital is crucial.

IMPORTERS

Issues

A summary listing of some of the many critical issues is as follows:

- i) **Supply**
 - a) Volumes, Prices, Storage, Distribution, Retailing
 - b) Taxes
 - c) Security, Volatility, Risk
- ii) **Refining**
 - Viability
- iii) **Transportation**
 - Mass, Public and Private
- iv) **Electricity**
 - Regulation, Generation
Expansion, Efficiency and Maintenance
- v) **Alternative Energies**
 - Rural, Urban, Bulk, Supplemental

Limitations (Importers)

The principal limitations which affect these issues are, in large measure, typical of most developing countries, but they are exacerbated by the small size of many of the island territories, with consequent small internal markets, reduced human resource pools, and limited capital resource accumulation due to the non-existence

of a domestic capital market. For the very small countries, proper technical information gathering and interpretation becomes a significant challenge, and the issues of choice and diversification, especially when they involve technological options, further complicate the decision-making process.

The need for developing a critical mass, of either information, technically trained human resources or capital, is therefore an overriding imperative. This necessarily requires some consistency in the application of policy and resources over an extended period of time, a luxury that is seldom afforded by either the exigencies of the day or the advice tendered by the many different external agencies which are usually involved in guiding the decision-making process in these countries.

Thus, the likelihood of achieving sustainability is oftentimes reduced, especially if it is assumed that the well-defined priorities of the developed world are of immediate relevance. For example, it is clear that the issues of Energy Security, Energy Conservation and Alternative Energy sources are very important, and this moreso in the context of the environment in these countries, many of which are tourism dependent. However, scarce foreign exchange, poverty and low living standards for the majority of the population and the role of the public sector as an employment agency, are of such critical importance, that a redefinition of priorities should perhaps take into account the following:

- a) Demand side management of energy use through appropriate pricing, tariffs and taxing policies, as well as through incentive programmes to promote solar energy in particular.
- b) The development of domestic capital markets and the use of private capital, including local capital, in all sectors of the energy sector, but particularly in the development of alternative energy projects.
- c) The further definition of the role of the public sector in particular, in harmonising the activities defined in (a) and (b) above, so as

to minimise the misallocation of public resources in the energy sectors of these countries.

Opportunities (Importers)

- (a) Local Capital Market Development in Electric Power generation.
- (b) Creation of balance between producers and consumers of electric power through new and transparent regulatory mechanisms.
- (c) Improvement in the reliability and quality of electricity.
- (d) Minimising the cost and security of petroleum supplies through market mechanisms and elimination of the costs of subsidised refinery operations.
- (e) Selection of appropriate technologies for alternative and rural energy opportunities, with reduction in the waste of scarce capital and manpower resources.
- (f) Introduction of appropriate new technical and management skills, in respect of:-
 - i) Risk management through the use of the commodities markets,
 - ii) Reduction of losses through improved maintenance and systems efficiency, and
 - iii) Demand management.
- (g) Maximising the use of the limited resources of the Caribbean by creating a common pool of skilled advisory professionals to assist in widening and sharing of the common experiences of the region, and advising on strategies to facilitate further regional development.

- (h) Development of sustainable alternative energy programmes with concomitant and appropriate pricing and tax policies to facilitate these programmes.

EXPORTERS

Most of the World Energy Council's scenarios in its 1993 report "Energy for Tomorrow's World" expected world energy demand to the year 2020 to be larger than 30% of the current world production of approximately 65 million barrels of oil per day. Of great importance for the Caribbean is that the largest increase in oil production the Americas is expected to come from Venezuela, currently producing approximately three (3) million barrels of oil per day.

Petroleos de Venezuela in its most recent forecast, expects that by the year 2007, it will have reached in excess of 5.5 million bopd of output. In order to achieve that, the company's strategy has been in part, to open up the country's oil and gas producing sector to outside capital and ownership - referred to as "the apertura". Since 1994, more than 500 new foreign oil and oil service companies have entered Venezuela in order to do business in this sector. Capital requirements have been estimated at US\$60 billion for the energy sector alone during the period 1996-2005. New arrangements to rework old oilfields and new contracts for the award of several large new tracts of acreage for exploration, are the key features of these efforts to double within 10 years, current levels of oil and gas production.

Issues (Exporters)

A brief review of these issues is as follows:-

- i) **Evaluation**
 - a) Eastern Venezuela
 - b) Deep water Trinidad
- ii) **Production**
 - a) Crude Oil/Heavy Oil
 - b) Natural Gas

NATURAL GAS-BASED PLANTS	EXPECTED COMPLETION DATE
620,000 tpa Farmland/Miss Chem Ammonia Plant	ECD 1998
620,000 tpa Arcadian '04' Ammonia Plant	" 1998
550,000 tpa Methanol 4 (Clico) Plant	" 1998
500,000 tpa Cleveland Cliffs Iron Reduction Plant	" 1998
830,000 tpa Titan Methanol Plant	" 1999
400 mmscf Atlantic LNG Plant	" 1999
600 mmscf Phoenix Park Gas Processing Plant	" 1999
1.5 million tpa ISPAT DRI Expansion	" 1999

ECD - Expected Completion Date

Table 1: Active Projects in Trinidad

iii) **Refining/Gas-based Processing**

- a) Competitiveness
- b) Upgrading
- c) Liquefied Natural Gas vs Methanol/Ammonia/Metals/Other
- d) Further downstream development e.g., Petrochemicals

iv) **Marketing**

Regional:

- a) Caribbean and Central America
- b) South America

Extra-regional

v) **Electricity**

- Regulation, Pricing, Taxes and Tariffs, Generation Expansion, Efficiency and Maintenance, and Cross-border harmonisation

vi) **Contractual Arrangements**

- Capital, Technology and Manpower needs to be met through:
 - a) E&P Joint ventures, Licenses, Production Sharing or Association Contracts, or
 - b) BOT, BOOT, etc., Joint ventures, or full private capital ownership in the downstream, electricity and alternative energy sectors.

vii) **Ownership**

- Public/Private, International (Foreign)/Domestic.

Limitations (Exporters)

As discussed earlier, this perspective focuses on the southern Caribbean in respect of the exporters; the two countries grouped together being Venezuela with a size, population and petroleum resources more than 20 times that of its neighbour Trinidad and Tobago. Colombia with a shared border with Venezuela will require a perspective that is not necessarily relevant to the area being referred to in this paper as the southern Caribbean.

The size of the investments made over the last two years and being contemplated over the next three to five years must make this area, easily, the highest per capita investment zone in any part of the developing world. This is of course, in part due to the underpopulated eastern Venezuela area, Trinidad having only 1.5 million people. However, it is important to recognise that more than US\$5.5 billion has and is being expended over the period 1993-1998 in Trinidad alone. Table 1 shows the follow-up new investments in the construction of natural gas-based projects which are currently underway, underlining the reality that a favourable economic and investment climate now applies to the area.

Natural gas consumption in Trinidad, which has doubled between 1985 and 1995, will further increase by 100% of current consumption by 2001 to more than

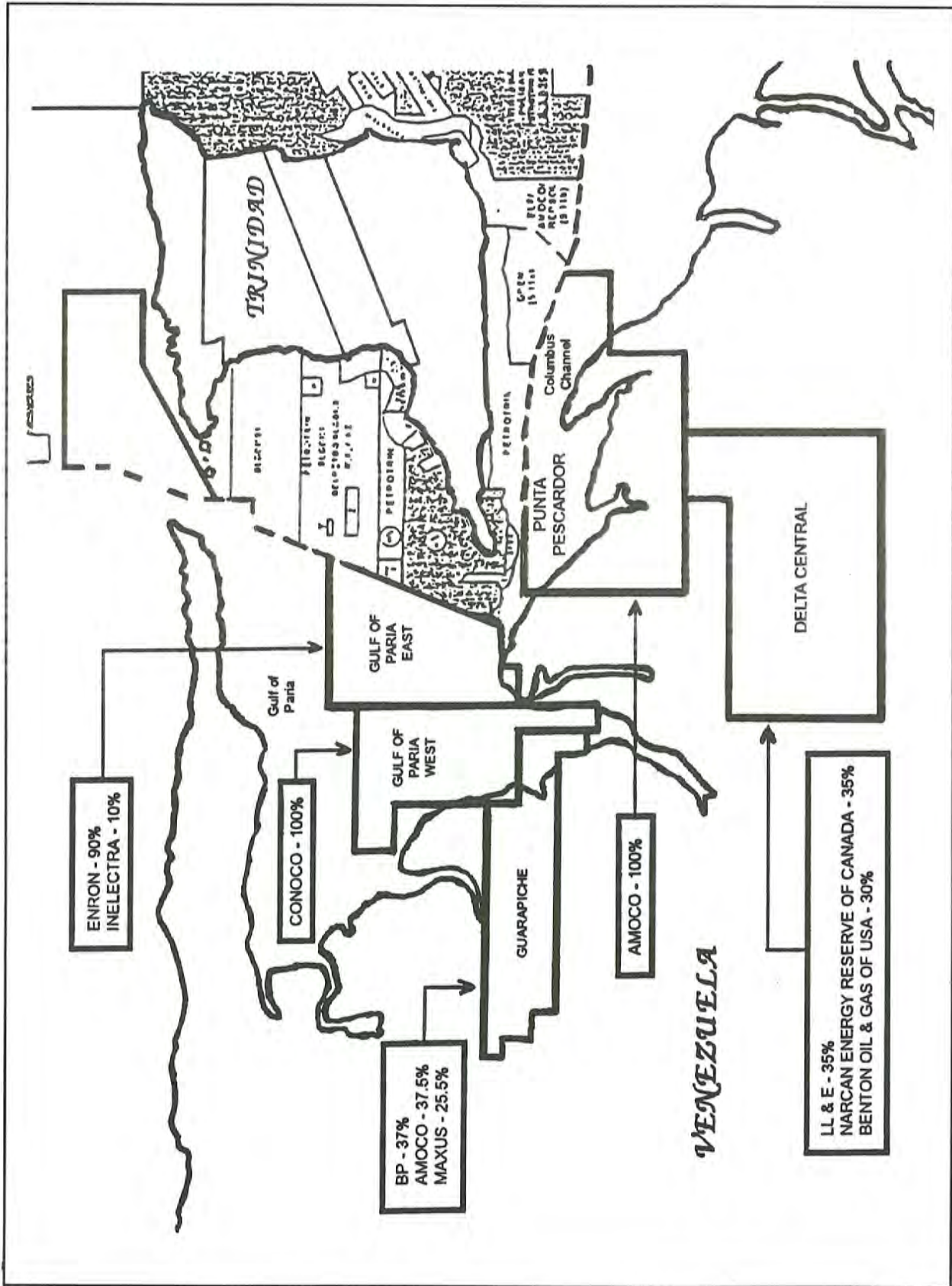


Figure 1: Map showing Trinidad and Tobago Offshore Leases and Venezuela Blocks

1500 million cubic feet per day. By 2005, based on the existing plants and the projects listed above, including a second LNG train, gas production will exceed 2 billion cubic feet per day. Proven natural gas reserves in Trinidad and Tobago have also doubled to 15.9 trillion cubic feet over the period 1994-1997.

Given the new acreage being explored in eastern Venezuela since the award of the Association Contracts in 1996, and the nine (9) new Production Sharing Contracts awarded since 1996 as well as the four (4) new deep water areas awarded in the marine areas off the east coast of Trinidad (see **Figure 1**), it is now obvious that more than US\$6 billion will be spent in this, the south-eastern Caribbean area, in the five-year period between 1994-1998. Moreover, it is apparent that a further likely equivalent amount will be expended in the succeeding quinquennium, 1999-2003. The development of the region will clearly not be hindered by capital shortages.

While the many benefits of the petroleum industry to a developing country economy cannot be ignored, the disadvantages which those countries face because their development is based largely on petroleum have always attracted attention, since modern economies do not prosper with all the implications of cyclic booms and busts, an evident reality for petroleum-dominated economies. Price booms are quite disastrous. Production booms are perhaps not nearly as bad but nevertheless are still in need of active management. The price booms in the 70's have certainly had staggering effects. For example, Trinidad and Tobago only came out of the effects of that boom of the 1970's in 1995/96, if debt repayment is included. That means it took almost 10 years after oil prices collapsed in 1986, to actually get out of some of the negative consequences of the large oil price increases which were initiated in 1973/74. The underlying real issue is, however, the skewed or unbalanced development, i.e., poor income distribution and a limited skills distribution pattern, which accompanies petroleum-based development, leading inevitably to the consequent social dislocation/disruption. That is clearly not an issue which can be ignored in the current expansion, nor should it be exported to our neighbours.

Sustainability of this development is therefore in large part, a function of macro-economic management.

Thus, the absorptive capacity of the area and the avoidance of boom conditions should be a recurring reality. The availability of skilled and semi-skilled human resources, the parallel development of appropriate systems involving the integration of the resource mobilisation efforts, training, the judicious importation of the necessary technical and managerial resource personnel are also critical issues, as is the considered management of the cross-cultural influences which will undoubtedly persist.

Integration of exploration and production efforts, including the further development of oil and gas production and the expansion of the effort to process and market the greater volumes of these commodities and their derivatives, as well as the expansion and further development of the services sector will require considerable coordination at many different levels for all of the organisations involved.

It is perhaps fortunate, maybe even prescient, that the principal role in this coordination will fall to the foreign private sector, a sector that is experienced in this role and one which will ensure that commercial considerations will stay in the forefront of its objectives. However, there are distinctly negative implications which arise from this control by external companies. Nevertheless, the role for the public sector, that is in the first instance the two central governments and their agencies as well as the State governments of the eastern Venezuelan region, is of considerable and equal importance. The role of *Petroleos de Venezuela (PDVSA)* and to a much lesser extent *Petrotrin*, acting to ensure that a high level of technical and commercial competence remains available to the regional decision-makers in this rapidly expanding development, will therefore be crucial.

For these two exporters, some of the principal matters which affect integration of the development will be:

- a) Cross border issues such as customs, immigration and trade in goods and services in general. The deregulation or re-regulation of the area will need to be seriously considered, while taking into account such activities as the trade in illicit drugs, etc.

- b) The Impact on the environment both immediate and longer term, given that Gulf of Paria is an almost completely enclosed body of water.
 - c) The prospects for extra-regional trade in the commodities being produced, in particular, natural gas for the region's consumption.
 - d) The expansion and further development of the domestic and regional oil service sector.
 - e) The critical need for rapid and expanded capital market development and the encouragement for domestic private capital to fully participate in these investments.
 - f) The development of Regional Strategies so as to ensure that the maximum benefits flow to the region and its people, through involvement of non-governmental organisations such as the universities, professional bodies and community agencies.
 - g) The recognition of the need to immediately develop structures and institutions to treat with some of the other issues such as economic and policy coordination, language, culture, etc.
- e) The development of appropriate strategies for:
 - 1) maximising energy efficiency, and
 - 2) sustaining an "acceptable" level of energy exports.
 - f) Improvement in regulatory practices and in the balance between consumers and producers and hence in the reliability and quality of electricity.
 - g) Local capital market development and exposure to more varied and sophisticated mixes between international (foreign), domestic, public and private capital.
 - h) Enhanced opportunities for the export trade in natural gas. The regional implications of the large increase in the commodities being produced, in particular, natural gas for the region's consumption, as the extra-regional export is effected.
 - i) The need for ensuring maximum domestic participation by both domestic private capital and the people as well as the institutions of the region, in these very significant and large developments of the energy sector.

Opportunities (Exporters)

- a) Minimise infrastructure and development costs.
- b) Expand oil and gas resource identification, development and utilisation.
- c) Coordinate and share risk, capital requirements, technology and training.
- d) Develop cross-border systems and activities, e.g., regulatory practices, common environmental standards, customs, trade in services as well as in manufactured goods, etc.

5.0 CONCLUSIONS

Energy integration in the Americas is therefore likely to proceed at different and variable speeds in the Caribbean over the next decade. Many opportunities exist for improving the quality and efficiency of energy use and the allocation of resources, both capital and human, within that period. National and regional development can thus be considerably enhanced. The role of the regional and multilateral institutions in assisting in the development of the appropriate support systems will be critical if these opportunities are to be captured.

For many of the importers, some of the opportunities may indeed be viewed by many as being

For many of the **importers**, some of the opportunities may indeed be viewed by many as being obstacles, given the level of overall development and the limited resources available to those countries.

For the two **exporters**, the size and in-out nature of many of the large capital expenditure projects with their dominance of financing from foreign sources for the purchase of foreign goods and services, has the real potential to bring a significant explosion in manpower costs, especially if basic manpower is imported to expedite development.

In summary, the **challenges** which arise in the energy integration of the Americas are principally going to be in:

- **Expanding the small domestic Private Sectors.**
- **Initiatives in maintaining dialogue and communication.**
- **Managing the Northern dominance**, which is one way to treat the region's reality. Most of the technology, most of the capital, much of the modern systems come from the north and the development of the regional skills at negotiating and intermediation will probably be the key to ensuring equitable sharing of the benefits, and, for Trinidad and Venezuela.
- **Controlling the economic imbalances.**

However, once those challenges are addressed, the **opportunities** abound for:

- **Human development,**
- **Improved energy security,**

- **Sustainable development both in the developing and the developed countries of the Americas,** taking into account the environment, and

- **The efficient use of both capital and energy.**

For the development of the region to be maximised, the real challenge may lie in the ability of the countries of the region to create a strong and effective Association of Caribbean States. This implies the development of coordinated and integrated policies aimed at providing more efficient and effective energy systems and an expanded and more developed domestic private sector within the Caribbean, while providing improved energy security for the Americas.

REFERENCES

1. Boopsingh, T.M., Byer, T.A., Richards, G., and Sharma, C. (1994). Caribbean Energy Sector Review and Perspectives, Andrew Mellon Foundation Project, pp. 184.
2. Julien, K.S., Boopsingh, T.M. (1995). The Management of Energy Resources: The Experiences of Trinidad and Tobago, 1974-1995, Proceedings of the XIth Conference of the Association of Professional Engineers of Trinidad and Tobago.
3. Skinner, R.G. (1995). (IEA) Global Energy Trends and Environmental Implications, 10th International Symposium on Petroleum Economics, Quebec, Canada.
4. World Energy Council, Energy for Tomorrow's World, 1993, St. Martin's Press Inc. N.Y. pp 320. ■